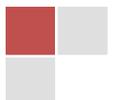


Beijing RichAuto S&T Co., Ltd

A1X Series

Turning & Carving Lathe Motion Control System

User's Manual



Thank you for choosing RichAuto products!

This manual helps you be familiar with the company's products, and get information about system components, configuration, etc.

The manual introduces the detailed knowledge of the system characteristics, operational processes, installation & commissioning, and safety precautions. Please read this manual carefully before using the system and machine, which will help you make use it better.

Precautions:

1. Use of this product is strictly prohibited in the strong interference, strong magnetic field environment. Operating ambient temperature 0-70 °C, working environment humidity 0-90% (non-condensing).
2. Insert U disk in the correct direction. Do not pull out 50 pins tenon type socket cable when system run.
3. Perform processing U disk file process, do not pull out the U disk to prevent the interruption of data transmission.
4. Strictly prohibited metal, dust, and other conductive substances enter the controller.
5. The machine shell should connect the ground wire to ensure the safety of working and to prevent interference.
6. Prohibited unauthorized disassembly, no internal user repairable parts.
7. For long periods of time not using, please cut off the power, and properly kept.
8. Pay attention to water, dust and fire when using it.
9. Do not use the corrosive chemical solvents to clean the device.
10. Spindle motor bearing life and its rotate speed is inversely proportional.
11. Graver is very sharp. Do not touch when it is running, in order to avoid injury; Do not use handkerchiefs, scarves contact it to prevent embroiled damage.

Important Notice:

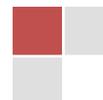
The Company shall not be responsible for any loss caused by improper using or breaking the correct operating procedures.

Beijing RichAuto S&T Co., Ltd owns this manual final interpretation, the company reserves the right to modify all information in this manual, including data, technical details, etc..



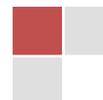
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Attachment 1



➤ Foreword

1. System introduction

RichAuto is CNC motion control system independently developed by Beijing RichAuto and it can be widely applied to machinery, advertisement, woodworking, mold engraving machine, laser, flame, plasma cutting machine, wood lathe, dispenser and so on in the machine control field.

RichAuto makes DSP as the core control system, High-speed processing operation is the microcontroller, PLC systems can't match; Use embedded structure, High degree of integration, Strong stability, easy to installation and operation; Support U disk and removable storage card reader. Adopt USB Interface for communication, High transmission speed, fully implement plug and play and all work offline.

Performance features

1. System deploy standard X, Y, Z axis motion control method, Support the rotation axis (C axis) control, Enables to switch the processing of surface and processing of rotation; up extended to X, Y, Z, C four-axis motion control, Implementation four axis interlocking Control.
2. Multi I / O Point Control, there is eight input and output signals in every basic I / O signal node, Expansion I / O nodes can be expanded to 32 input and output signals.
3. Support the standard G code, PLT format instructions; support domestic and international mainstream CAM software, such as: Type3, Art cam, UG, Pro / E, Master CAM, Cimatron, Wentai etc.
4. Support adjusting spindle operating frequency (or spindle speed) during processing. With 1 to 8 spindle state which can be set according to the request. User can change the spindle state by pushing buttons without suspend processing.
5. Support adjusting work speed during processing. User can press buttons to change speed ratio so as to adjust work speed and fast speed. The speed ratio is from 0.1 to 1, the value increase or decrease 0.1 each time.
6. Simply manual operate mode. In manual mode, the system provides three kinds of sports concluding continuous, step (crawl), distance, and manual operation became more simple and convenient.
7. Identifies M code, F code and other development commands, can open a special code based on user needs.

8. Built-in 512 M memory.
9. Unique handheld form factor with one hand to hold. Own liquid crystal display and 16 buttons board, operate intuitive and flexible, no longer dependent on the computer, the full realization of full offline operation
10. Comes with USB communications port, file transfer efficiency can be directly read U disk, card reader file, Plug and Play.

➤ 1. RichAuto System Construction

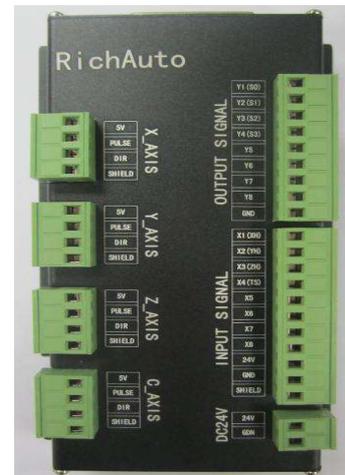
● 1.1 System Construction

RichAuto control system contains the following parts: (1) handheld motion control system, (1) interface board, (1) 50-pin data transmission cable, (1) USB communication cable.

RichAuto accessories schematic diagram



Handheld motion control system



interface board



50-pin data transmission cable



USB communication cable

● 1.2 Description of Each Component

1.2.1 Handle

As shown below, contains 6 sections:

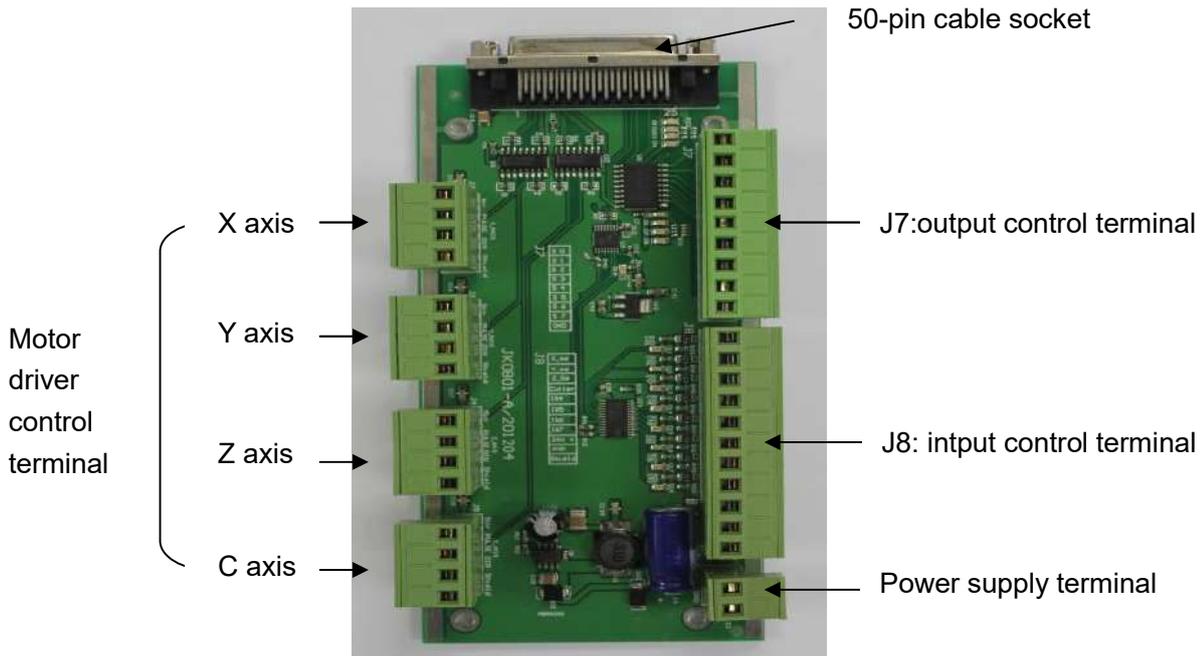


Handle

- 1) LCD screen: 128 * 64 resolution LCD screen, to display the machine motion, system settings and other information.
- 2) Keyboard: Contains 16 buttons to input system parameter information and operate the machine.
- 3) U Disk Interface: The port of U disk (FAT16/32) and the memory card.
- 4) RichAuto LOGO.
- 5) 50-pin Data Cable port: The port of 50-pin data cable, it connect the handle with the interface board to realize controlling the machine.
- 6) USB Communication Port: The port of USB communication cable. It is used to connect the handle with your computer.

1.2.2 Interface board

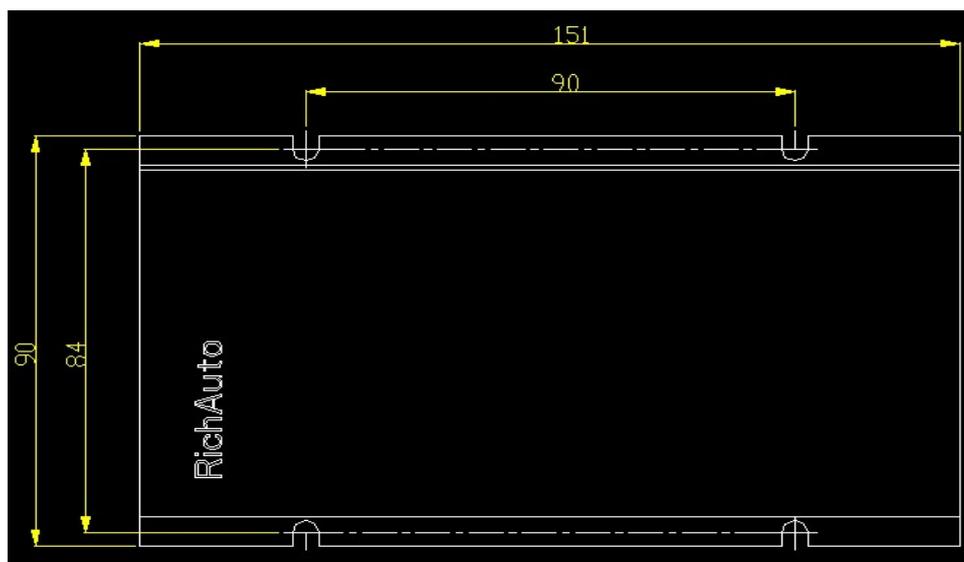
It relies on the connection between handle and interface board to control the machine. As shown below, the connection terminals have 5 groups:



Interface board

- 1) 50-pin cable socket: Connect handle with interface board.
- 2) Output control terminal: Including spindle On/Off signal, work & alarm led signal etc..
- 3) Input control terminal: including machine origin detection switch, tool setting, driver alarm, hard limit switch, and E-stop signal.
- 4) Power supply terminal: DC24V, 3A
- 5) Motor driver control terminal: Drivers control signal output terminals.

● **1.3 Interface Board Shell Installation Size**

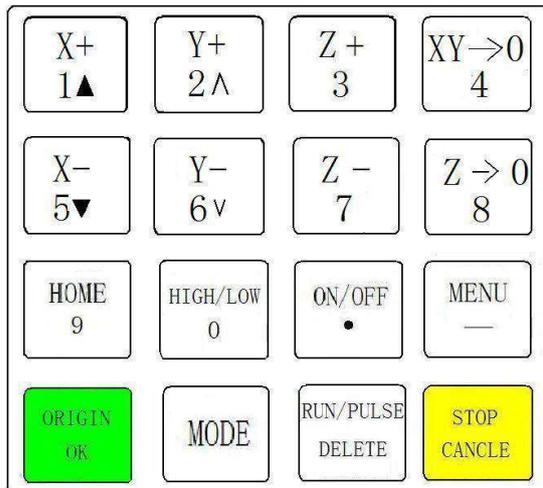


Scale 1:1 Unit mm

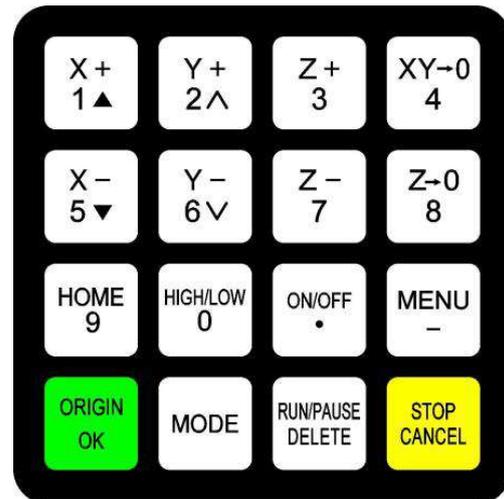
➤ 2. Handle buttons introduction

● 2.1 Buttons introduction

RichAuto motion control system defines 16 buttons according to functional requirements. Each button has one or more functions under different work status.



16-button layout



buttons real picture

● 2.2 Usage methods

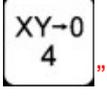
RichAuto motion control system operation is divided into one-button and buttons combination two ways operation.

One-button operate: Separate press one button on handheld motion controller is One-button operation.

Combination buttons operate: Press two buttons at the same time implement some operation is the combination buttons operation;

The method is: Firstly, push the first **main function button** and do not release; Secondly, push another **auxiliary function button**, loosen both of the two buttons to realize combination buttons operation.

List of combination buttons:

	Combination buttons	Function
1	 	Start advanced processing
2	 	Repeat last time processing
3	 	Set current location as stop position
4	 	System upgrade
5	 	Move machine by entering coordinates parameters
6	 	Set the current position as machine origin
7	 	Quit buttons testing interface

8	 + 	lathe grinding cycle processing file selection
9	 + 	Lathe grinding cycle machining

● 2.3 Detailed information for buttons function

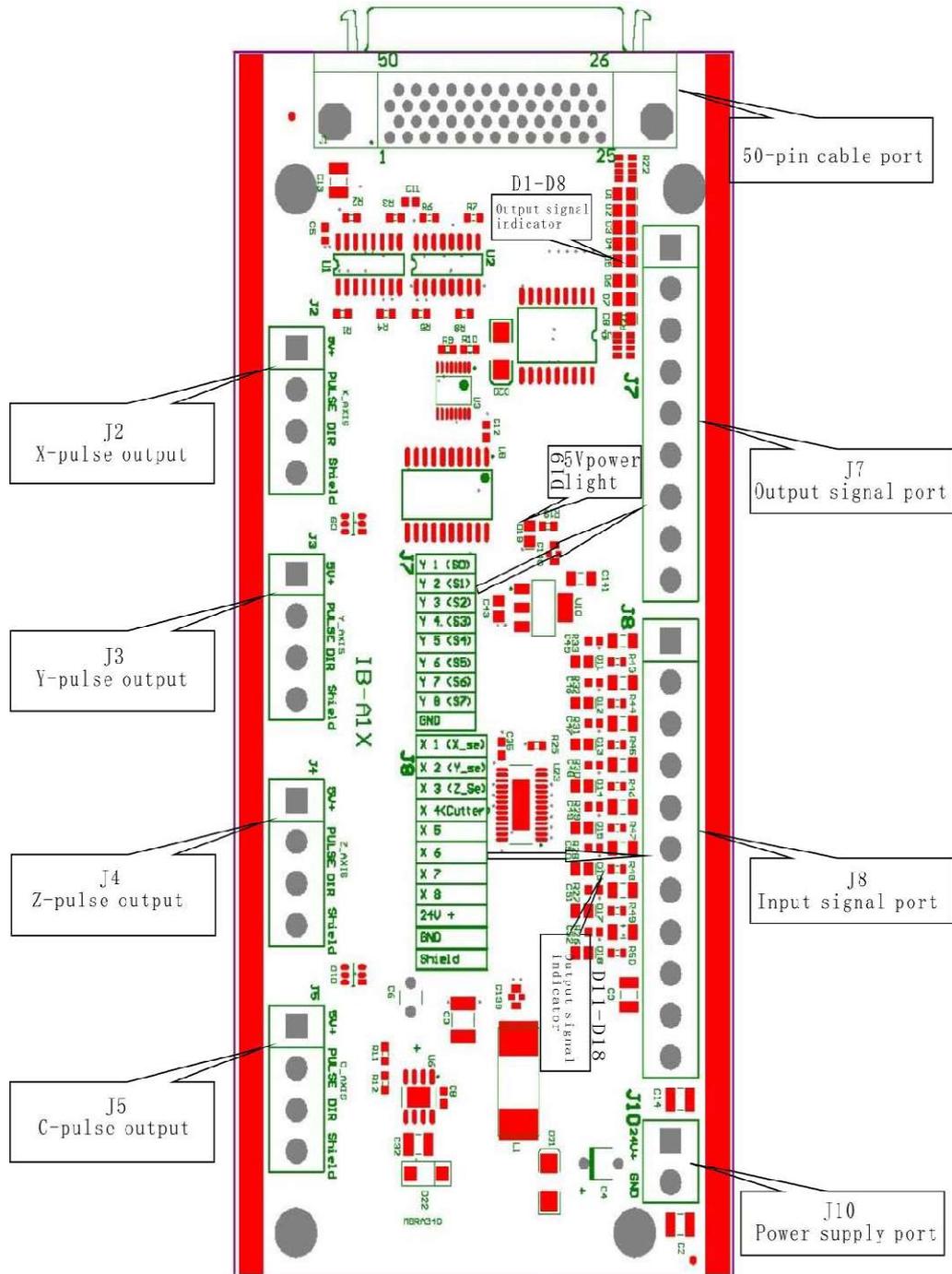
Name	function
	Positive movement of X axis, menu upward , figure 1 inputting
	Positive movement of Y axis, speed-up processing speed, figure 2 inputting
	Positive movement of Z axis, figure 3 inputting, increase spindle speed during processing
	Set X axis and Y axis work origin, figure 4 inputting
	Negative movement of X axis, menu downward, figure 5 inputting
	Negative movement of Y axis, slow down processing speed, figure 6 inputting different property selecting in Menu
	Negative movement of Z axis, figure 7 inputting, reduce spindle speed during processing
	Set Z axis work origin, figure 8 inputting
	Machine back home, figure 9 inputting, check information during processing
	High or low speed selection under manual mode, figure 0 inputting, change work coordinate & mechanical coordinate during processing

	<p>Spindle start/stop, decimal point inputting</p>
	<p>Enter menu setting, negative sign inputting, check information during processing</p>
	<p>Back to work origin, confirm motions /inputting/operating</p>
	<p>Manual mode, continue/step/distance to select</p>
	<p>Run or pause processing, delete inputting data, different property selecting in menu</p>
	<p>High/low speed parameter adjust under manual mode, quit process stop/selections, inputting and operating cancel</p>

➤ Wiring Instructions

● 3.1 RichAuto interface board description

Interface board schematic diagram:



● 3.2 Interface Board I / O Ports Description

Terminal	Name	Signal description	Pin functions and parameters	Note
J10:DC24V	24V+	Input power+	Interface board give DC 5V for system when the current is switched on	Power area: DC24V/3A
	24V-	Input power-		
J2: X-axis pulse output	5V	X-axis common anode signal	X-axis drive common anode power supply terminal 5V output	Don't impose other voltage on this pin
	PULSE	X-axis pulse signal	output voltage $\geq 3V$ drive current $\leq 8mA$	
	DIR	X-axis direction signal	output voltage $\geq 3V$ drive current $\leq 8mA$	
	SHIELD	Shield signal	X-axis drive signal output voltage line terminal shield	Don't impose other voltage on this pin
J3: Y-axis pulse output	5V	Y-axis common anode signal	Y-axis drive common anode power supply terminal 5V output	Don't impose other voltage on this pin
	PULSE	Y-axis pulse signal	output voltage $\geq 3V$ drive current $\leq 8mA$	
	DIR	Y-axis direction signal	output voltage $\geq 3V$ drive current $\leq 8mA$	
	SHIELD	Shield signal	Y-axis drive signal output voltage line terminal shield	Don't impose other voltage on this pin
J4: Z-axis pulse output	5V	Z-axis common anode signal	Z-axis drive common anode power supply terminal 5V output	Don't impose other voltage on this pin
	PULSE	Z-axis pulse signal	output voltage $\geq 3V$ drive current $\leq 8mA$	
	DIR	Z-axis direction signal	output voltage $\geq 3V$ drive current $\leq 8mA$	
	SHIELD	Shield signal	Z-axis drive signal output voltage line terminal shield	Don't impose other voltage on this pin
J4: Z-axis pulse output	5V	C-axis common anode signal	C-axis drive common anode power supply terminal 5V output	Don't impose other voltage on this pin
	PULSE	C-axis pulse signal	output voltage $\geq 3V$ drive current $\leq 8mA$	
	DIR	C-axis direction signal	output voltage $\geq 3V$ drive current $\leq 8mA$	
	SHIELD	Shield signal	C-axis drive signal output voltage line terminal shield	Don't impose other voltage on this pin

Terminal	Name	Signal description	Pin functions and parameters	Note
J7: Output Signal connecting terminal	Y01	Spindle forward signal	Low level signal	
	Y02	Signal to be defined	Low level signal	
	Y03	Signal to be defined	Low level signal	
	Y04	Spindle reverse signal	Low level signal	
	Y05	Signal to be defined	Low level signal	
	Y06	Run light signal	Low level signal	
	Y07	Turning and grinding convert signal	Low level signal	
	Y08	Signal to be defined	Low level signal	
	GND	Common end		
J8: Input signal connecting terminal	X01	X_se: X machine origin sensor input signal	Low level signal	Support mechanical, proximity, photoelectric and other types of switches
	X02	Y_se: Y machine origin sensor input signal	Low level signal	
	X03	Z_se: Z machine origin sensor input signal	Low level signal	
	X04	Signal to be defined	Low level signal	
	X05	Driver alarm signal	Low level signal	
	X06	Hard limit signal	Low level signal	
	X07	Emergency stop signal	Low level signal	
	X08	Foot switch signal	Low level signal	suspend during processing or repeat last processing when finished work
	24V	24V voltage output	provide 24V operating voltage for limit switch	Limit switch power supply must be taken at this port
	GND	Ground terminal	Supply GND signal for limit switch	Limit switch power supply circuit
SHIELD	Shield terminal		Don't use this port as the power source negative electrode for the sensor isolation circuit	

● 3.3 Hardware Wiring

Installation Requirements: Power(24V, 3A), it is better to add a filter to prevent the electric field interference. If origin detecting switch are different power supply type, the special testing switching power is needed. (24V origin detecting switch is the best choice)

RichAuto motion control system realizes its control through the connection between the interface board and CNC machine. Interface board terminal can be divided into input terminals and output terminals:

Input terminals include:

J8 (input connecting terminal)

J10 (main power connecting terminal)

Output terminals include:

J2 (X axis pulse signal output terminal)

J3 (Y axis pulse signal output terminal)

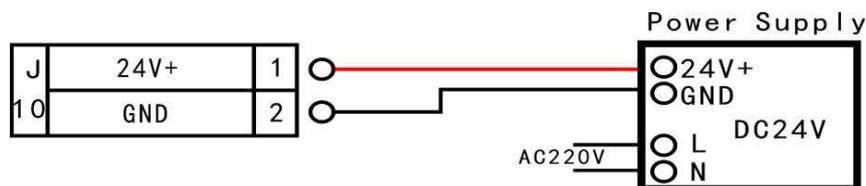
J4 (Z axis pulse signal output terminal)

J5 (C axis pulse signal output terminal)

J7 (output ports control terminal)

Input signal terminal

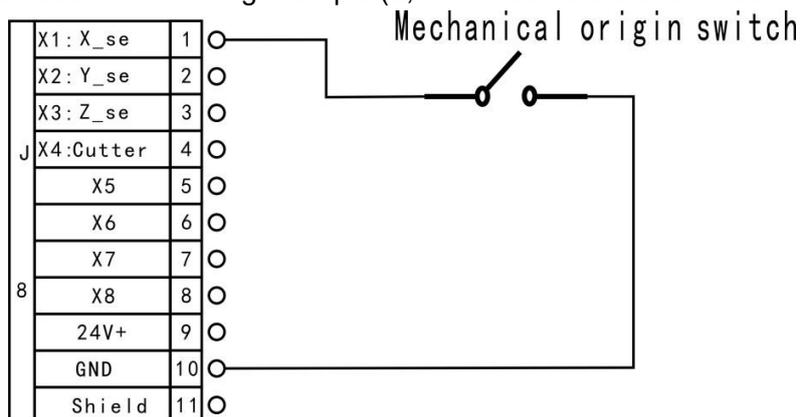
J10 main power terminal wiring method:



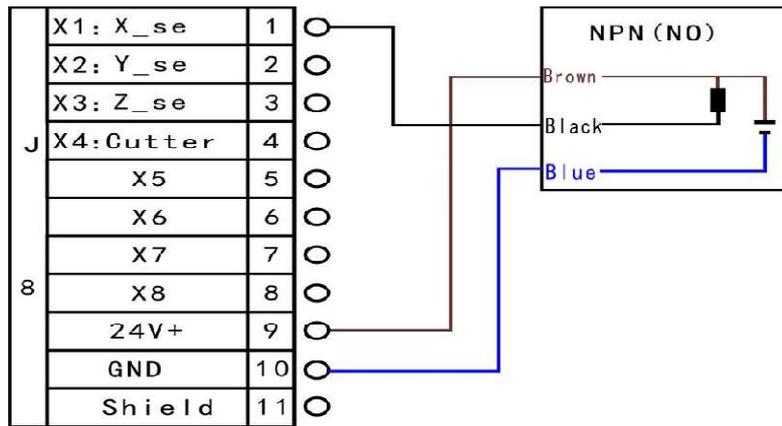
J8 wiring:

1. Reset terminal:

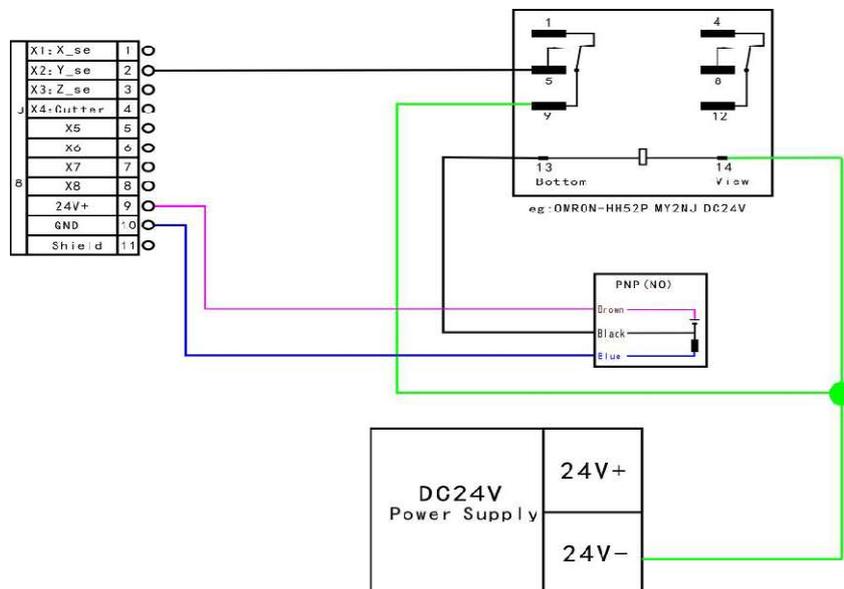
a) Mechanical reset switch wiring example (Z, Y direction are the same as X direction)



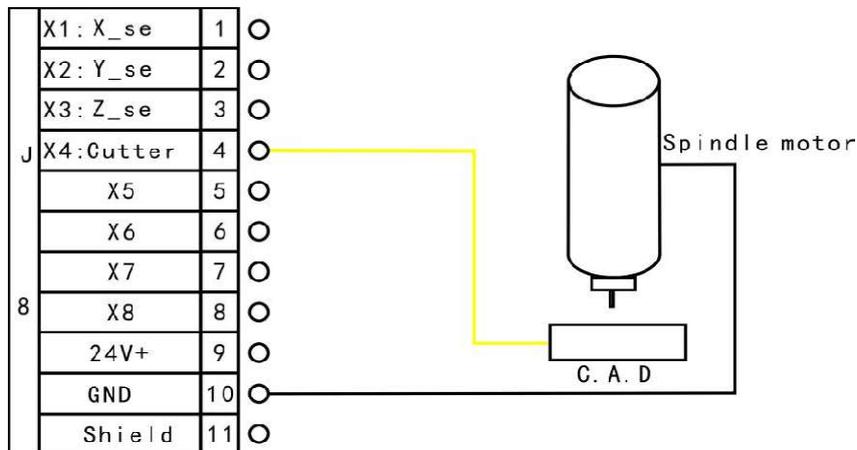
b) NPN (normally open type) proximity switch wiring example (wiring methods of Y and Z are the same as X axis).



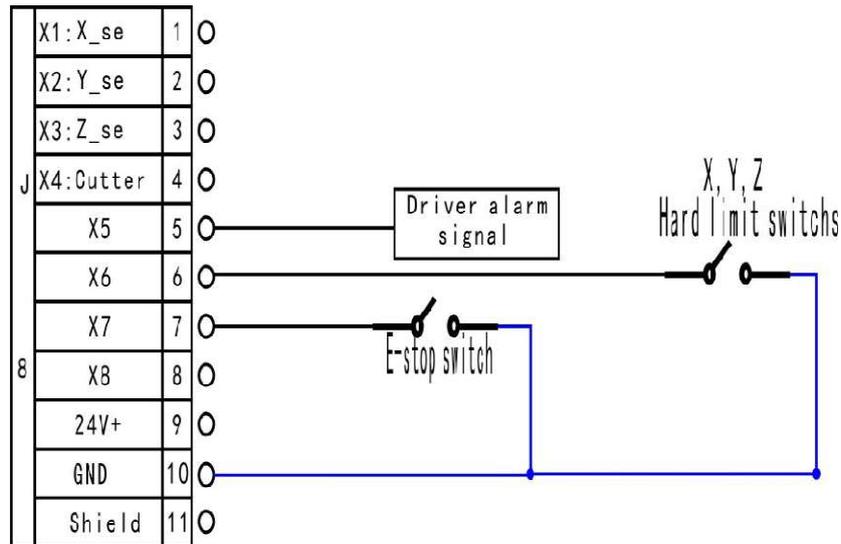
c) PNP (normally open type) proximity switch wiring example (wiring methods of X and Z are the same as Y axis').



2.Tool setting terminal: simple auto-tool setting gauge wiring example:



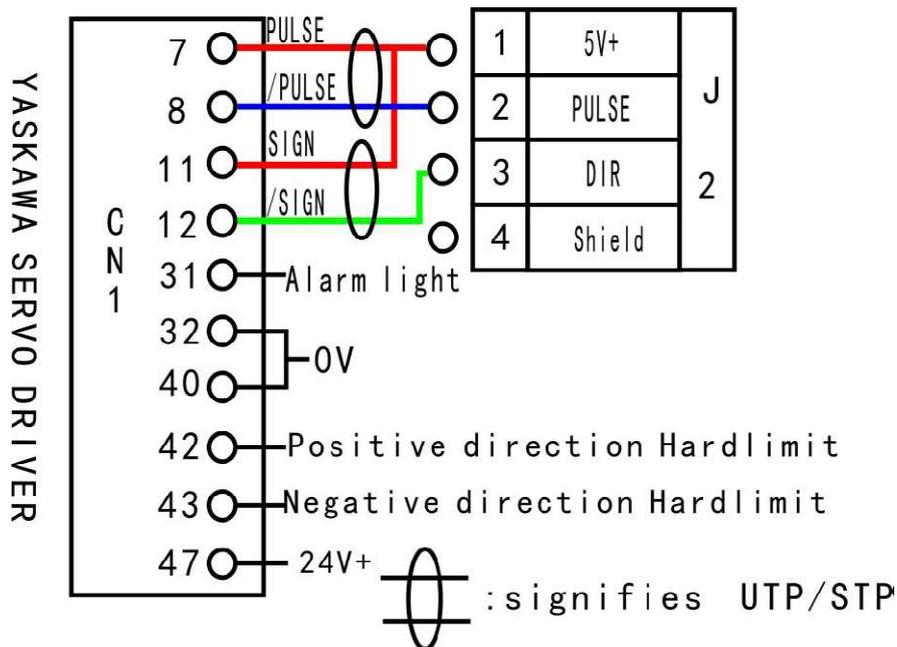
3. X5 to X7 signals: X5 Driver alarm, X6 hard limit, X7 E-stop port wiring example



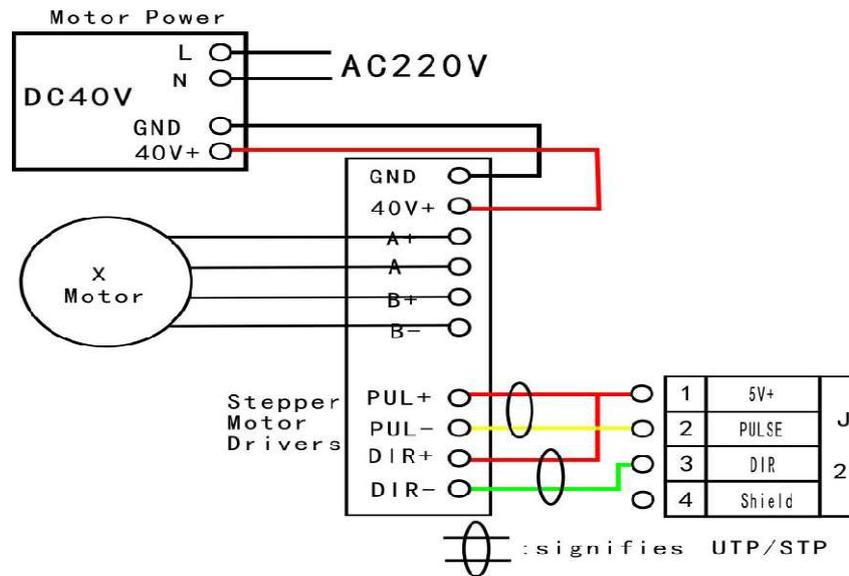
Output signal terminal

J2 X pulse signal wiring (wiring method of Y and Z are the same as X axis')

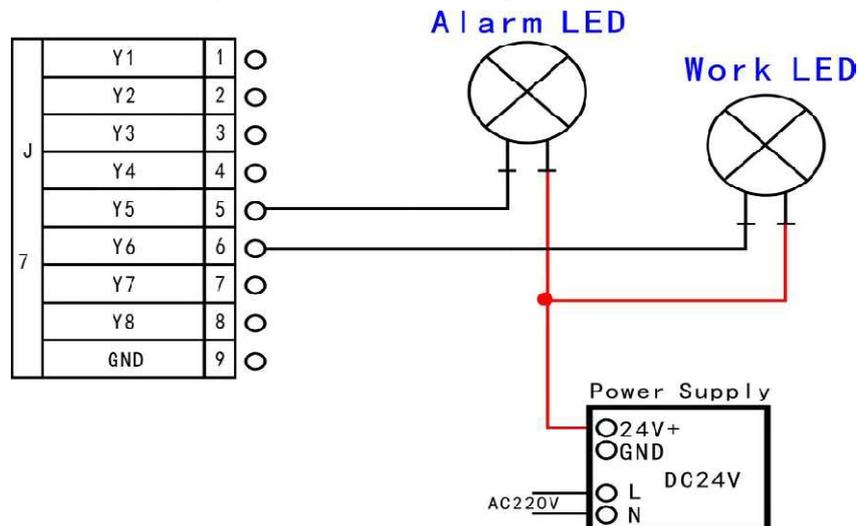
Servo driver:



Stepper driver:



J7 output port Y6: run light (work LED) wiring:



The dsp controller would be completely connected to cnc machine while you finished above all wiring procedures.

● 3.4 Commissioning of the Machine and Control System

1) After turn on the power, users can manually move each axis and confirm the X, Y and Z axis motors directions. If the movement direction and definition direction are opposite, users can change the motor phase sequence (A+ \rightleftharpoons A- or B+ \rightleftharpoons B-).

2) According to the original location of the machine coordinates, enter into the menu--machine setup--home setup-home direction and reset it.

3) Double-press “menu” and enter into manual voltage setup (the upper row of arrows stand for input voltage) , pls check whether the home switch and tool setting port are working normally(manually trigger, arrow flip).

4) Press”ON/OFF” button, to check if the controller can control the on/off of the spindle, if not, pls check the wiring or system configuration.

The machine is in good connection if all the above setting has been confirmed normal operation.

➤ 4. Menu Description

● 4.1 Menu category

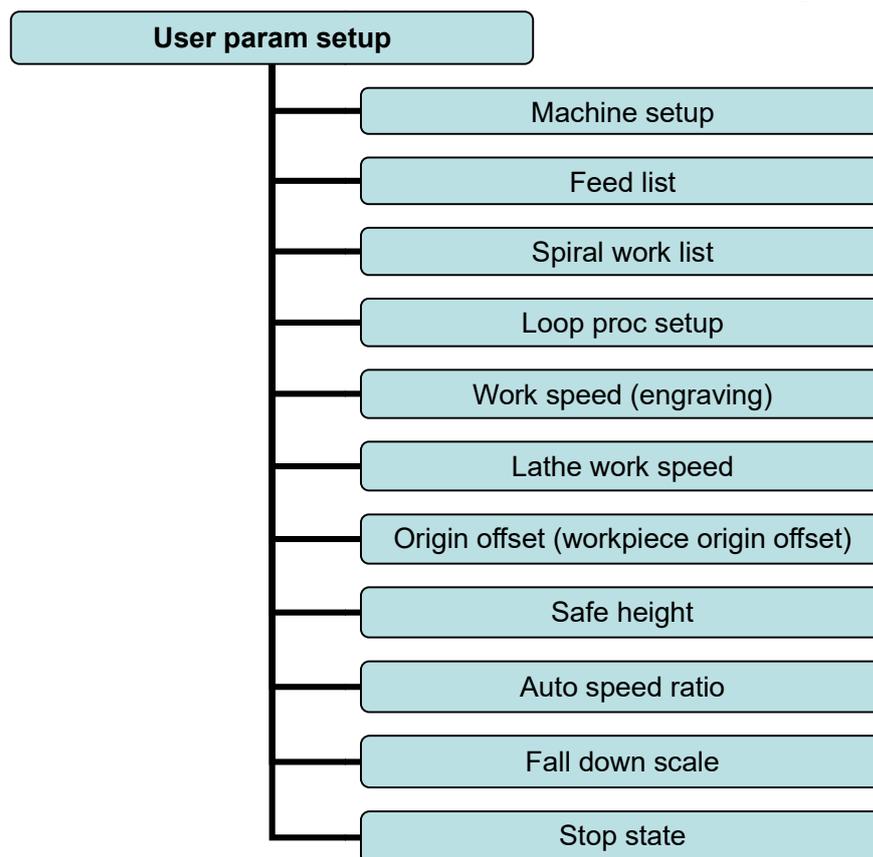
According to menu function, RichAuto system menu is divided into 5 main menus: **user param setup**, **file operation**, **system setup**, **factory setup**, **version view**, each main menu has multiple submenus.

● 4.2 Menu details

4.2.1 User parameter setup

“User parameter setup” menu is used to set the parameters about machine hardware. It is set by machine producer according to device type. If parameters such as machine hardware, electronic device settings have not changed, user also should not change the parameters under this menu. If user need to modify parameters, please consult the equipment manufacturer and modify with the help of the manufacturers technical engineer.

User parameter setup structure diagram

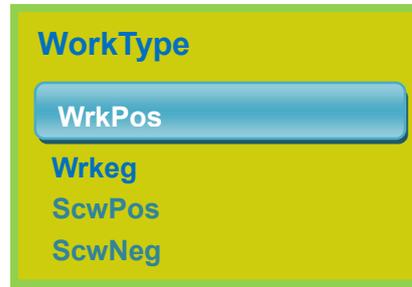


1. Machine setup

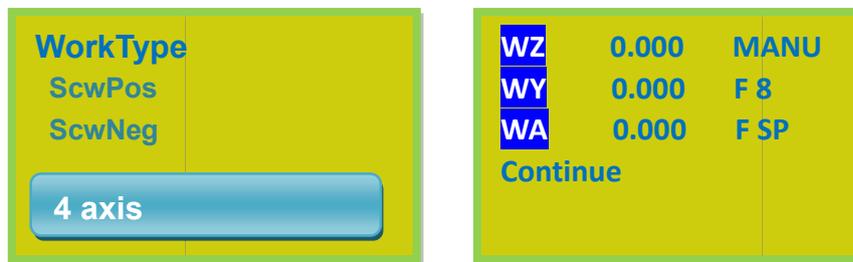
(1) Work type:

- a. Submenu “WrkPos/Neg”, “work positive” refers to machining processing direction is from the tailstock to four-jaw chuck. “Work negative” is the opposite of “work positive”

direction. To modify the direction by pressing “”, entering into the direction selection list (The following submenu “ScwPos” and “ScwNeg” are same argument).



- b. “4 axis”, means engraving mode. The screen main interface will change as below after choosing this submenu.



- (2) RoughS (rough machining value setting)

The “RoughS” is to control the cutting depth ratio of crude knife and fine knife. For instance, the value 0.7, refers to cutting depth ratio of crude knife(X knife) is 70%, so the fine knife (Z knife) is 30%.

Modify method: press “” to input a specific value, and then press “” to finish the setting.

- (3) Offset (cutter spacing)

Refers to the spacing distance of the two cutters along Y axis direction.

Modify method: press “” to input a specific value, and then press “” to finish the setting.

- (4) AtchStrt(attachment start position)

The start coordinate of the paste wood strip (calculate from the work piece origin), the value can be achieved from the processing file, its unit is **mm**.

Modify method: press “” to input a specific value, and then press “” to finish the setting.

- (5) AtchLgth(attached wood strip length)

Indicate paste wood strips length. According to the actual measured value, unit is mm.



Modify method: press “” to input a specific value, and then press “” to finish the setting.

(6) PartCnt (part count)

The feed count of paste wood strips area, it is to say, divided into several times to complete the lathe working. **Note: the “PartCnt” must be a odd number (1,3,5,7,9....).**

(7) AtchThck(attached wood strip thickness)

Refers to the thickness of the wood strips. According to the actual measured value, unit is mm.



Modify method: press “” to input a specific value, and then press “” to finish the setting.

(8) OppoErr (opposite error)

Factory setting, please do not change.

(9) Use fast(using fast speed)

Indicated choose whether to execute the fast speed or not when the tool is retracting along vertical angle.



Modify method: press “” to choose on/off, and then press “” to finish the setting.

(10) LathGrnd (lathe grinding)

Factory setting, please do not change.

(11) Retract

Refers to the distance of cutters retract to the sides when set the work piece origin after completed the tool setting. Unit is mm.

2. Feed list

(1) Feed cnt (feed count)

Indicated how many time to finish the work on the wood material. System defaults value is 1 time.



Modify method: press “” to input a specific value, and then press “” to finish the setting.

(2) FrstPcnt/LastPcnt

When set feed count is over 1 time, the user can decide the first time feed depth ratio and the last time feed ratio.

Eg1: Divide into 2 times to complete the lathe processing, if the “FrstPcnt” value is 0.6, then the “LastPcnt” value should be set as 0.4 .

Eg2.: If the lathe working feed count is divided into 4 times, the “FrstPcnt” value is 0.5, the “LastPcnt” value is 0.1, then two times in the middle will be divided equally by the dsp system (the two times feed depth ratio in the middle are both 0.2).
“FrstPcnt” and “LastPcnt” lose efficacy when the “Feed cnt” value is 1.

3. Spiral work list

(1) ScrewCnt(TwistCnt)

Twist number in need for processing.

(2) ScrewAgl

The rotating angle of a twist in processing, system default value is 0, that is straight line.

(3) ScrewPls(RotaPuls)

Pulse equivalent of a rotating shaft

(4) ScrewSpd(RotaSpd)

The speed of rotating shaft which moving from the completed twist to the next twist.

(5) ScrewCnt

How many processing times for completing one twist (The depth of each process will be evenly distributed).

(6) 1 WayScrw

One-way screw processing can avoid screw gap, it twisting from only one side to another every time.

4. Loop Proc Setup

Set recycle the processing files. First, select lathe grinding file (The first letter of the file name must be **D**), and then choose spiral file(Mark the file name with the first letter of the **S**).

5. Work speed

Work speed in “4 axis” mode.

6. Lathe work speed

Work speed in lathe turning & grinding mode.

7. Origin offset

Workpiece zero offset, each axis position offset in the setting of the working origin.

8. Auto speed ratio

In auto processing, actual processing speed=work speed*auto speed ratio, ”auto speed ratio” does not affect the “fast speed”.

9. Fall down scale

Fall down scale, system default is 1.000, fall speed=fast speed*fall down scale, max. fall down speed = Z-(neg) speed limit value*fall down scale.

10. Stop state

The spindle stop position after auto processing completed. It could be set a special coordinate location or a specified location.



Special coordinate location, it should be modified at above submenu. Press “”、

“” to move the cursor and select a coordinate, press “” and input the

coordinate value and press “” to finish the modification.

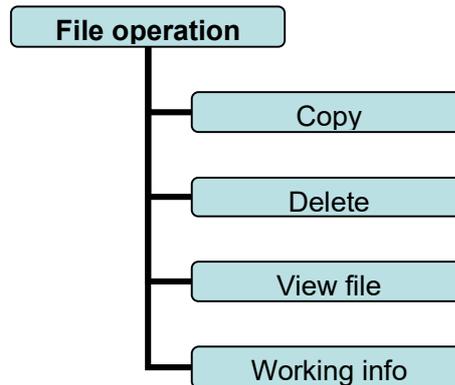
Press “” button to enter into the stop state list(as follow):



Press “”、 “”、 move the cursor and select required stop position, press “”

to finish the modification and return to upper menu as well.

4.2.2 File Operation



1. Copy File

Copy files from U disk to Inner.

2. Delete File

Delete inner files.

3. View File

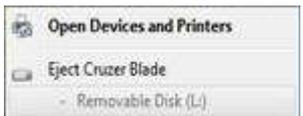
View G codes of each line of the file in U disk or inner.

4. Working Info (Processing Information)

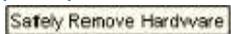
To count the times of all completed processing according to the file names. The data will be cleared if system is powered off.

PS: Please pull out the U disk correctly after copying files from computer, otherwise the controller may not recognize the U disk.

1. Win7(32 bit) system: after copying files, please press“” on the bottom right corner,

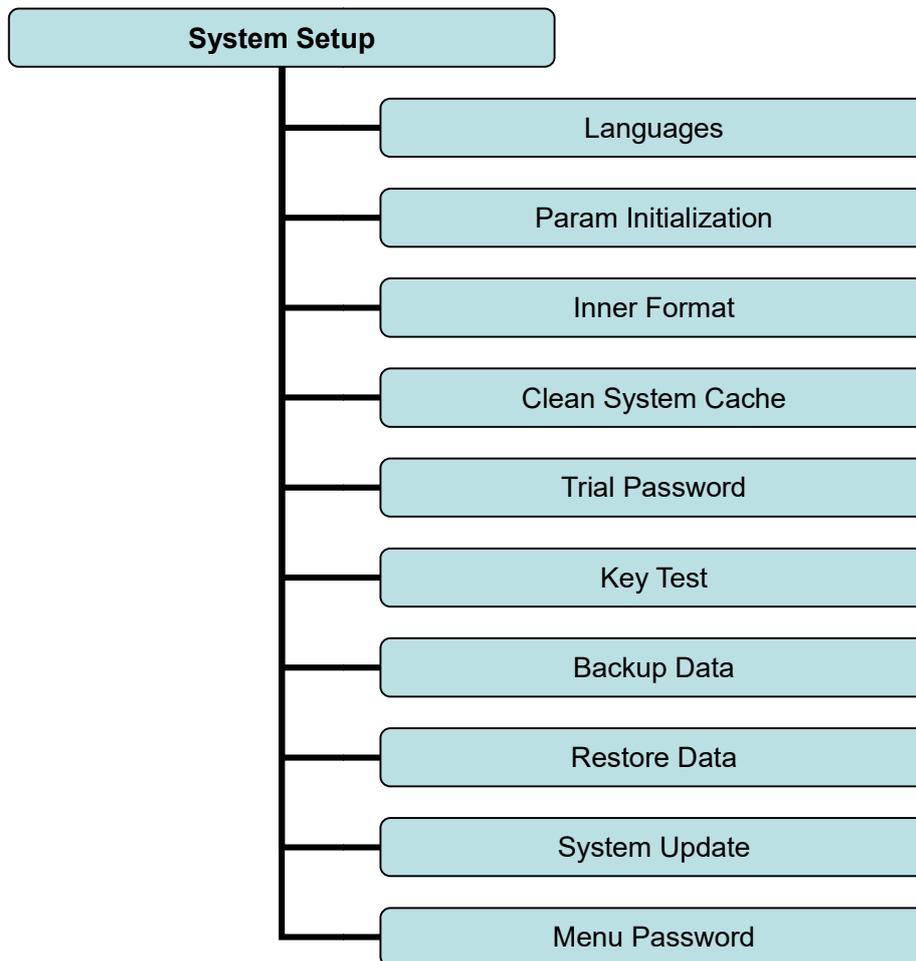
prompt  ,choose “remove disk”. The it shows

 , indicates the U disk pull out from computer successfully. Now user can insert the U disk to the controller to start the file operation.

2. Win XP system: after copying files, please press“” on the bottom right corner, prompt  ,click it and prompt  indicates the U disk pull out from computer successfully. Now user can insert the U disk to the controller to start the file operation.

4.2.3 System Setup

System Setup structure diagram



1. Languages

Change system display language, users can choose Chinese or English.

2. Param Initialization:

After data initial system parameters will restore to factory setting.

3. Inner format

To empty the internal file storage area data, it will not affect the system parameters.

4. Clean system cache

Users need to do this in certain operations. Such as break point recovery or functional upgrade (such as change four-axis program to three-axis program, users must do this operation). After this operation, users need to restart the system.

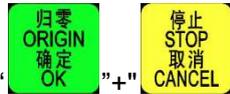
5. Trial password

If CNC machine manufacturers had set some kinds of passwords before shipment (including trial password, backup password, etc.), but forgot them, pls contact RichAuto and tell us the 20 original digits. RichAuto will provide new 20-digit, pls input them into the system to remove the old one.

6. Key test

Users can check buttons are valid or not under this menu.

Enter “Key test”, press every button, if it is valid, the screen will highlight. Exit“Key test”



press combination keys “”+“”.

7. Backup data

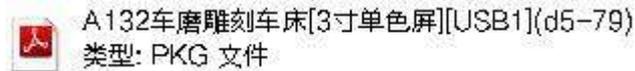
Backup system parameters to U disk or inner memory, it is not affected by “Inner format” operation. The backup file format is: **data.bak**.

8. Restore data

Restore backup data from U disk or inner storage space to dsp system.

9. System update

RichAuto will provide upgrade file (extension name is **.PKG and shown as Q13-xxx or D5-**) if the system is added new function. User can upgrade through the U disk, specific steps in Appendix 1. Original system parameters will not affect by the system updating.



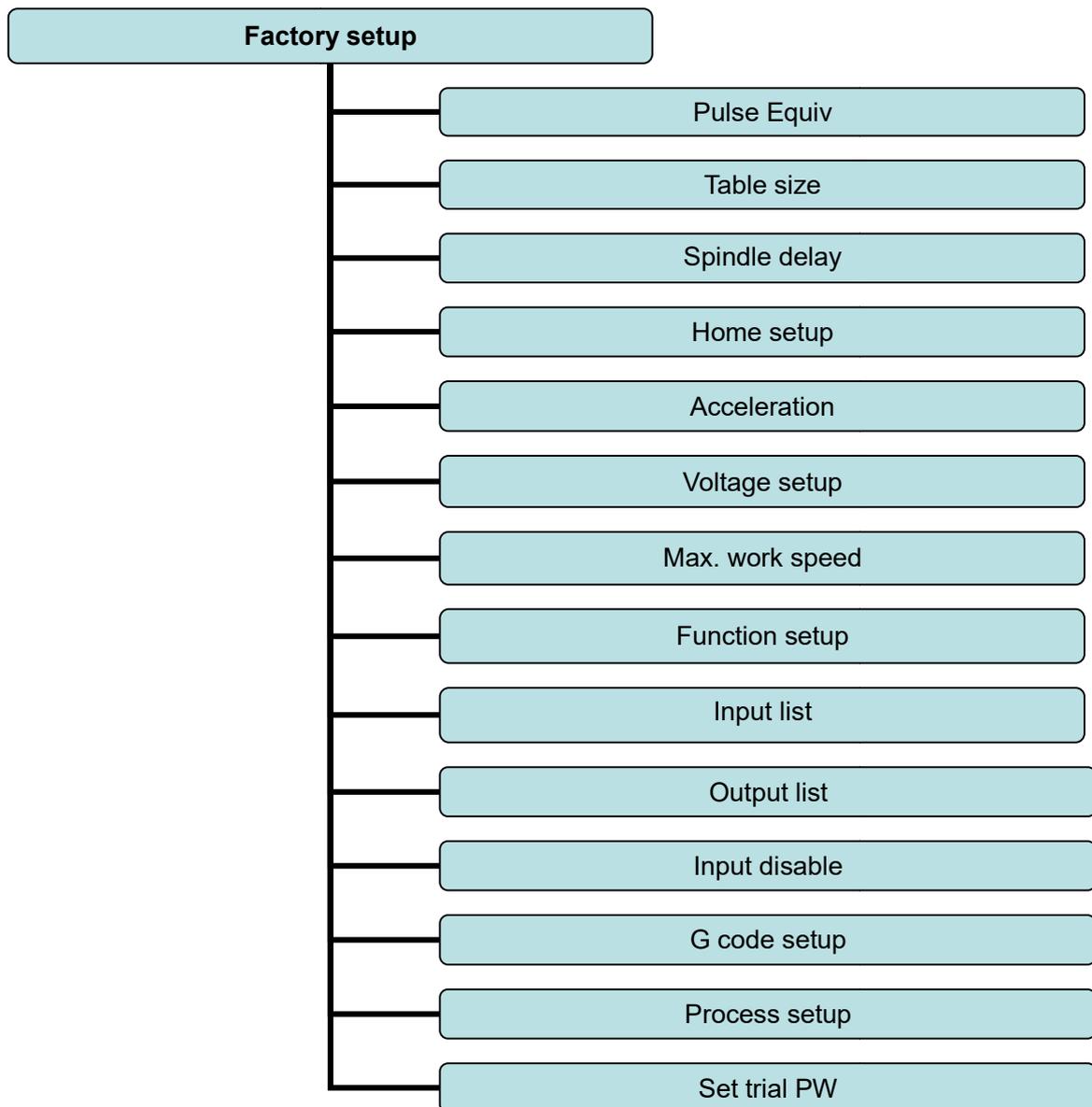
Upgrade file format is:

10. Menu password

Set a password with 1-6 numbers to avoid malicious tampering for the machine parameters and settings.

4.2.4 Factory Setup

Factory setup structure diagram



1. Pulse Equiv (Pulse Equivalent)

The number of pulses of the system needs to send when machine moves every 1mm.

Unit: pulse/mm.

(1) Stepper motor drive

Calculation formula= (pulse number of motor revolving one full turn)/ (distance of machine moved one full turn).

Pulse number that motor revolving one full turn calculation formula: $(360^\circ/\text{stepping angle})^*$
subdividing number of drive

Some of the stepper motor drivers directly mark the pulse number of the motor revolving one full turn.

Distance of machine moved when motor revolving one full turn calculation formula:

- Lead screw drive machine=lead screw pitch*transmission ratio
- Rack (straight tooth) drive machine=rack module*gear teeth*pi*transmission ratio
- Rack (helical tooth) drive machine=rack module*gear teeth*pi*transmission ratio/cos(helix angle)
- Belt pulley and belt drive machine=pi*belt pulley diameter*transmission ratio

So, stepping motor system calculation formula:

- ✓ Lead screw drive:



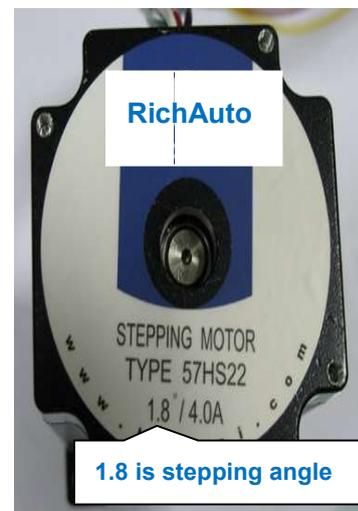
$$\text{pulse equivalent} = \frac{360^\circ}{\text{stepping angle}} * \text{subdividing number} / \text{lead screw pitch} * \text{transmission ratio}$$

Pulse/rev	SW5	SW6	SW7	SW8
400	ON	ON	ON	ON
800	OFF	ON	ON	ON
1600	ON	OFF	ON	ON
3200	OFF	OFF	ON	ON
6400	ON	ON	OFF	ON
12800	OFF	ON	OFF	ON
25600	ON	OFF	OFF	ON
51200	OFF	OFF	OFF	ON
1000	ON	ON	ON	OFF
2000	OFF	ON	ON	OFF
4000	ON	OFF	ON	OFF
5000	OFF	OFF	ON	OFF
8000	ON	ON	OFF	OFF
10000	OFF	ON	OFF	OFF
20000	ON	OFF	OFF	OFF
40000	OFF	OFF	OFF	OFF

Name plate 1 for stepping drive

MSTEP	SW5	SW6	SW7	SW8
2	ON	ON	ON	ON
4	ON	OFF	ON	ON
8	ON	ON	OFF	ON
16	ON	OFF	OFF	ON
32	ON	ON	ON	OFF
64	ON	OFF	ON	OFF
128	ON	ON	OFF	OFF
256	ON	OFF	OFF	OFF
5	OFF	ON	ON	ON
10	OFF	OFF	ON	ON
25	OFF	ON	OFF	ON
50	OFF	OFF	OFF	ON
125	OFF	ON	ON	OFF
250	OFF	OFF	ON	OFF
DISABLE	OFF	ON	OFF	OFF
DISABLE	OFF	OFF	OFF	OFF

Name plate 2 for stepping drive

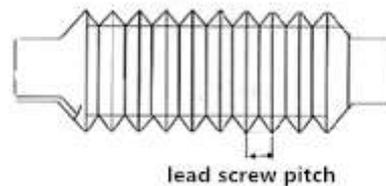


Name plate 3 for stepping motor

Instruction: The Pulse/rev in Nameplate 1 represents the pulse number of motor revolving one full turn. At this moment, we need only choose the corresponding value according to the actual dial without computing the numerator in the calculation formula. For example, if you choose 3200 in Nameplate 1, then we could get that $(360^\circ/\text{stepping angle}) * \text{subdividing number of drive} = 3200$. The MSTEP in Nameplate 2 represents the

subdividing number. For example, if you choose 16 as the subdividing number with a motor of stepping angle 1.8°, then according to the calculation formula, we could get that $(360^\circ/\text{stepping angle}) * \text{subdividing number of drive} = (360^\circ/1.8^\circ) * 16 = 3200$. Users should choose a right computing method based on the actual nameplate of stepping motor drive.

The formula notes: The stepping angle is a motor parameter which represents the distance motor moved per step. The subdividing number is a parameter set by the driver.



Lead screw pitch (see pic. above): Distance of screw nut moved when ball screw revolving one full turn.

Transmission ratio: The ratio of beginning drive wheel angular velocity or revolving speed and terminal driven wheel angular velocity or revolving speed in mechanical drive system.

✓ **Rack drive:**

Straight tooth:



$$\text{pulse equivalent} = \frac{\frac{360^\circ}{\text{stepping angle}} * \text{subdividing number}}{\text{rack module} * \text{gear teeth} * \pi * \text{transmission ratio}}$$

Helical tooth:

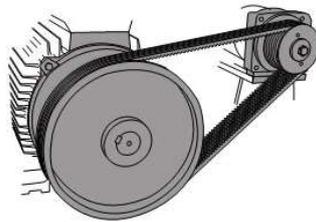


$$\text{pulse equivalent} = \frac{\frac{360^\circ}{\text{stepping angle}} * \text{subdividing number} * \cos(\text{helix angle})}{\text{rack module} * \text{gear teeth} * \pi * \text{transmission ratio}}$$

Instruction:

The rack module and gear teeth are wheel gear parameters, and that rack module*gear teeth*pi represents perimeter of pitch circle.

- ✓ Belt pulley and belt drive:



Notes: d represents belt pulley diameter.

$$\text{pulse equivalent} = \frac{\frac{360^\circ}{\text{stepping angle}} * \text{subdividing number}}{\pi d * \text{transmission ratio}}$$

The formula notes:

The stepping angle is a motor parameter which represents the distance motor moved per step.

The subdividing number is a parameter set by the driver.

The rack module and gear teeth are wheel gear parameters, and that rack module*gear teeth*pi represents perimeter of pitch circle.

Transmission ratio: The ratio of angular velocity or revolving speed of beginning driving wheel and terminal driven wheel in mechanical drive system.

Setting method: Enter machine setup>pulse equivalent, and the cursor is on x-axis

equivalent, you could press “” or “” to let it move to the item that needs to

be modified and then press “” to make the value able to be modified, so you could

modify the value by pressing numerical buttons and save it by pressing “”. After

you finished modification, the cursor will pass to the following row automatically, you could



modify all three axes pulse equivalent in turn by the way described above. Press “ORIGIN OK” to save all modifications you’ve made and return to the previous menu.

(2) Servo motor drive

The pulse equivalent factory defaults of X, Y, Z or A are all 400, it can be used as a constant value and set the electronic gear ratio in servo motor drive.

The numerator of electronic gear ratio represents encoder resolution and could be found in servo drive instructions.

The denominator of electronic gear ratio:

- ✓ Lead screw drive: pulse equivalent(400)*lead screw pitch*transmission ratio
- ✓ Spur rack drive: pulse equivalent(400)t*rack module*gear teeth*pi*transmission ratio

2. Table size

RichAuto system make the table size as the soft limit values, in order to prevent machine move over travel, machine size value must be less than or equal to the actual value of machine travel.

Setting method: Enter “Table Size”, press “X+ 1▲” or “X- 5▼” to move cursor to option to be modified. Press “运行/暂停 RUN/PAUSE 删除 DELETE”, input the new numbers, press “归零 ORIGIN 确定 OK” to save. Modify X, Y, Z axis in order and then press “归零 ORIGIN 确定 OK” to save all of the settings.

3. Spindle delay(time)

Spindle delay (Unit: ms): Including spindle on delay and spindle off delay.

4. Home setup

Home speed: Each axis movement speed when execute return home. System default X,Y axis home speed is 3000mm/min, and Z axis home speed is 1800mm/min.

Home sequence: Each axis movement order when execute return home.

Including:

◇ Z, X and Y	Z,X,Y	Z,Y,X	
◇ Z only	X and Y,Z	X,Y,Z	
◇ Y,X,Z	XY home	X,Y home	
◇ Y,X home	None home	X home only	XZ and Y

Home direction: Each axis motion direction when return home. This setting depends on the installation position of home sensor. If the home sensor is installed at the positive side of machine tool, then it should be set “pos”; if it is at the negative side of machine tool, should be set as “Neg”.

Setting method: Enter “home direction”, press “”、“” to move cursor to where

users want to modify. Press “” to change home direction, after that press “” to save the change.

5. Acceleration(Unit: mm/s²)

The maximum acceleration value during acceleration and deceleration movement, improve (including straight and curve motion) processing capability. If acceleration value is too large, it may cause the motor losing steps, jitter and even whistle, if the value too small, it will lead to accelerated slowly and reduce the operating speed of the entire graph. System defaults: linear acceleration is 800 mm/s², curve acceleration is 1000 mm/s², the recommended curve acceleration is 1.5 - 2 times of the linear acceleration.

6. Voltage setup

Set input and output signal terminal status(normal open or normal closed), system defined “↓”means normal open, “↑”means normal closed.

Including two rows of arrow:

The upper arrow indicates the input level: Set input voltage signal terminal status.

The first four:0、1、2、3positions correspond X axis home、Y axis home、Z axis home and tool setting signal; 5-7: 4、5、6 positions correspond driver alarm , hard limit and E-stop signal.

The bottom arrow indicates the output level: Set output voltage signal terminal status.

The top four: 0、1、2、3 positions correspond in turn by **spindle forward, port to be defined1, port to be defined 2 and spindle inversion output signal** port ; No.6 position is **work type changing signal**.

Setting: Press “”、“” to move left and right, press “”、“” realize to

move up and down, press “” to change the direction of each arrow.

7. Max. work speed(Unit:mm/min)

The maximum movement speed of the three axis of the machine tool during processing. It only takes effect during processing, and not limits the speeds under manual mode. System default max work speed of X,Y(both pos and neg direction) is“60000000 mm/minute”, “Z+” is “1800 mm/minute”, “Z-”is “3000 mm/minute”.

8. Function setup

Set whether the system reserves a function or not, change it according to the actual application. Restart the system after the operations. (pic. as shown below)

Note: the **blue** fonts section is the default configuration of the system.

Set function			
		StrtHome	Query/Auto/Zonly/None
SpdLimit	None/Limit	FileSort	ByCopy/ByName/NoSort
PausePkup	NoPick/Pickup	CopyWork	off/on
SpdlAtP	Ramian/Stop	RetOrgPZ	Pick Z/Z stop
ScaleFast	None/Affect	TolstAct	Pickup/Origin
Manual	Trad/Step	PausRstr	All/only Z
Pretrt	None/Parse	NI Mode	Full/Small
QuryPara	None/Query	SpdOutpt	Polar/ SglAng/Mulang

Setting method: Press “”、“”move cursor to where users want to modify,

press  and then select the required function, and press “”to save.

9. **Input list:** View 8 inputs signals' configuration. No.1 to 3 are X,Y,Z axis returning home signals, no.4 to 8 have not defined any signal.
10. **Output list:** View 8 outputs signals' configuration. No.1 is spindle forward on/off signal, No. 4 is spindle inversion on/off signal, no.6 is run lamp signal.
11. **Input disable:** Enable or disable input signals. User can select disable from X5 to X8 port signals if there have no signal wires.
12. **G code setup:** Set special commands reading settings in G code file, change according to real demand.(See Attachment 1)

Attribute of G code	
F Read	Ign F/Read F
AbsCntr	Off/On
T Read	Read T/Ign T
Spindle	NTLLG/FORCE/INSTR
Filter JD	None/Filter
S Read	Ign S/Read S
Read G54	Ign G54/ Read G54
Read G49	Ign G49/ Read G49
Read G40	Ign G40/ Read G40
Gcode Head	Skip /NoSkip
G83 Space	0.00000

Note: The **blue** characters section is the system default attribute.

Setting method: : Press “”、“”move cursor to where needed to be modified,

press “”,and then select the setting according to real needs, press “”to finish the modification, return to previous menu.

13. Proc setup: Set some special configurations in the process according to real needs.

Work attribute	
Adj Z	Adj Z/Rev Z
Adjust WP	None/Adjt
Ignore Z	Read Z/Ign Z
CirLmt	55.556
StepWork	Contns/Single
ATC SpId	Auto/None
FilterParm	Ignore/Read

Note: The **blue** characters section is the system default attribute. (See attachment 2)

Setting method: : Press “”、“”move cursor to where needed to be modified,

press “”,and then select the attribute according to real needs, press “”to finish the modification, then return to previous menu.

14. Set trial PW

Including Four levels password. Password and using time can be set in every level respectively. Password can be set to be 1-8 digits; Time unit: hour; System defaults 1 hour.

The passwords work according to top-down order, that is to say level 2 works when level 1 expired the trial time, so level 3 after level 2 and level 4 is valid after level 3 exceeded trial period. If you haven't set trial 1 password, only set trial level 2-4, the system will work according to 2-4 order, forman and gordon.

The operation of **Data Initial、Inner Format、Wipe Cache and System Update will not remove the 4 level password.**

Setting: Press “”、“”move cursor to select options and enter by

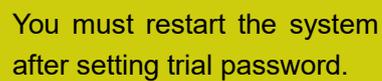
pressing “”button, when finished inputting values press “” to confirm, the cursor moves to next option. When completed all of the settings the screen displays:



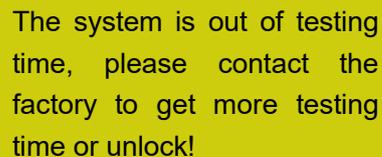
There is a mark "*" before every level password, if not indicates that the password will not work normally.



When you have set all passwords, press "STOP CANCEL", the screen will display:



When password expires, the screen will display:



When user gets the password from engraving machine manufacturer, press "归零 ORIGIN 确定 OK" the screen will display:



Enter the new password directly, press "归零 ORIGIN 确定 OK" to save and screen shows:



Restart the dsp controller, after that the system will work normally.

Emphasis: If the engraving machine manufacturer forgets all passwords, user could contact RichAuto and tell us 20-digit original password under the menu "SYSTEM SETUP-Trial Password". We will provide the new 20-digit password. Enter the new

ORIGIN
OK

numbers, and press “ORIGIN OK” to confirm.

After cracking password, restart the dsp controller, and then it can work normally.

4.2.5 Version View

Users can view information both hardware and software about the system, including:

- ✧ Update Version e.g.: d5-68
- ✧ Product ID e.g.: A0020099
- ✧ Soft Version e.g.: A1.2866
- ✧ Emergency Version eg: A1.2268
- ✧ Soft type: Lathe Carving
- ✧ Hardware type: Support 3-inch screen, Lathe, 2 spindle lathe, flash disk mode

➤ Machine Operation

● 5.1 Return home

It will display “all axis home”, “Z home only”, “none axis home” when the dsp handle is starting up. Select one as needed. Machine return home can correct the coordinate of the system.

In some cases, such as reboot and continue the last time operation after normal power off, the system no need to return machine home, just choose “none axis home”. That is because system had already saved the coordinates values when system normally powered off.

● 5.2 Import processing files

Before processing, generally we should import files. RichAuto system has 2 ways for processing: U disk file processing and inner file processing.

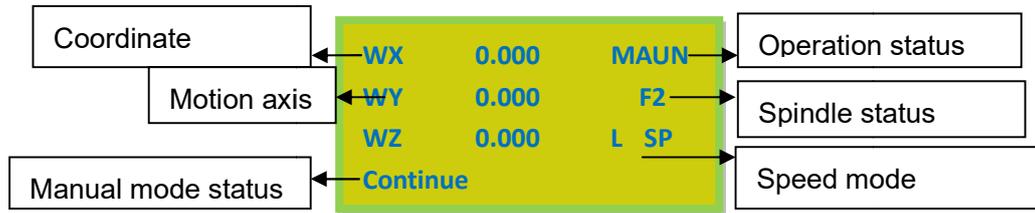
1. Directly import the processing file into U disk, and then run the controller.
2. Copy the process file to inner memory space via U disk or U Flash Disk Mode.

● 5.3 Manual processing Operation

Manual Processing Operation refers to controlling of the machine tool through the keyboard 3-axis direction buttons. User can change the manual speed and set the grid under manual processing operation. System will enter manual operation state after

returning home, and the screen displays as follow:

Manual control state initial interface:



5.3.1 Manual operation speed switching and adjusting

1) Speed mode switching

There are two speed modes: high speed(F) and low speed(L). Change the speed mode by

pressing “”. The speed mode you choose will decide the manual processing speed.

2) Speed adjusting:

Under the manual operation mode, pressing “” to adjust current speed settings. If the current speed mode is “L”, the dsp controller displays as follow:

Manual Param	
XSLOW	1200.000
YSLOW	1200.000
ZSLOW	1200.000
Slow Grid	0.100

Press “” or “” to move the cursor, then select the option and press

“” button to modify the value, press “” to save, press “” to quit. If

input a wrong number, press “” to delete the last numbers and re-input new value.

In order to ensure the accuracy of processing and debugging, the system introduces a concept of grid which also called minimum feed. It range is 0.05mm-1.0mm. When user change mode into “step”, pressing 3-axis direction buttons, the machine will be moving at the grid distance which user has set.

About the high speed manual mode setting method is exactly the same as introduced above.

5.3.2 Manual processing mode

In order to meet different situation of manual movement, the system provide 3 kind of motion modes: Continue, step, distance. Users can change mode by pressing  button at any time, and view real-time motion mode at the bottom left side of the screen main interface.

1) Continue

This mode has no value control. In continue mode, machine will be moving when user

presses the direction keys(, , , , , )until stop pressing them. Its motion speed is decided by current manual speed mode.

2) Step

Under this mode, machine always moves at a low speed. It moves a grid distance per 0.5 second. The grid distance is decided by current speed mode. System default high speed mode moves 0.5mm/step, and low speed mode moves 0.1mm/step. “Step” motion mode is suitable for tool adjusting or accurately adjusting the position of the mechanical coordinates.

3) Distance

In distance mode, machine runs according to the setting of distance. It will be moving at a

distance when user is pressing directions keys , , , , , .

Note: Grid can't affect the distance motion mode. Machine only moves by distance setting

exactly. Press  three times to enter into “distance mode” and input a value

according to the real needs, press  to save it.

5.3.3 Manual testing input and output

In the initial boot interface, the screen displays as follow:

1X	0.000	MAUN
1Y	0.000	F2
1Z	0.000	L SP
Continue		

Press “” three times, the screen will display two rows of arrows which are all downwards “↓”.

Upper arrows represent input signals: the former 4 numbers **0, 1, 2,3** corresponding to X zero, Y zero, Z zero and tool setting gauge. Number **4, 5, 6, 7** corresponding to driver alarm, hard limit and emergency stop input signal and foot switch.

Manual trigger the corresponding signal switch by pressing “”, the corresponding **arrow flip up indicates that the signal is normal**. If not, pls check the switch, wiring, 50 core cable and so on.

Bottom row represents output signals: the former 4 numbers 0,1,2,3 corresponding to **spindle forward on/off、 signal to be defined 1, signal to be defined 2, spindle inversion output signal**. No.4, 5 corresponding to alarm lamp、 running lamp output signal.

Press “” button can change the arrow direction, so it can control the output of

corresponding port. For example, press “” to flip the arrow upwards under the

position of 0, it is equivalent to start the spindle. Press “” again, the arrow flip downwards, the spindle stop

● 5.4 Automatic processing operation

Auto processing refers to the system runs the file in U disk or inner storage space according to the instructions, it also called file processing. Before auto processing, user must set the machine tool parameters and all of the system parameters correctly.

Auto processing steps:

5.4.1 Set workpiece origin

The start position of X, Y and Z in the processing program is the workpiece origin. Before operation, we should pay attention to this position as well as the real position. Operation is as follow:

Manual move X,Y and Z to the position which will start to process the file on workpiece.

Afterwards, press zero clearing “” to decide the origin of X,Y axis. Press zero clearing “” to decide the origin of Z axis.

5.4.2 Set stop position

Press “”/“”to move the two cutters to reasonable and safety position, then press “” to move Y axis to a proper position too, and then press the combination keys “”+“” to set the current location as stop position, press “” to save the setting.

5.4.3 Adjust the origin of the workpiece

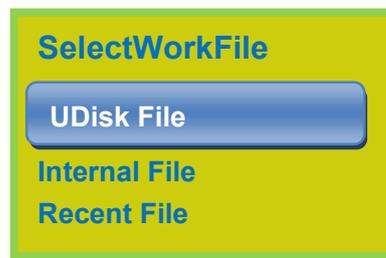
If the user needs to reset workpiece origin, for example: needs to move Y direction or adjust the cutters depth of X and Z axis. In this case, the user can operate as follow. Press

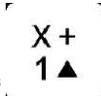
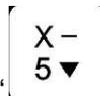
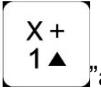
 , the lathe machine will complete the moving of returning to workpiece origin, Y axis will move to the settled original position, and cutters of X and Y axis will stop 10mm over the settled workpiece original point at the same time. Next, double press the  button to change the manual mode into DISTANCE, input the value 10, and then press  button to save the distance as 10mm. At that time, single press “”and“”, to make the X and Y cutters moving back to the settled position of

workpiece origin. Then double press  button to change it into STEP mode(at “Low speed mode”) , fine adjust X and Z axes to new workpiece origin position then press  and  to save the adjustment. That’s all the steps of adjusting workpiece origin.

5.4.4 Choose processing files

Since the workpiece origin has been set. Now user can press  and see the prompt dialog shown on the screen:



Press  and  to move the cursor and select through the displaying list, press  to enter into the file list, the screen will display three file name in every screen, choose the file by pressing  and  to move one by one. Press  and  to skip two rows and turn to the next page. Press  button to exit.

5.4.5 Set processing parameters

After choosing the processing file please press , enter into “Set work parameters” menu, it includes work speed、 travel speed (or Fast speed)、 last speed、 RoughLen, Left length, speed scale, fall down speed(refer to picture below).

Set Work Param	
WorkSpd	1200.000
FastSpd	1200.000
LastSpd	3000.00
RoughLen	0.00000

Press “” and “” to move cursor and select the item which needs to modify,

press “” to set the value (next value setting is the same), then press “” to save. The system checks the processing code and start to process when the checking is finished.

The system code checking is auto mode, user can press “” to skip the checking and start running file immediately.

System can remember the checked files and will not recheck the same code again next time.

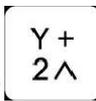
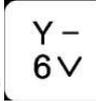
During the processing, the screen scrolling display real-time processing speed, operation

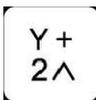
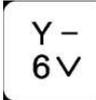
time、 current g code line number. If user only need one of them could press 

button, and it will stop rolling, press  again to switch to the next option.

● 5.5 During processing operations

5.5.1 Speed ratio Adjustment

In process of processing, press “” and “” can change speed ratio directly,

every single push “” or “”, the speed ratio will go up or down by 0.1, the displayed speed changes according to the speed ratio, but displayed time will not change.

current speed= work speed * speed ratio

5.5.2 Pause & position adjust

RUN/PAUSE
DELETE

Press “” button to pause the current processing. The right upwards of screen will change from “RUN” to “PAUS” and machine paused processing except the rotating of spindle. Shown below:

WX	7.000	PAUS
WY	8.000	S2
WZ	-2.000	H SP
Continue working		

At this moment, user can adjust 3 axes position, and the system default the manual mode is STEP, so that the user can fine adjust each axis, that is to say the machine moves per Fast/Low speed grid distance every signal pressing. When finished the adjustment, press

RUN/PAUSE
DELETE

button again, and the screen prompt as follow:

WX	9.000	PAUS
WY	7.000	CS 2
WZ	-0.200	0.4
Restore Position?		

ORIGIN
OK

RUN/PAUSE
DELETE

The system asks the user whether save the modified position. Press “”/ “”

STOP
CANCEL

the system will start processing from modified position, press “”, system will continue the processing at previous position which is before the adjustment.

5.3.3 Set reference point

MODE + XY-0
4

Press”  +  ” to set the reference point, totally needs to operate for 2 times.

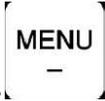
Fist time is setting in WrkPos/WrkNeg type, second is setting in ScwPos/ScwNeg, make sure system can save breakpoint in both working type. The reference point needs to be reset when system has updated.

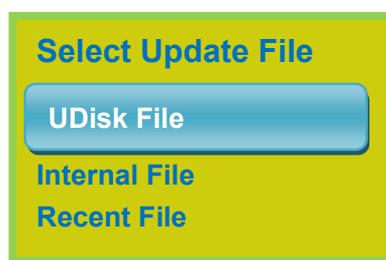
➤ PS1.System upgrade

During the using of dsp controller may get the updated versions of the system software, so handle needs to be upgraded, the operation is as follows: **U disk compressed file upgrade**

1.1 Common method entering updating menu

1. Copy the compressed file to U disk and insert the U disk into handle, upgrade file format is **.PKG which displays as rz-xxxx or qxx-xx on handle.

2. Press  and enter into "system setup", press "" and "" to move the cursor and choose "System Update", then the screen displays:



3. Press  to enter into "UDisk File" and select correspond update file, and then

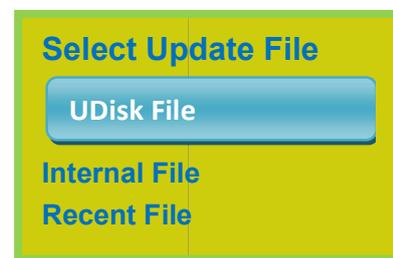
press  to wait the system complete auto updating.

4. Restart the controller after the updating successfully.

1.2 Quick method shortcut key upgrade

1. Make sure the update file is already restored in the U disk, and then insert Udisk into the controller.

2. Press "" + "", the screen displays:



3. Press  to enter into "UDisk File" and find the update file. The system will automatically complete the upgrade, after the upgrade is completed, restart the handle.

➤ PS2. Operations of handle communicating with computer

RichAuto-A1X series numerical system has been added a new function "U Flash Disk Mode" start from the hardware serial number A010XXXX(E.g.A010203), software number rz-1967(Contains subsequent updates, needs to update if the version is less than 1967) . Connect handle and computer by USB cable, users can find portable storage device on the computer, copy processing files from computer to handle internal storage space. This function can keep on the normal processing when there is no U disk at hand or the USB socket damaged.

Operation steps:

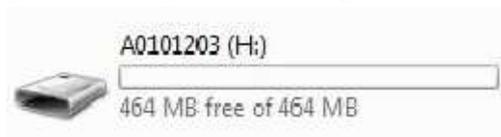
1. Press any two buttons at the same time (for example: "ORIGIN OK" + "MODE").
2. Connect handle and computer via an USB cable, it means that the handle is powered on by computer, loosen the buttons after power on.

3. Handle screen displays:



Connect successfully and can communicate normally.

4. Open "My Computer", and you will find portable storage device,



A0101203(H:): Handle, Users can copy processing files into the handle inner.

5. Connect handle and machine, Choose internal file to start processing.

NOTE: Users can check "hardware type" and see the supported hardware type in "Version View. If the "U flash disk mode" is not in that list, means the controller is not support this function.

➤ PS3. Common problems and troubleshooting

■ Solutions of the faults display on the screen

1. Indefinite “screen flicker or automatically restart”

Analysis and solutions:

- (1) Power supply is insufficient. Check power supply if there are problems, and change high-quality power supply to solve the problems.
- (2) The local power grid unstable. Check local grid voltage instability, or increase the regulator filter device.
- (3) There is something wrong with the power chip of the handle. This phenomenon also appears when the handle is powered through the USB cable to the computer, please return back the handle to our company.

2. Cannot set working origin

Analysis and solutions:

- (1) You may get into the mechanical coordinate system. Press the button "menu" + "1" to back to the first work coordinate system.
- (2) The buttons are broken. Menu-system setup-buttons check, to check the buttons are normal or not.

■ Faults in practical operation

1. The file size does not match the size of the actual set

Analysis and solutions:

- (1) Pulse equivalent is wrong.
- (2) You do not select the right tool.

2. The screen displays”beyond limit” when processing file

Analysis and solutions:

- (1) The machine is not carried back to zero, the system is not able to confirm the actual position. Make the machine back zero.
- (2) After setting the working origin, the reserved range is less than the actual file size .Determine the actual file size and set correct working origin.
- (3) You set the wrong working origin in the file. Check the path of the file, and re-export the correct file.

3. Z axis (spindle) fall down abnormally (too fast) during processing

Analysis and solutions:

- (1) Working speed beyond the fastest speed of Z axis."Machine setup"-"Max speed limit", set the speed to the safe speed.
- (2) Coupling is losing or transmission slippages. Re-adjustment the connecting parts.
- (3) The lines connect the interface board with the motor drivers has disruption. Re-adjust the lines.

(4) Processing file error. Check processing file, try to download the correct processing file to U disk or handle internal.

(5) There is something wrong with the lines connecting Z axis motor and motor driver. Replace the lines.

4. Return to the machine origin, the spindle keep going and crashes the machine body

Analysis and solutions:

Three press the "menu" button, self test the input signal (origin detection switch signal), check whether the detection signal is normal or not.

(1) The origin detection switch is damaged. Replace a new one.

(2) The distance of the origin detection switch detection sheet beyond the detection range of the switch, adjust the position of the test piece.

(3) The origin detection switch to the interface board wiring aging or loosening. Again check the connections.

(4) The interface board is broken. Depot Repair.

(5) 50-pin data cable is broken. Replace it with a new data line.

5. Back to the machine origin , machine move to the reverse direction

Analysis and solutions:

(1) The origin detection switch types do not match with the definition of the corresponding level. Modify the level.(Normally open type corresponds to a level defined the direction of the arrow down, normally closed type corresponds to the level defined arrow up).

(2) The origin detection switch is damaged. Replace a new one.

(3) The origin detection switch connects interface board not well.Refresh the line to determine the wiring is correct.

(4) Too much interference, resulting in the illusion of the detection switch has been triggered. Recalibrate the whole circuit.

(5) The interface board is broken. Depot repair.

(6) 50-pin data cable is broken. Replace the data line.

6. Abnormally working when processing file or the actual working is different from the processing file

Analysis and solutions:

(1) The program disorder.

(2) External interference is too large. Refresh connection.(separate strong electric from weak current, "GND" of inverter separated from the other components).

7. Handle LCD digital changes, the machine does not move

Analysis and solutions:

If only one axis is not moving, it may be a connection problem. Change another normal terminal to this terminal, if it is ok, indicate the motor driver works normally. So there is something wrong with interface board or 50-pin cable. If it is still does not move, it is necessary to detect the corresponding driver and motor.

If all axes are not moving, firstly check if there are problems in the 50-pin cable and interface. Secondly check the power supply of the motor drivers. Lastly, you have to check the mechanical part.

8. It is normal to the move from one location to another location, but when return from that position to the original position is not normal

Analysis and solutions:

Mechanical problems, screw may install not well.

■ Electrical components and wiring problem

1. An axis or multi-axis only one-way movement after handle power-on

Analysis and solutions:

(1) There is something wrong with the lines connect the interface board with the motor driver, check the connection.

(2) Interface board is damaged. Replace the interface board.

(3) The motor driver damaged. Replace the driver

2. The certain axis motor does not move after handle power-on

Analysis and solutions:

(1) Operator makes pulse line and direction line oppositely, rewiring it.

(2) 5V common anode end of the motor driver disconnected, check the connection.

(3) The motor driver is damaged, operator can promote motor after handle power-on.

(4) The chip of the interface board damages, no pulse signal output.

3. Screen is not bright after handle power-on, and connected handle to computer with a USB cable the screen displays normal

Analysis and solutions:

(1) The handle does not connect to power supply. Check DC24V power supply output normal or not, if normal please check the cable from the power supply to the interface board.

(2) The 50-pin cable is damaged or the interface is broken.

4. Screen is not bright after handle power-on, and connect the handle to computer by USB cable, the screen is also not bright

Analysis and solutions:

(1) This phenomenon may due to the handle shocked by external force or fall on the

ground, causing the crystal process or damaged. Depot repair.

(2) Users connect high voltage power supply, Depot Repair.

5. The screen display “spindle on”, actually the spindle off, the screen display “spindle off”, actually the spindle on

Analysis and solutions:

(1) There is something wrong with wires. Organize your wires.

(2) The output level definition is wrong. Modification correct output level definition.

6. Screen is not bright after handle power-on

Analysis and solutions:

(1) The power supply voltage is too big or the chip is broken because operator makes positive and negative of the power oppositely. Depot repair.

(2) The power supply is damaged. Replace the power supply.

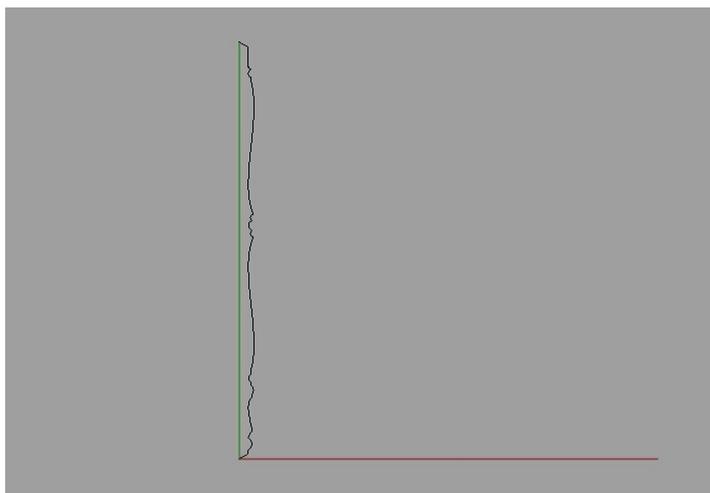
(3) 50-pin data cable damaged. Replace the data line.

(4) Handle 50-pin interface damage. Depot repair.

➤ PS.4. Making Graphs

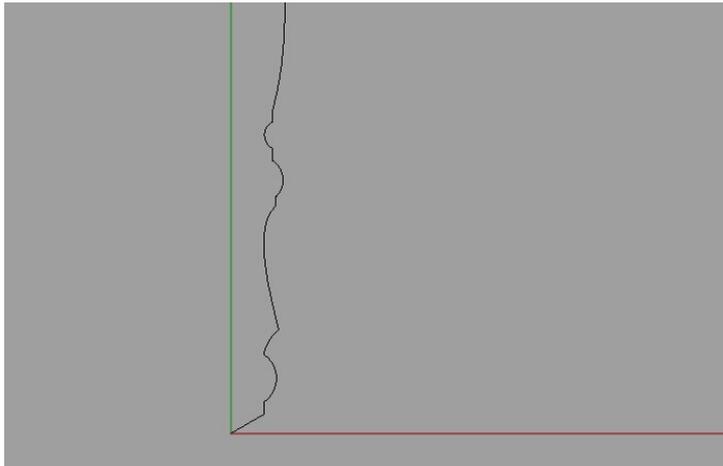
For Lathe processing file, users can use the modeling software such as CAD, Rhinoceros etc. as the tool to make graphs. And save as DXF format(2000,2004, R12, R20 version and so on).

1) Example of lathe drawing



Red line refers to the direction of X axis and the knife feed depth distance during processing.

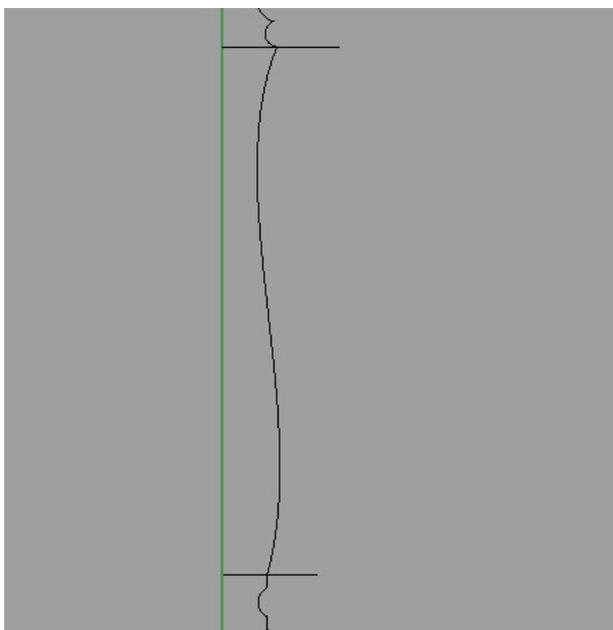
Green line represents Y axis direction, refers to the working length during processing.



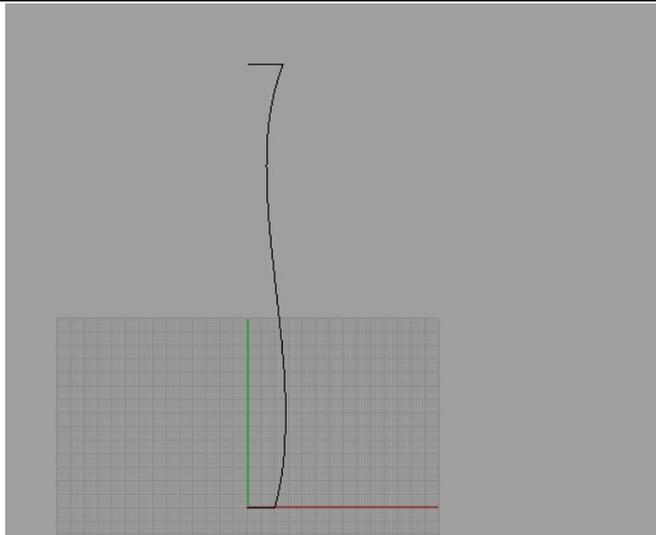
Note: the start point must be (0,0)

The image file name should be named with letter D at the beginning of it. The system automatically calls the prefix file named D as lathe processing file in turning & gridding loop processing. E.g.: D1.dxf

2) Example of spiral machining drawing



Truncate in the wood work piece image at the position where needs to do spiral machining, and save as a new file (as shown in the following picture)



The finished image file name should be named with letter **S** at the beginning of it. The system automatically calls the prefix file named **S** as spiral processing file in turning & gridding loop processing. E.g.: **S1.dxf**

➤ P.S.5. Supplementary specification of model type A122 dual head lathe system

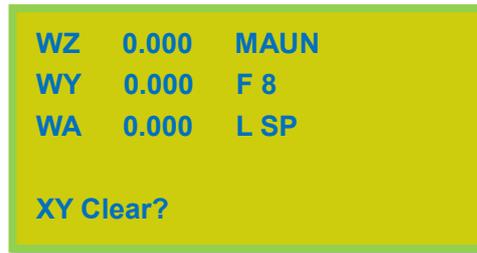
RichAuto developed the new type A122 dual head multifunctional lathe system which is based on the function of A132. It is a system includes turning graphics processing, twist graphics processing, sculpture graphic processing and additional on four sides flat carving graphics processing.

The basic operation of A122 has inherited the simple and fast features of A132, but different from the following points:

1) Return workpiece origin

	Combination Keys	Function
1		XY axes return to work origin
2		Z/A axis return to work origin

After these operation the screen of A122 displays as shown in the picture below. Press OK to confirm.



2) Axis mark

The carving knife installation position of lathe machine which adapted with A122 system is at the top of the machine, becomes the forth axis. The others marks are the same as A132's. Another difference is the moving direction of the forth axis of A122, moving down towards is negative.