User's Manual of RDD6584G Control System

V1.1

Shenzhen Ruida Technology Co., Ltd.

RD Co., Ltd.

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Version History

Version	Log
V1.0	The original version
V1.1	1. Add the synopsis for adaptive control to the flat
	2.Changed some introduction for modifying the cutler's coordinate
	3.Changed some introduction for factory or user parameters
V1.2	1. increased the total suction output of the fan
	2. increased the alarm input of servo driver
	3. increased in the explanation of some manufacturer's parameters:
	(1) whether the manufacturer mode is made;
	(2) whether to be able to reverse the blow;
	(3) the V punching independence or shared mode is optional.
	(4) the diameter ratio of the V punching / pressing wheel under the share mode;
	(5) the offset angle of the original point of the shared axis

CATALOG

1 Overview

1.1 Briefing

RDD6584G supports single coordinate cutting mode and dual coordinates independent cutting mode. Intelligent allocation management for multi-knife can be supported to do special array cutting with higher cutting efficiency. Camera and projector can be also integrated to do some complex applications.

RDD6584G is multi-functional digital cutter controller with tangent knife cutting control. Modularized tool head management enables convenient tool-switching among and provides economical future upgrading. Oscillating cutting knife, plotting pen, circular puncher, V puncher, creasing wheel and milling tool can be controlled on one machine. Laser pointer and automatically feeding are also integrated into this control system. Flexible tool module options meet the requirements of diverse industries applications.

Eight axes motor-controlled CNC system performs with high speed and accuracy with DSP integrated on board. Stable hardware structure reduces the error rate and maintenance cost while the divided-section vacuum system offers satisfactory and controllable suction. The Ethernet port, user-friendly interface allows design software from different PCs access to one cutter which maximizes your investment. USB2.0 compatible interface and U disk supply easy and convenient way to operate the control system. The controller support 16 channels limit input and 28 channels universal output with opto-couplers. Friendly HMI operation with LCD touch screen panel makes it easy to operate.

RDD6584G is suitable for cutting machines that applied in various industries including packaging, printing, advertise displaying, leather processing, architecture modeling, composite material and knife modeling.

1.2 Description of Controller Model

RDD6584G

- Conventional Edition
- **7 inches Touch Screen HMI**
- 8-axle Card
- Hardware Sub-Edition
- Hardware Edition
- Secant Knife Cuting Control
- RD Technical Products
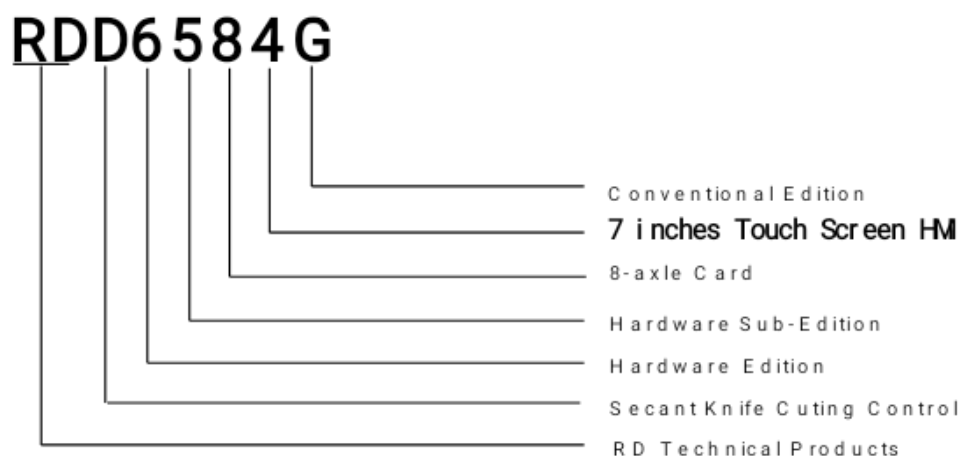
1.3 Controller Performance

		RDD6584G
Power Feature		*Only one-way 24V*
U-Disc Feature	Copying Speed	*High Speed*
	Compatibility	*Support all USB disks with different capacities*
Nand Memory Feature	Capacity	*256M*
	Fault Tolerance	*Capable of checking defective track and formatting and good in fault tolerance*
General IO Feature	Input Port	*16-ways dedicated inputs and 16 ways limiter inputs*
	Output Port	*28-ways outputs (500mA high current for each, OC output, reverse current protection included)*
Software Feature	Power-off restart for Engraving	*YES*
	Multi-origin Logics	*YES*
	Parameter Backup Logics	*YES*
	Work time Preview	*YES*
	Online Update Mainboard Program	*YES*
Display Feature	Online Modification Laser Power/Speed	*YES*

	Offline Modification Layer parameters	*YES*
	File dynamic/static preview	*YES*
	Modification Factory/User's para on display	*YES*
	Online Update Hmi's program	*YES*
	Display type	*7 inches touch Hmi*
Motion-axle Feature	Soft Spacing	*YES*
	Hard Spacing	*YES*
	Power-on Resetting	*Configurable for each axes*
	Key Speed	*Configurable*
	Key move mode	*Configurable for fixed distance or continue move*
	Axles	*8*
	Robotization Multi-X axes Support	*2 header*
	Belt of Multi-X axes	*Single or Multi- Belt*
	Supported cutler	*Vibrancy knife, circular knife ,milling cutter, press wheel, or pen*
Puncher Feature		*Big puncher, small puncher, V-puncher*
Encryption Feature		*Realtime clock and battery integrated for hardware encryption*
Communicate Mode		*10/100MHZ Ethernet or USB2.0, communication mode is automatically checked*
Extended Communication Ports		*Two ways* *For wireless handset, EPLC400 or other equipment*
Phone App Support		*YES*

2 Installation Size

2.1 Installation Size of MainBoard

The unit of all sizes is millimeter (mm) and the size accurate to 0.1mm (the four holes are symmetrical)
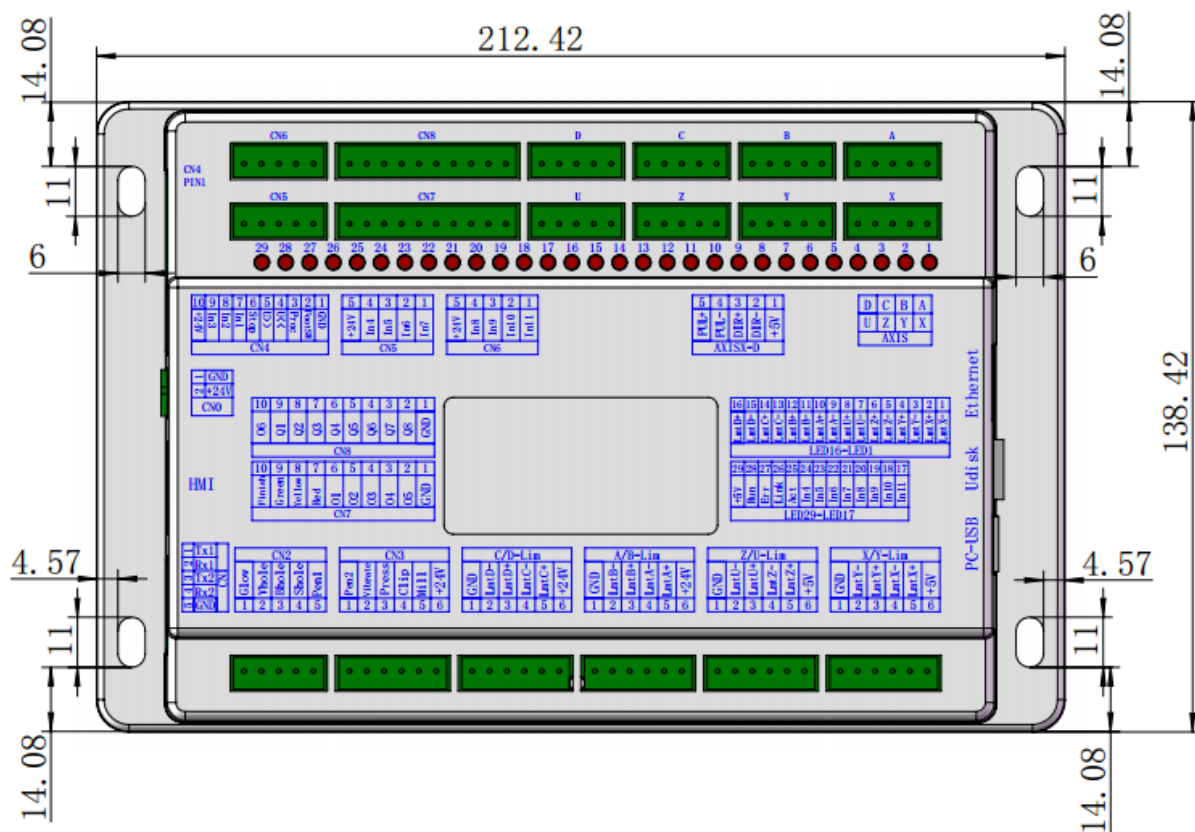
Figure 2.1-1

2.2 Size of Panel

The unit of all sizes is millimeter (mm) and the size accurate to 0.1mm.
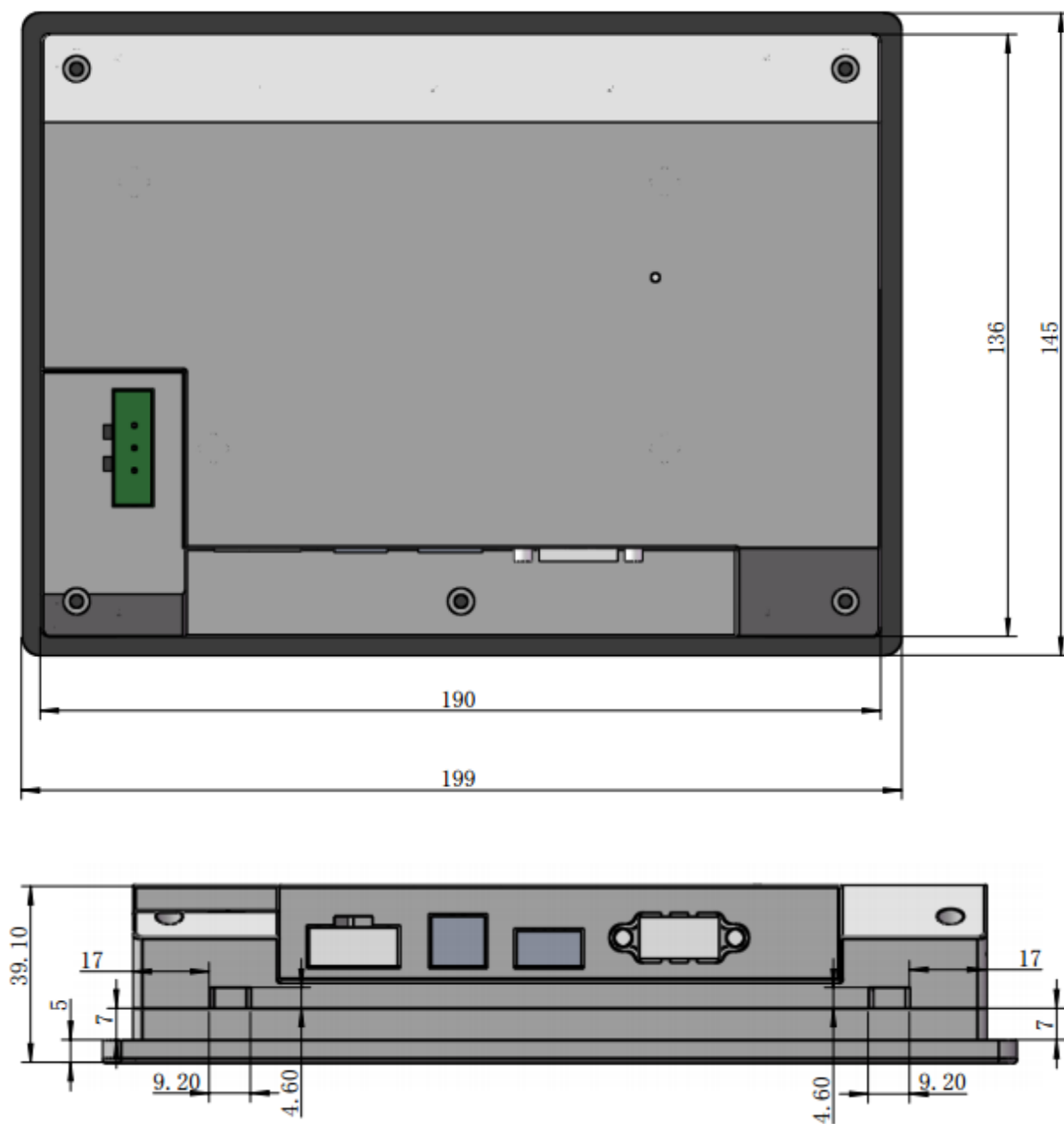
Figure 2.2-1

3　Object Pictures and Interfaces

3.1　Object Pictures of MainBoard

For more detailed pin description, see the Chapter 4: Description of Interface Signal for MainBoard.
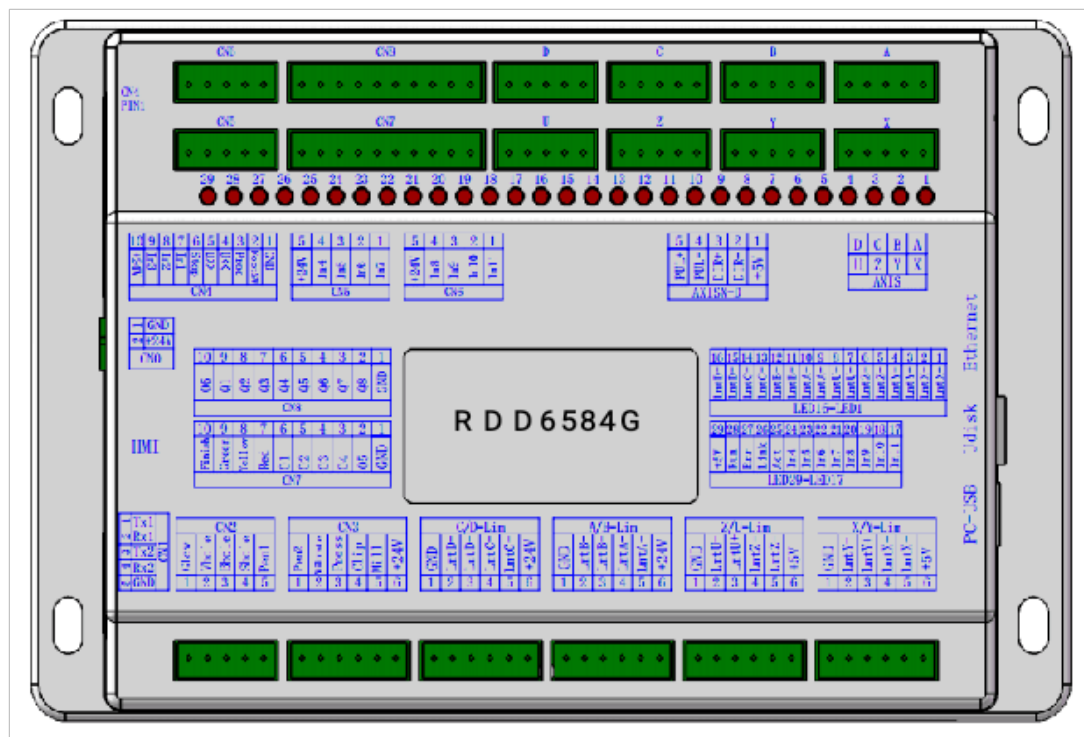
Figure 3.1-1 Object Picture of MainBoard

3.2 Object Pictures of Panel
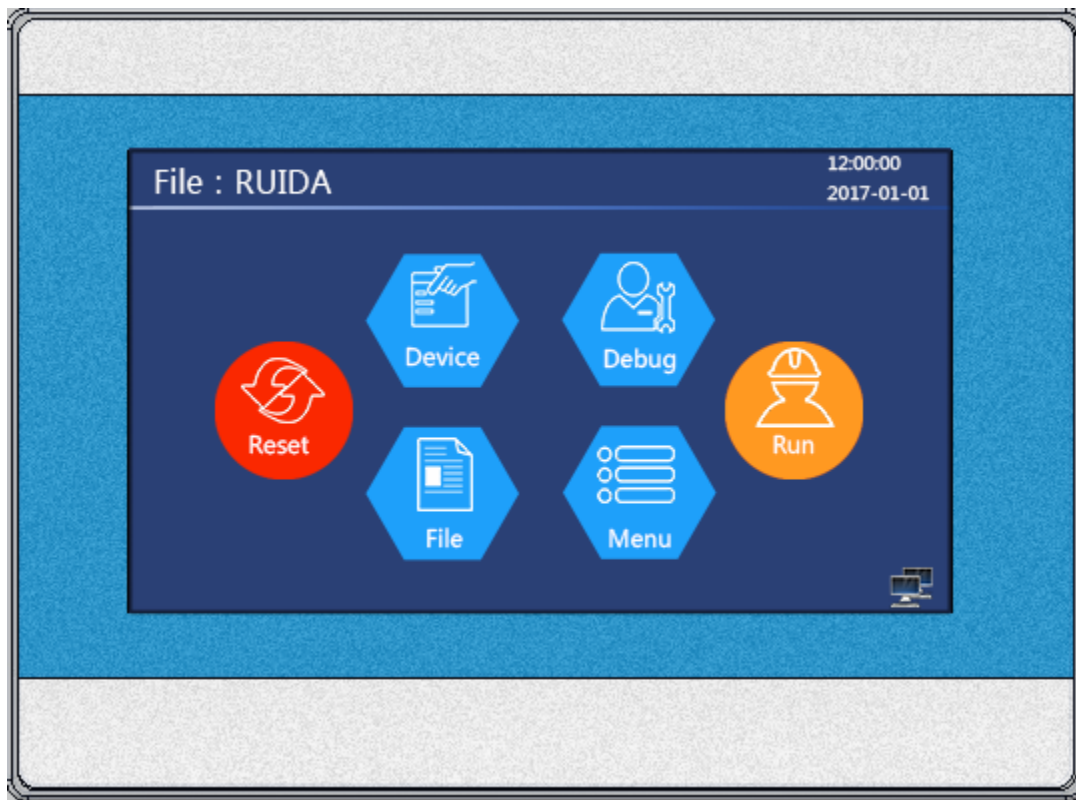
Figure 3.2-1 Object Picture of Panel

3.3 Electric connection
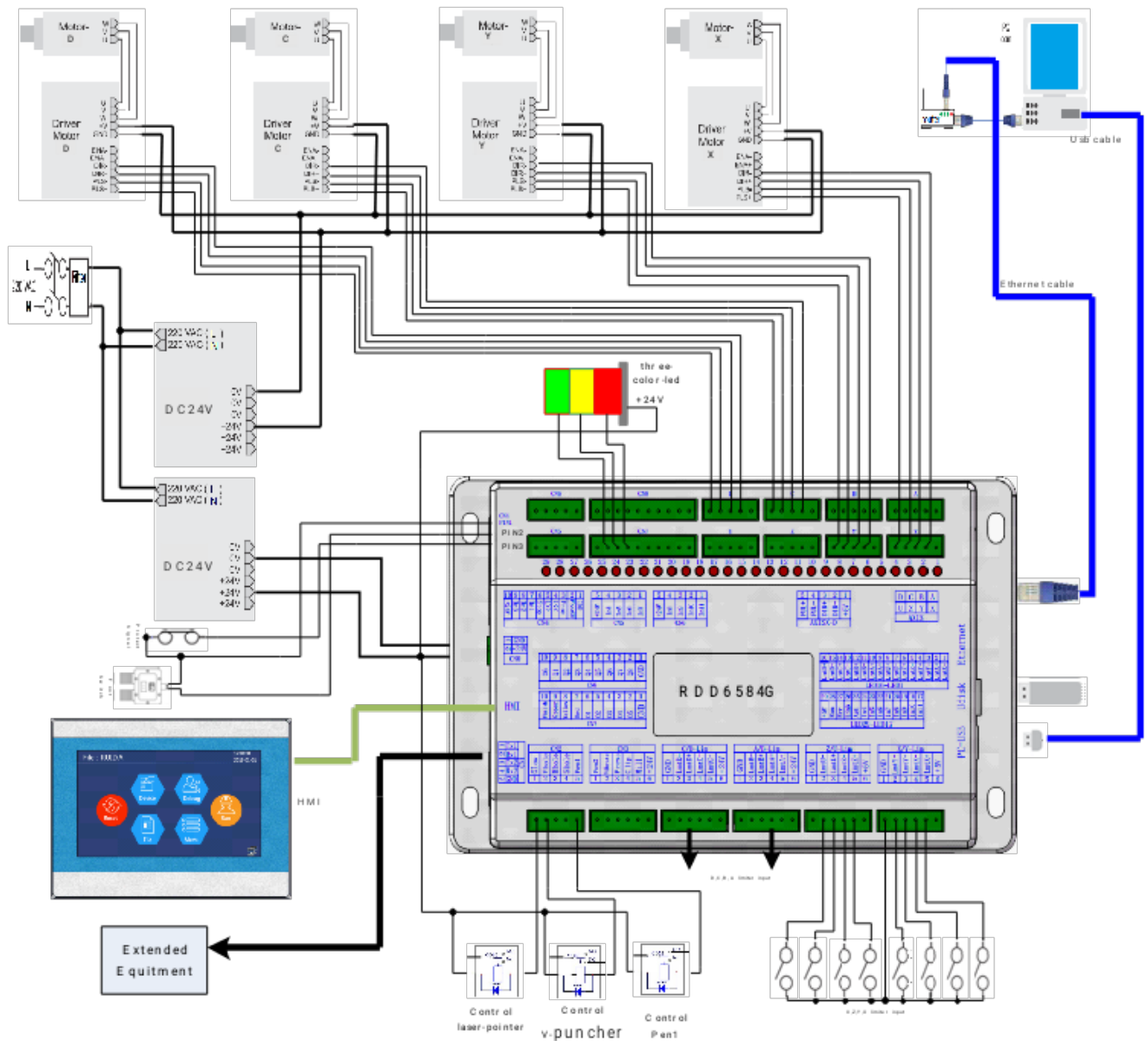
Figure 3.3-1 electric connection

3.4 Lamp instruction

RDD6584G have twenty nine red lamps:

LED NUMBER	NAME	SENSE
LED1	LmtX-	X negative limit indicator
LED2	LmtX+	X positive limit
LED3	LmtY-	Y negative limit
LED4	LmtY+	Y positive limit
LED5	LmtZ-	Z negative limit
LED6	LmtZ+	Z positive limit
LED7	LmtU-	U negative limit
LED8	LmtU+	U positive limit
LED9	LmtA-	Anegative limit
LED10	LmtA+	A positive limit
LED11	LmtB-	B negative limit
LED12	LmtB+	B positive limit
LED13	LmtC-	C negative limit
LED14	LmtC+	C positive limit
LED15	LmtD-	D negative limit
LED16	LmtD+	D positive limit
LED17	In11	Indication for In11 port
LED18	In10	Indication for In10 port
LED19	In9	Indication for In9 port
LED20	In8	Indication for In8 port
LED21	In7	Indication for In7 port
LED22	In6	Indication for In6 port
LED23	In5	Indication for In5 port
LED24	In4	Indication for In4 port
LED25	Act	Ethernet communication
LED26	Link	Ethernet connection
LED27	Err	error in controller hardware
LED28	Run	the normal running status
LED29	+5V	+5V power supply

3.5 Function distribution of all eight axes

The function distribution of all eight axes is as below:

Single Roboticized X axes	
X Axes	Used to control the left and right moving
Y Axes	Used to control the up and down moving
Z Axes	Used to control the up and down moving for milling cutter
U Axes	Used to control feed in Axes
A Axes	For the independent mode of the creasing wheel or V puncher rotation.
B Axes	Used to control the up and down moving for press wheel
C Axes	Used to control revolving for Vibrancy knife
D Axes	Used to control the up and down moving for Vibrancy knife

4 Sample Operation

Based on the normal machine, the machine connects XYCD axis. XY controls the plane motion of the machine, C controls the rotary motion of the vibrating cutter, and D controls the up and down movement. For more detailed operation procedures of HMI touch panel involved in this chapter, please refer to Chapter 8 "HMI Operating Instructions". For more detailed explanations of manufacturers and user parameters, refer to Chapter 9 "Manufacturer/User Parameters" of this document.

4.1 Axis reset function

First of all, connects the wires between the XYCD axes of the controller and driver according to the electrical connection diagram of the control system in Figure 3.3-1. And also connects the four-axis origin limit (negative limit) signal. Then turn on the machine. After the touch screen operating system is powered on, the words "system reset" will pop up on the touch screen. Press Cancel on the touch screen to cancel the reset process and the system enter the idle state.

4.1.1 Axis limit settings

The polarity of the limit ,it means inputting the low voltage or high voltage signal to the main board when the limit switch is touched. If the limit switch is touched, it is low voltage signal ,and the limit polarity is [negative].Otherwise, if the limit switch is touched, it is high voltage signal, the limit position is [positive].

If user do not know the polarity of the limit, follow the steps below to determine :

In the system idle state, make sure that the limit switches of all axis are not touched, and then enter the [IO Control], [Input Port] in the touch screen's debugging function interface. There are 16 limit input indicators. Taking X axis for example, if it the first time to enter this input interface, X-position indicator is gray, so when touching the X-limit switch, this indicator will turn red, then limit polarity is [negative]. On the contrary, if it is the first time, the X-position indicator is red. Then, when the X-limit switch is touched, this indicator will turn gray. In this case, the limit polarity is [positive].

The other axis are same settings.

4.1.2 Direction polarity of each linear motion axis settings

In the idle state of the system, enter [Reset] → [Axis Reset] in the touch screen debugging function interface, and manually reset the XYCD axes respectively (The prerequisite is that the reset enable in the axis parameters from factory parameters needs to be turned on.).

Take the X-axis reset as an example. If the X-axis origin limit is installed on the left side of the machine, after the X-axis reset, X will move to the right, it indicating that the polarity of the X-axis direction signal is reversed. User can press the cancel key to stop the X axis reset, and then enter the axis parameters of the manufacturer's parameters to reverse the polarity of the X axis (if the original is negative, user need to change to positive polarity; otherwise, if it is the original positive polarity, user need to change to negative), and after ensuring that user have modified the parameters, press X again to reset. At this time, X should be reset to the left.

YZUBD axes are same settings.

4.1.3 Direction polarity of each rotary axis settings

1、Rotary axis coordinate system, positive and negative direction motion, origin declination introduction

In order to better understand the positive and negative direction of rotation axis, the coordinate system of rotation axis is explained in detail here. It also explains the origin angle of the rotation axis.

● **Concept 1: horizontal axis is X axis, vertical axis is Y axis.。**
● **Concept 2: Rotating from the X positive half shaft to the Y positive half shaft are called the positive rotation direction of the C axis. Similarly, the rotation from the Y positive rotation axis to the X positive rotation axis are called the negative rotation direction of the C axis.**
● **Concept 3: When the C axis is reset, C axis rotates in the negative direction and touches the C axis's origin limit. Due to the installation problem of the C axis origin limit, At this time, the tool's cutting direction is not completely coincident with the positive axis of the X axis. If the positive half shafts are completely coincident, then if the C axis needs to be rotated by some degree in the positive direction , the knife direction is completely coincident with the positive X axis . and at this time, the degree is called the origin offset angle of the C axis (The degree is positive or negative values, positive value means C axis positive rotation, negative value means C axis negative rotation)**

Because the machine's XY origin limit (negative limit) may be located at the bottom left, bottom right, top left and top right corners of the machine, the corresponding plane coordinate system has four conditions, corresponding to each plane coordinate system. The concept of rotation in the positive and negative directions of the rotation axis will also change, and the concept of the origin declination will be changed. At the same time the concept of the origin declination also changes, the four coordinate systems are as follows:

（1）Coordinate system 1
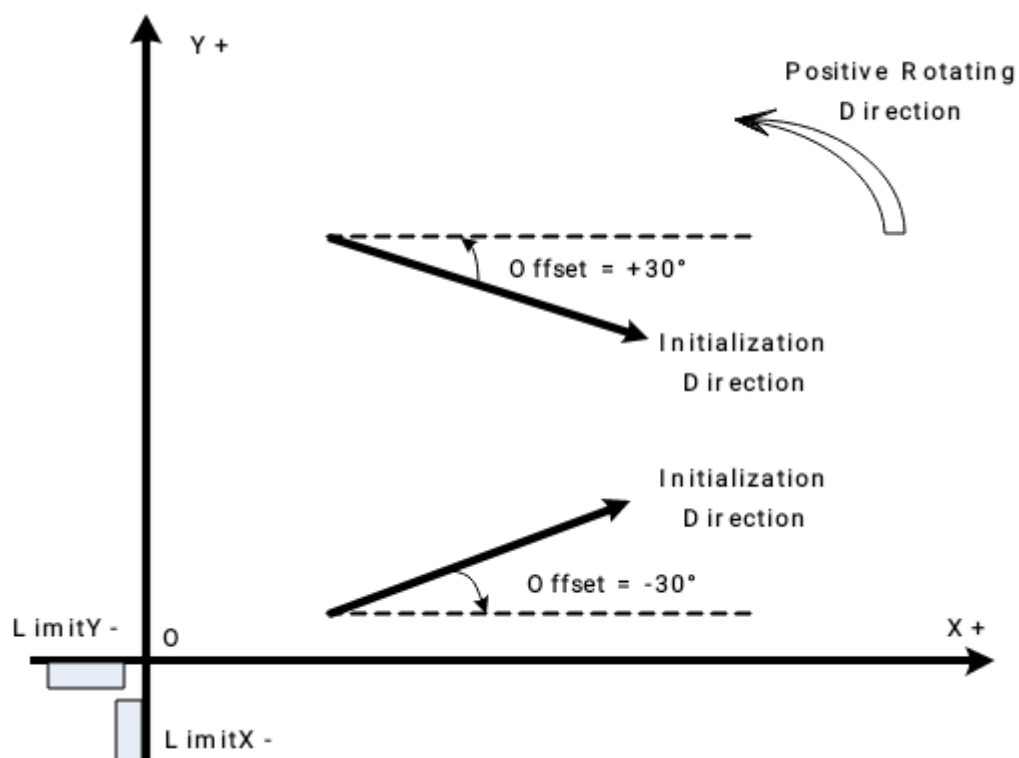
（2）Coordinate system 2
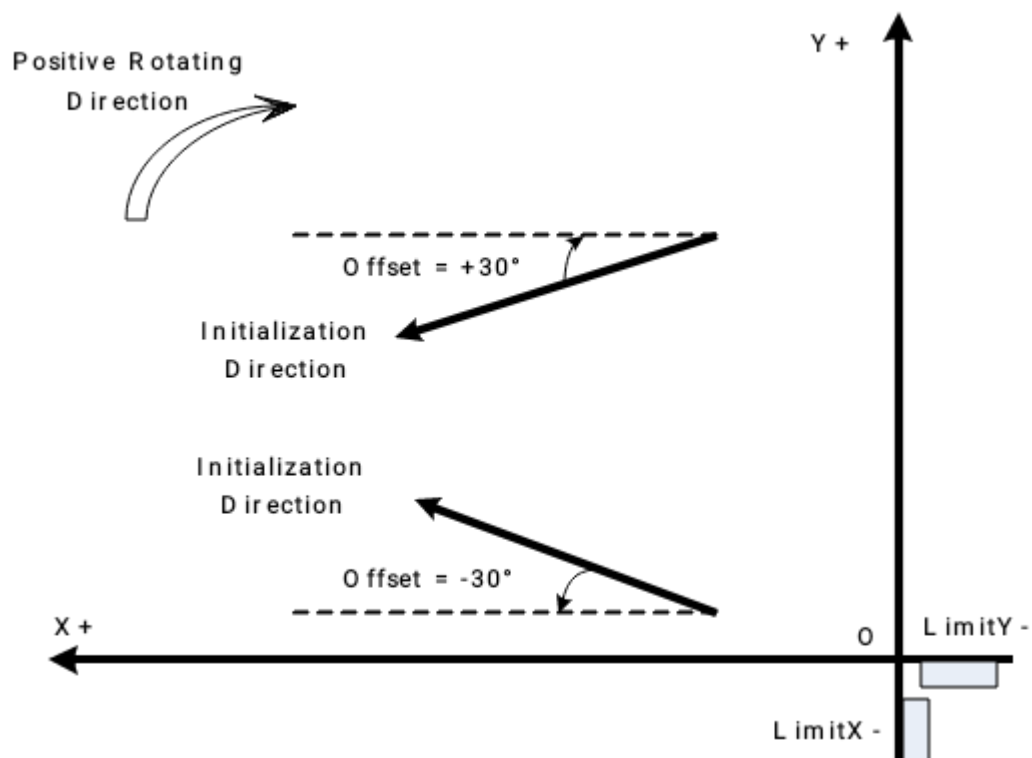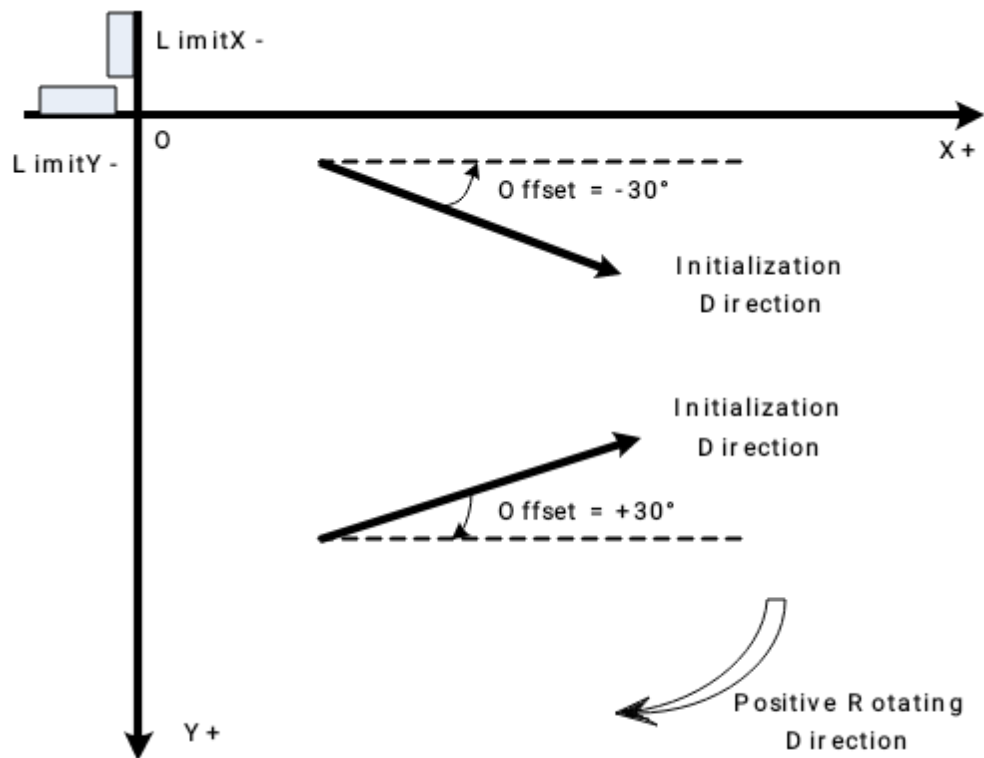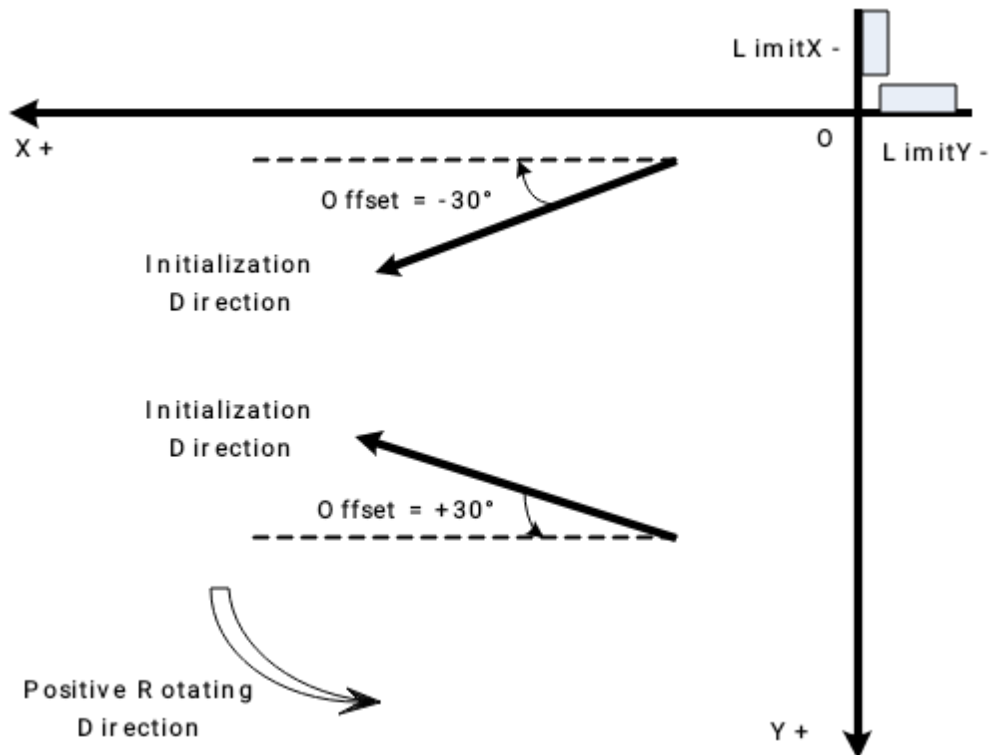

（3）Coordinate system 3

(4) Coordinate system 4

2、Polarity of rotation axis signal settings

The rotation axis is different from the linear axis and there is no concept of up, down, left and right. The rotation axis can be rotated clockwise or counterclockwise, and rotate in both directions. it can touch the limit switches, but still need to set the rotation axis here, the correct polarity of the direction signal is needed. If the polarity is set incorrectly, It will cause the cutter following with wrong direction.

The AC axis is the rotation and the C axis is used to control the direction following rotation of the vibrating cutter. Take C-axis debugging as an example here.AC.

Similarly, in the idle state of the system, press C-axis reset to check whether the C-axis is moving in the negative direction of the rotation axis (for the concept of positive and negative directions, see the interpretation of rotation axis coordinates). If yes, the signal polarity of the rotation-axis direction is correct. If not, it means that the polarity of the direction signal needs to be reversed.

4.2 Axis step length/cycle pulse settings

When the polarity of each axis direction and the polarity of the limit position are determined correctly, reset all axis and then the step length or the cycle pulse of each axis needs to be set. Only when the step length or the pulse pulse is correctly, all the speeds and acceleration are correct. For example, if the X-axis step length should have been 5um, but now the system is set to 10um, then when the speed is set to 100mm / s, the actual speed of the machine is 50mm / s, this speed is actually wrong.

The linear motion axis needs to adjust the step length of each axis, and the rotational motion axis needs to adjust the peripheral pulse of each axis. For introduction of the step length and cycle pulse, please refer to Chapter 9.

4.3 Rotary axis offset angle settings

After the reset correctly, the offset angle of the rotation axis can be adjusted after correct adjustment of the step length and the cycle pulse. First of all, user can use the observation method to roughly determine a slightly offset angle. For example, after the C-axis is reset, user need to rotate it approximately 80 degrees in the positive direction at the current stop position. That is, user can point the cutter tool toward X in the positive direction of the axis, user can initially set an origin declination equal to 80 degrees, and then reset the C axis again. After the C axis is reset, it will continue to rotate in the positive direction by 80 degrees. This new position at this time is used as the zero position of the C axis. .

However, the originally observed C-axis origin declination is inaccurate. It is also necessary to accurately calibrate the origin declination of the C-axis so that the cutter's direction completely coincides with the X-axis positive direction after the C-axis is reset. At this time, user can enter the debugging page->other debugging projects to perform the original offset angle. After   debugged, the controller will automatically record the new origin offset angle. For details, please see Chapter 8.

4.4 The limit parameters of each axis settings

After the above process is completed, it is still necessary to set the correct axis parameter value in each axis factory parameter. For example, each axis breadth, that is to say the maximum scope of each axis, and the space of the X+-, Y+- direction (in the factory parameter → system parameters), the take-off speed of each axis, the maximum speed, and the maximum acceleration, emergency stop acceleration and so on.

4.5 Axis key movement parameters Setting

In this system, the key movement can be divided into a fixed distance movement mode or a continuous movement mode. The fast or slow speed of the movement can be switched on the HMI in real time. The fast or slow speed mode of each axis corresponds to a speed value and this speed value can be set. For example, if the X axis slow speed value is 20mm/s, the fast speed value is 300mm/s, when switching to fast movement on the HMI, then at this time move the X axis, and the movement speed is 300mm/s. If the slow movement mode is selected, then it will take 20mm/s to move the X axis.

The parameters related to the key movement function of each axis are as follows:

Factory parameters →axis parameters: key take-off speed, key acceleration, and whether the keys need to be reversed.

Factory parameters→ system parameters: whether HMI-XY should be interchanged or not

User Parameters→Key Speed Parameters: Slow movement speed and fast movement speed of each axis.

4.6 Knife depth settings

After the above steps are completed, the knife depth must be adjusted. There are two parameters that need to be adjusted in the HMI knife depth debugging page. One is the knife raising coordinate, and the other is the falling tool coordinate (the knife depth). The falling coordinate is the target coordinate that the knife needs to be driven when the tool is vibrating and run track. The raising coordinate of the knife is the target position of the knife that needs to be moved when the knife is idle moved. Setting proper raising coordinates can save the time in knife raising and falling repeatedly, and improve machining efficiency.

The specific knife depth debugging method are described in Chapter 8.

4.7 Process parameters setting

Then need to set the correct processing parameters. This set of parameters has basically set a reasonable value when the controller sent out from the factory. Corresponding to different machines, such as the length of the XY span, the inertia of the XY axis and other factors, user may need to fine-tune some processing parameters. For the explanation of each parameter, please refer to the "Factory/User Parameter Explanation".

4.8 Downloading files via PC software for processing

After the above steps. It can use the PC software to drawing, and then download the file to the controller memory through USB or network. After downloading, user can start file processing.

For more instructions on the software, please refer to the software operating instructions. Here are two special points.

1、IP settings

After the software is installed, the default is USB communication when it is initially turned on. If the computer and the mainboard are originally transmitted via USB, it is now possible to communicate directly with the software and the controller. However, if the network communication, user need to set the IP. IP settings need to pay attention to three places:

(1) Set an IP value in the controller board. The initial IP value of the mainboard is 192.168.1.100. Assuming that the IP has met the requirements, no modification is required.

(2) Set the IP value of the PC , this IP value and the mainboard's IP value are in the same LAN, that is to say, must ensure that the first three fields of the IP are the same, and the last field must be different . This is set to 192.168.1.10, for example.

(3) Open the PC software of the tangent cutting system. Under the right interface of the software, there is an option of [Device Port].
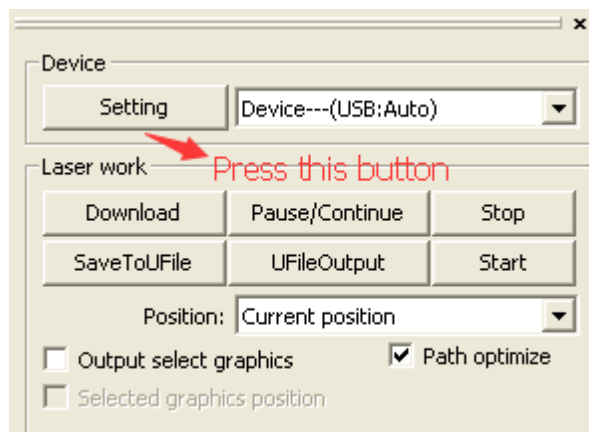
Click this button to add in the lower level interface, select the network, write the IP

value, where the IP refers to the controller's IP, that is, the software will soon communicate with the IP.

2、The coordinate system settings in the software

The coordinate system in the software must correspond to the actual coordinate system of the machine. If the actual coordinate system of the machine is the coordinate system 1 mentioned in the previous chapter, the default coordinate system in the software is correct.

If the actual coordinate system of the machine is [Coordinate System 2] mentioned earlier in this chapter, the X-axis needs to be mirrored in the software coordinate system. Other coordinate systems are handled similarly.

Click the software menu: File→System Settings→Software Parameters→Machine Configuration. The popup interface is as follows:

Correspond to "coordinate system 2", the X-axis mirroring should be checked here, which means that the actual positive direction of the machine X-axis is opposite to the normal direction of the X-axis of Cartesian coordinate system 1 which we usually understand. If the PC software coordinate system does not correspond to the actual coordinate system of the machine, the processed image will be a mirror image.

5　Description of Interface Signal for MainBoard

5.1　Interface of Main Power Source CN0

Pin	Symbols	Definitions
1	GND	24V power ground (**input**)
2	+24V	24V power positive (**input**)

⚠ Caution	This control system employs single 24 power supply. For a certain margin, it is suggested to select 24V/2A power.

5.2　Panel Signal-Cable Interface HMI

The panel signal-cable is a pin-to-pin cable, which is included in the factory shipper bill.

5.3　Udisk Interface

Udisk is a USB-AM interface. The controller may visit the u-disk by this interface.

5.4　PC-USB Interface

PC-USB is a USB-BM interface. The controller may communicate with PC by this port.

5.5　Ethernet Interface

Using this interface, the mainboard can communicate with PC by 10/100MHZ Ethernet.

⚠ Caution	Pin to Pin Ethernet parallel line is recommended.

5.6 Extended Equipment Interface CN1

Pin	Symbols	Definitions
1	TX1	The TX for the first RS232 port
2	RX1	The RX for the first RS232 port
3	TX2	The TX for the second RS232 port
4	RX2	The RX for the second RS232 port
5	GND	Power ground (output)

5.7 Output Port

Out Port【CN2】:

Pin	Symbols	Definitions
1	Glow	Drive to laser pointer
2	Vhole	Drive to V-puncher
3	Bhole	Drive to Big- dia. puncher
4	Shole	Drive to Small- dia. puncher
5	Pen1	Drive to Pen1

Out Port【CN3】:

Pin	Symbols	Definitions
1	Pen2	Drive to Pen2
2	Vib	Drive to vibrating of the knife
3	Press	Drive to press pole
4	Clip	Drive to clip
5	Mill	Drive to open the milling cutter
6	+24V	24V Power positive output

Out Port【CN7】:

Pin	Symbols	Definitions
1	GND	Power ground (output)
2	O5	Reserved
3	O4	Drive up and down for press wheel(if IO mode enabled)
4	O3	Driver up and down for vibrancy knife(if IO mode enabled)
5	O2	Driver to equipment for knife aperture (if enabled)
6	O1	Beep output(if enabled)
7	Red	Three-color-led: output for red led(if enabled)
8	Yellow	Three-color-led: output for yellow led (if enabled)
9	Green	Three-color-led: output for green led (if enabled)

10	Finish	Output signal for work finish(when work finished, this out port will open, then, one second later, it close again)

Out Port 【CN8】:

Pin	Symbols	Definitions
1	GND	Power ground (output)
2	Q8	Subarea adsorption: output for 8 subarea
3	Q7	Subarea adsorption: output for 7 subarea
4	Q6	Subarea adsorption: output for 6 subarea
5	Q5	Subarea adsorption: output for 5 subarea
6	Q4	Subarea adsorption: output for 4 subarea
7	Q3	Subarea adsorption: output for 3 subarea
8	Q2	Subarea adsorption: output for 2 subarea
9	Q1	Subarea adsorption: output for 1 subarea
10	O6	Output for a total switch for adsorption

Prompt	All outputs are isolated through the optocoupler, and 500mA current for each, OC gate output, each can directly drive the 5V/24V relay.

5.8 Input Port

Input port 【CN4】:

Pin	Symbols	Definitions
1	GND	Power ground (output)
2	FootSW	Input port of foot switch. The connection method is: when the pedal is stepped down, the low-level signal will be inputted to this port; when the pedal is released, the port will be disconnected or the high-level signal can be inputted to this port; when the stepped-down pedal is held for not less than 100 ms, if the machine lies idle, it can be started for work; if the machine is in the working state, the work will be suspended; of the machine is in the suspension, the work will be restarted, that is to say, the function of the pedal switch is the same as that of the "Start/Pause" key. If the interval time to the first stepping-down of the pedal should be less than 100ms when the pedal is stepped down once again, the second stepping-down of the pedal will be considered invalid by the mainboard.

3	Proc	Input from protective port. If the machine needs to be protected in the special state (such as door open protection), the protective signal can be inputted from this pin. This pin can be enabled and prohibited. This signal is not inquired by the mainboard if this pin is prohibited; if this pin is enabled, when the input is high-leveled or this input port is suspended, the machine will be protected, the work suspended and the laser closed.
4	U<<	Input for negative direction hand feed in(Low level valid)
5	U>>	Input for positive direction hand feed in(Low level valid)
6	Stop	Stop key input, used to stop the running work(Low level valid)
7	In1	X axis servo alarm input
8	In2	Y axis servo alarm input
9	In3	Z axis servo alarm input
10	+24V	24V Power positive output

Input port【CN5】:

Pin	Symbols	Definitions
1	In7	C axis servo alarm input
2	In6	B axis servo alarm input
3	In5	A axis servo alarm input
4	In4	U axis servo alarm input
5	+24V	24V Power positive output

Input port【CN6】:

Pin	Symbols	Definitions
1	In11	Reserved input11
2	In10	Reserved input10
3	In9	Reserved input9
4	In8	D axis servo alarm input
5	+24V	24V Power positive output

5.9 8-axle Spacing Input Interface

X/Y axle spacing input【X/Y-Lim】:

Pin	Symbols	Definitions
1	GND	Power ground (output)
2	LmtY-	The spacing from axle Y- and Y to 0 coordinate

3	LmtY+	The spacing from axle Y+ and Y to max. coordinate
4	LmtX-	The spacing from axle X- and X to 0 coordinate
5	LmtX+	The spacing from axle X+ and X to max. coordinate
6	+5V	5V Power positive (output)

The spacing polarity is optional, that is to say, when the motion axle reaches the spacing position, it will trigger a low-level signal so as to make the corresponding LED (under the cover) light; when the motion axle leaves the spacing position, it will trigger a high-level signal or disconnect the spacing signal so as to make the spacing indicator go out, but when it leaves the spacing, the corresponding indicator will light and the spacing polarity become positive. The mistaken setting of spacing polarity will result that the spacing can't be detected when the system is reset so as to lead to the collision of axles.

The pin definitions of all other axle spacing input such as Z/U-Lim, A/B-Lim and C/D-Lim are the same as X/Y-Lim.

Prompt	All X~D axle spacing inputs are compatible to 5V/12V/24V logic level inputs。

5.10 X~D axle Motor Driver Interface AXIS_X~AXIS_D

The interfaces of the above eight motion axles are the same. The AXIS-X interface is exampled.

Pin	Symbols	Definitions
1	+5V	5V Power positive (output)
2	DIR-	Direction difference negative signal
3	DIR+	Direction difference positive signal
4	PUL-	Pulse difference negative signal
5	PUL+	Pulse difference positive signal

The polarity of directional signal for driver pulse signal can be set. Where a certain axle is reset, it will move to the opposite direction of machine origin, which means the polarity of directional signal for this axle is not correct. In such a case, the connection between this axle and the motor driver can be broken first (otherwise the mainboard can not be detected to the spacing so as to lead to the collision of this axle), and then such a polarity can be corrected after this axle is reset completely. Upon the correction, the reset key can be pressed against to reset the mainboard.

And, the Pulse signal can be falling edge valid or rising edge valid. The default setting

is falling edge valid.

	The Pulse signal and the directional signal are all TTL outputs. Difference connection and common anode connection are supported, but, difference connection is recommended.
Prompt	

6 Examples of Driver Interface for Step-servo Motor

6.1 Brief

The input signal end of step-servo motor driver employs the light-coupled isolation technology. For the step-by-step impulse signal, some isolate the side OC diode from cutoff to conduction (e.g. the valid falling edge of pulse signal inputted from the diode minus end) and some do so from conduction to cutoff (e.g. the valid rising edge of pulse signal inputted from the diode minus end).

When it is indicated whether the pulse signal of motor driver is the valid rising edge or the valid falling edge, it will be subject to the pulse signal inputted from the minus end of side OC diode.

Some input signals of motor driver are independent and some are internally of common anode, so some have 4 external leading-out wires and some 3 wires (only the pulse and directional signals are counted) as shown in Figure 6.1-1 and 6.1-2.

RDD6584G Controller has eight groups of 5-wires motion driver interface, each interface has two direction signal, two pulse signal, and one 5V positive output, the direction signal and the pulse signal are all TTL output.

Difference connection is recommended in RDD6584G system.
The polarity of the direction signal can be changed in the factory parameters, and the valid edge of the pulse signal can also be changed.
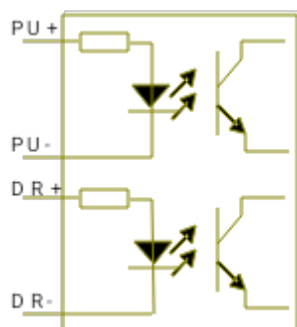

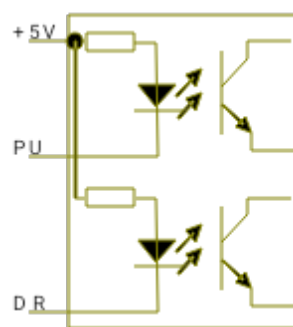Figure: 6.1-1 Four Inputs, Independent
Input Signal of Driver

Figure: 6.1-2 Three Inputs, Common-anode
Input Signal of Driver

6.2 Examples of Motor Driver Connection

The connection between the motor driver and the RDD6584G controller is given up as chapter 3.3: Electric connection.

7 Examples of Extended Equipment Interface

The extended communication port, which named CN1, included two ways RS232 ports. The first way can communicate with EPLC400 or wireless handset, which are developed by RuiDa Technology Co.,Ltd. The second way can also communicate with wireless handset or other equipments.

Below is the connection instruction.

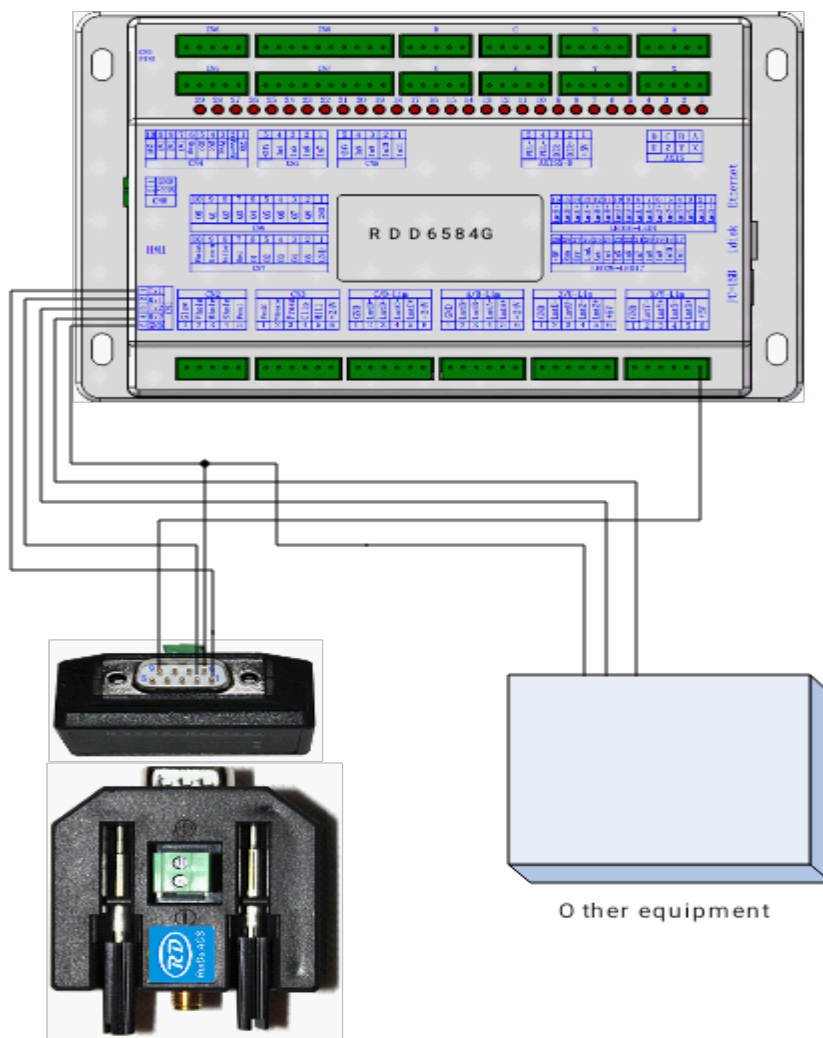## 7.1 Example1:Wireless handset connect to channel-1

Figure 7.1-1: BWK301R to channel 1, other to channel 2

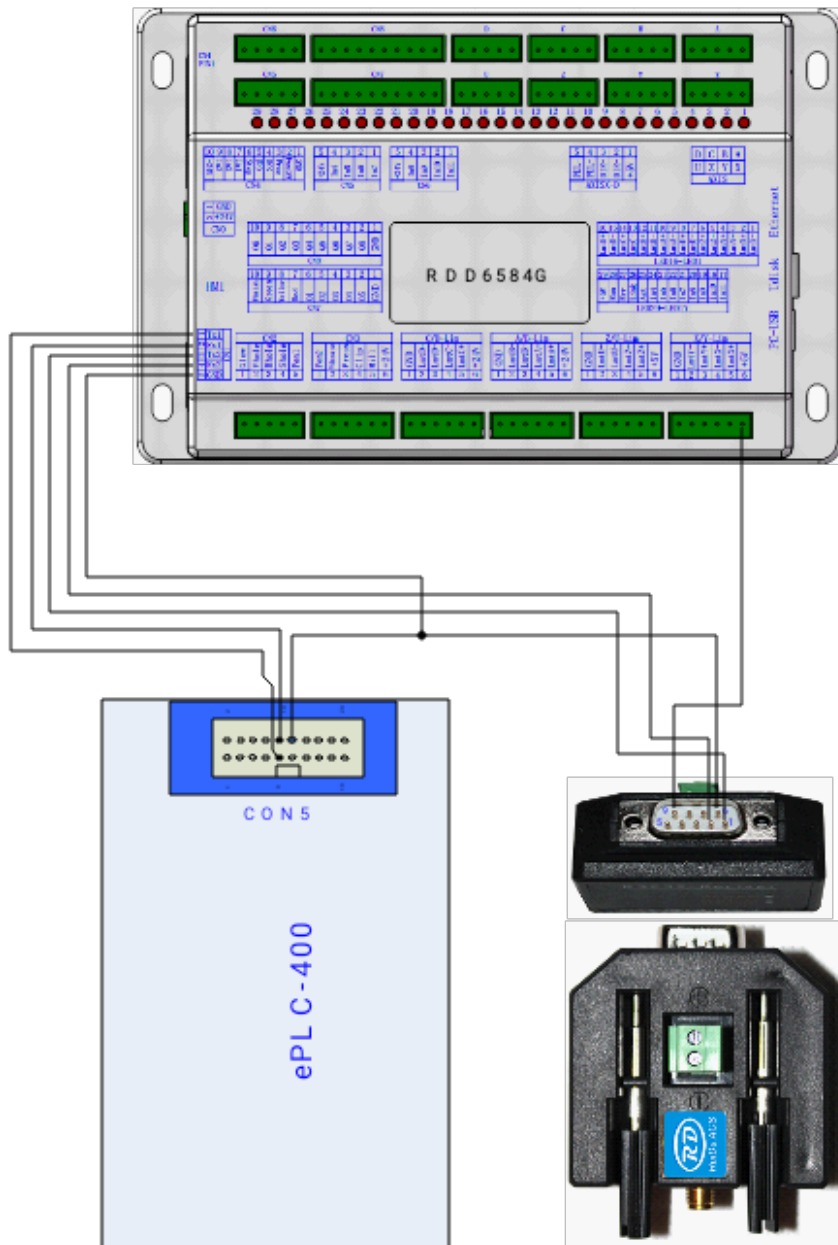## 7.2 Example2:Wireless handset connect to channel-2

Figure 7.2-1 :EPLC to channel 1, BWK301R to channel 2

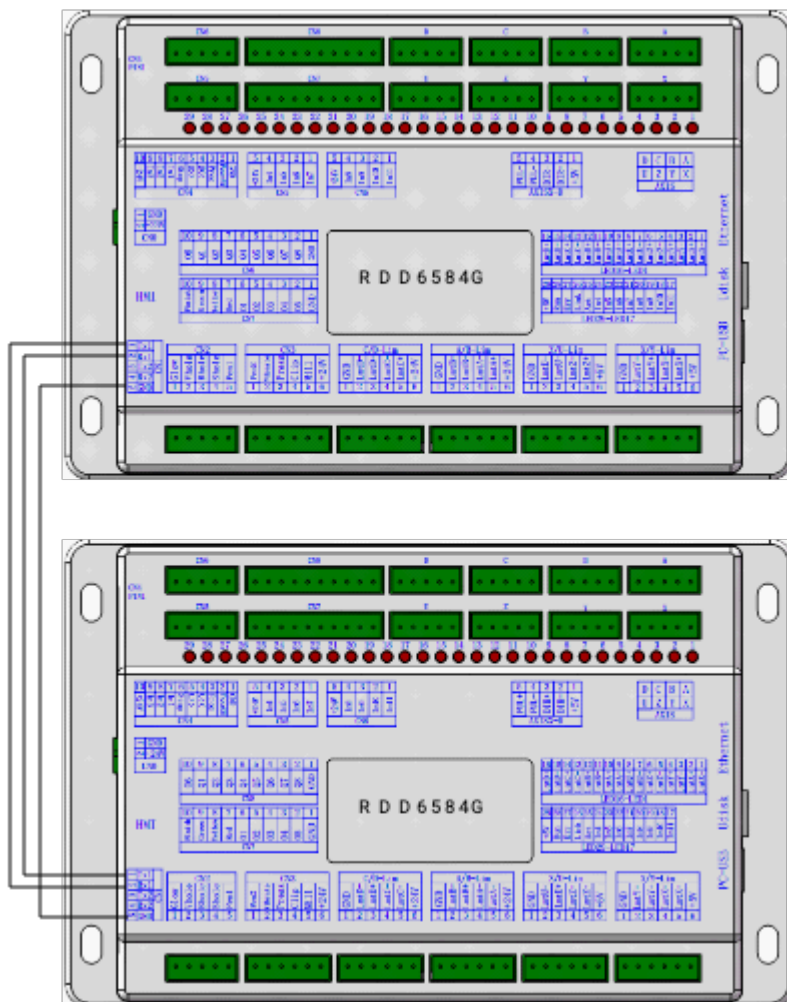## 7.3 Example3: Communications between two controllers

Figure 7.3-1 ：communications between two controller

8 Operating Instruction for Panel

This chapter introduce the function of all kinds of buttons on the touch screen.

8.1 Main interface

8.1.1 Instruction for main interface of touch screen

When system is powered, x~d axes all will go to the origin point to research the origin limiters if the start-up reset parameter is enabled, when all axes have researched the origin limiter, the touch screen will show as below:

Figure 8.1.1-1 Main interface

On this screen, the above area is the information column, in which, selected file name and system time are shown. If there has no file in controller, the file name will be shown as 'TempFile'.

In right down corner, the status of Ethernet connection is shown.

On this screen, the 'exigency reset' is a button, other are menu. If push the button, the whole system will reset well as being power on reset.

8.1.2　Screen rectification

The touch screen is rectified in factory, but, sometimes the screen resistance changes because of the temperature, extrusion etc, so the touch point is not exact, at that time, user can rectify the touch screen again. Two types of rectifying method are introduced as below:

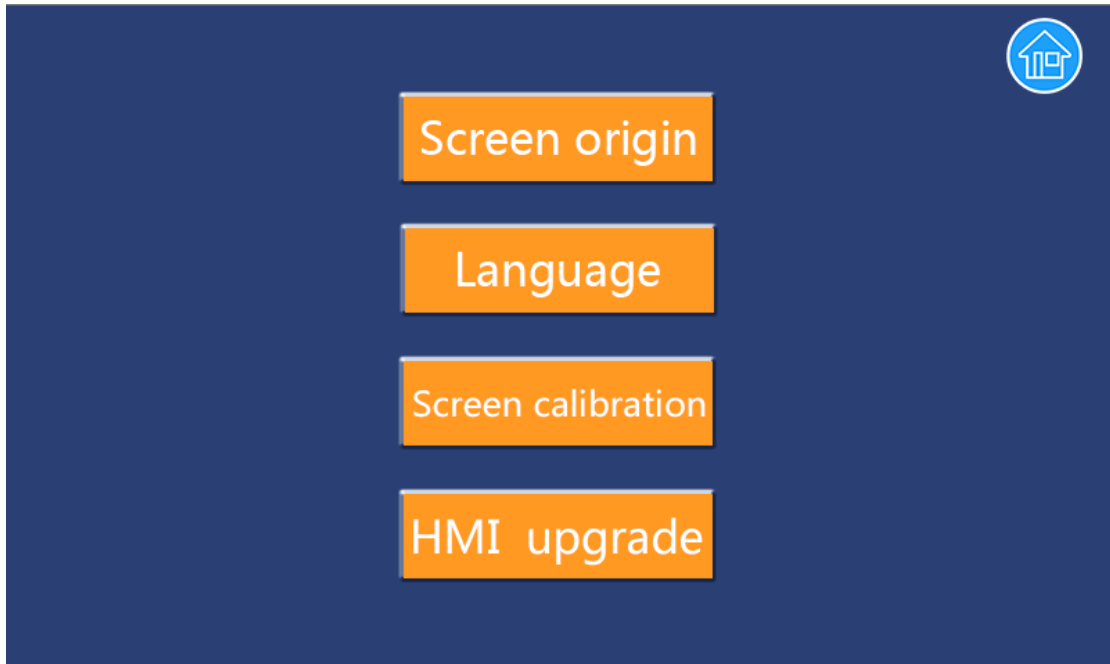**Method1**：Push the '**Menu**'　button on the main interface, the screen show as below:

Figure 8.1.2-1 interface of Menu

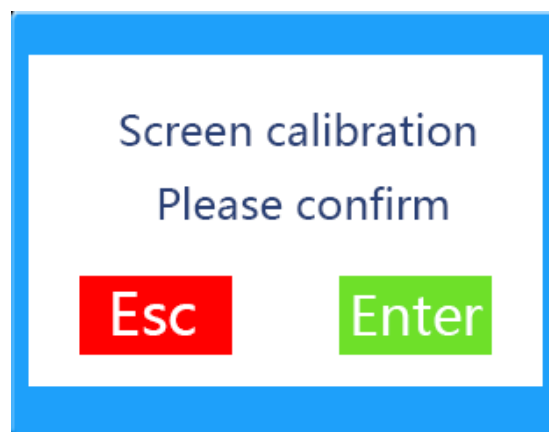Push the '**Screen calibration**' button, the screen show as below：

Figure 8.1.2-2 confirmation interface for calibration

If the 'Enter' button is pushed, the screen will show as below:

Figure 8.1.2-3 calibration interface

Using touch pen dotted on the center of the cross cursor, then the cross cursor will change the position, continue dotted it, when the cursor's coordinate changes five times, the calibration finished.

This calibration method is used if the offset of the touch position is small enough, that is to say, if there have too much offset, then the method 2 is used, which is introduced as below.

Method 2：Firstly confirming the screen is on the main interface, then on this main interface, using touch pen dot on a fixed point for up five seconds, then the screen will show as figure 8.1.2-2, if 'Enter' is pushed, the screen will show as figure 8.1.2-3, or, if there is no operation on screen 8.1.2-2, three seconds later, the screen also will show of oneself as 8.1.2-3, on this interface, user can calibrate the screen the same as method1.

8.2　Parameter settings

8.2.1　Introduction for parameter menu

On the main interface, if 【Device】 button is pushed, it will show as below:
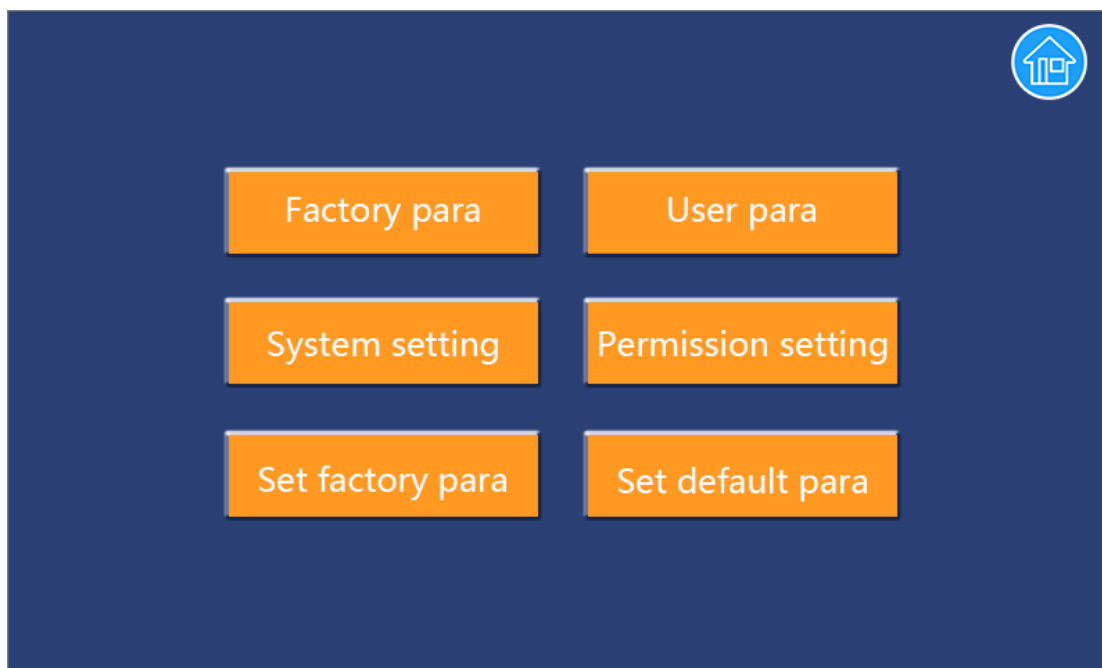

Figure 8.2.1-1 interface for Device

On this screen, the blue button on the top right corner is a shortcut key to return the main interface(Figure 8.1.1-1).

On the interface for device, there have six items, some are introduced as below:

【Set Fact Para】：

After the "Set Fact Para" button is pushed, the interface will show the specific password to be entere. If the password is true, then all the factory and user parameters will be writed to a backup area in the controller memory.

After the manufacturer regulates all parameters of the machine well (including all manufacturer parameters and user parameters), this function can be used to store the well-regulated parameters to help users to recover the original parameters (including all manufacturer parameters and user parameters) through selecting "Recover Para" when they regulate parameters improperly.

When there need input some number or character, the screen will shown as below:
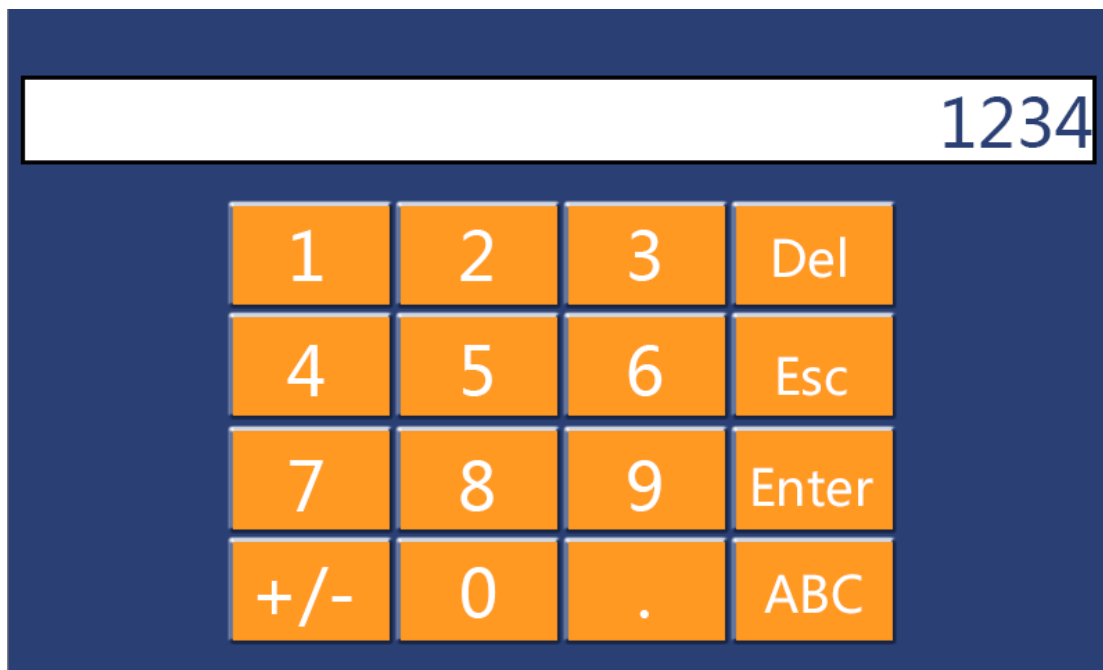
Figure 8.2.1-2 numeric keyboard

On this screen, user can push 'ABC' button to change the keyboard, show as below:

Figure 8.2.1-3 character keyboard

User can push '123' button to change back the keyboard.

【Set Def Para】：

After the "Set Def Para" is selected and the Enter key pressed, the "Successful Recovery" dialog box will pop up to prompt that all manufacturer parameters and user

parameters are recovered successfully. You can return to the previous menu by press the Enter key.

8.2.2   The logic of reading or writing factory and user parameters

The detail meaning of all factory and user parameters introduced in chapter nine' **Manufacturer/User Parameters Explanation**'.

After system power on, firstly enter into the interface of 'factory para', the system need users enter the dedicate password, which is 'RD8888'.

It is all the same to operate the interface correlative factory and user parameters, for example, reading or writing axes parameters of factory parameters are introduced as below.

Figure 8.2.2-1 interface of axes parameters

There are total eight groups parameters, each group is all the same as another. In the mode of two controller associated control, the button 'MainCard' is used to exchange the main controller and the slave controller, if maincard is selected, all parameters are displayed to main controller, then if slavecard is selected, all parameters are displayed to slave controller. And, if in the mode of single controller, the 'MainCard' button is invalid.

After system power on, firstly enter into the interface of 'axes para', the button of 'Write' is grayer, that is to say, the button cann't be pushed, only when user pushed the 'read' button, the 'write' button will be bright and can be pushed. In addition, if user exchanged the main or slave controller, the 'write' button will grayer again.

When certain axes parameter is selected, the axes number button is grayer to denote which axes is selected.

In the axes parameter interface, pushed the 'read' button, the controller will read all

eight axes' parameters, so, if many parameters need be changed, user can push the 'write' button after changing all the parameters.

8.2.3 System setting

In the system setting interface, there are two item named 'Origin setting' and 'IP setting'.

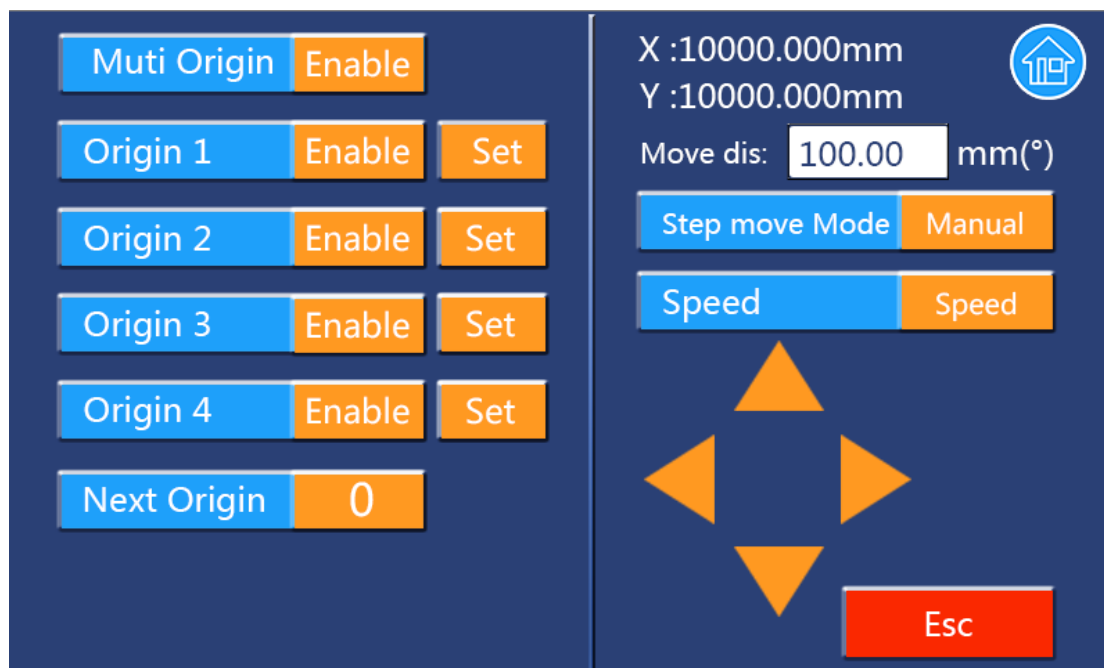Origin setting interface show as below:

Figure 8.2.3-1 Origin setting interface

This function of origin setting is to say the multiple origin function, which is used in application of exchange running between multiple origin.

On this interface, the items are introduce as below:

【Multiple Origins Enable】：

"Yes" or "No" can be selected. If you select "No", the system will use the single-origin logic. You can press the "Origin" key and set the origin, and only this origin can become valid. If you select "Yes", the system will use the multiple- origin logic and the "Origin" key on the keyboard become invalid. In such a case, the parameter of each origin must be set in the menu as follows.

【Origin Enable1/2/3/4】：

After the multiple-origin logic is enabled, the four origins can independently be prohibited and enabled.

【Set Origin 1/2/3/4】：

After the multiple- origin logic is enabled, you can stop the cursor at "Set as Origin 1/2/3/4". Press the "Enter" key on the keyboard and the system will take the coordinate figures of current X/Y axles as the corresponding ones to the origin 1/2/3/4.

【Next Origin】：

There are such five digits as 0~4 for option, which are the origins to be used for the next figure. Origin 0 means the origin set by the "Origin" key on the panel in the single-origin logic. 1~4 means the serial number of the origins in the multiple- origin logic. Next origin can be modified to any one of origin 1~4, so as to control the start location of next work (the premise is that the origin is enabled), but it can't be modified to origin 0.。

	Once the multiple- origin logic is selected and if the serial number of the next origin is 1 and four origins are enabled, when the memory file function is started or the processing file is uploaded into the PC and this file selects "Take the Original Origin as current Origin", the work started for each time will use different origins. The rotation order of origin is 1->2->3->4->1->2…….
Prompt	

IP setting interface shown as below:
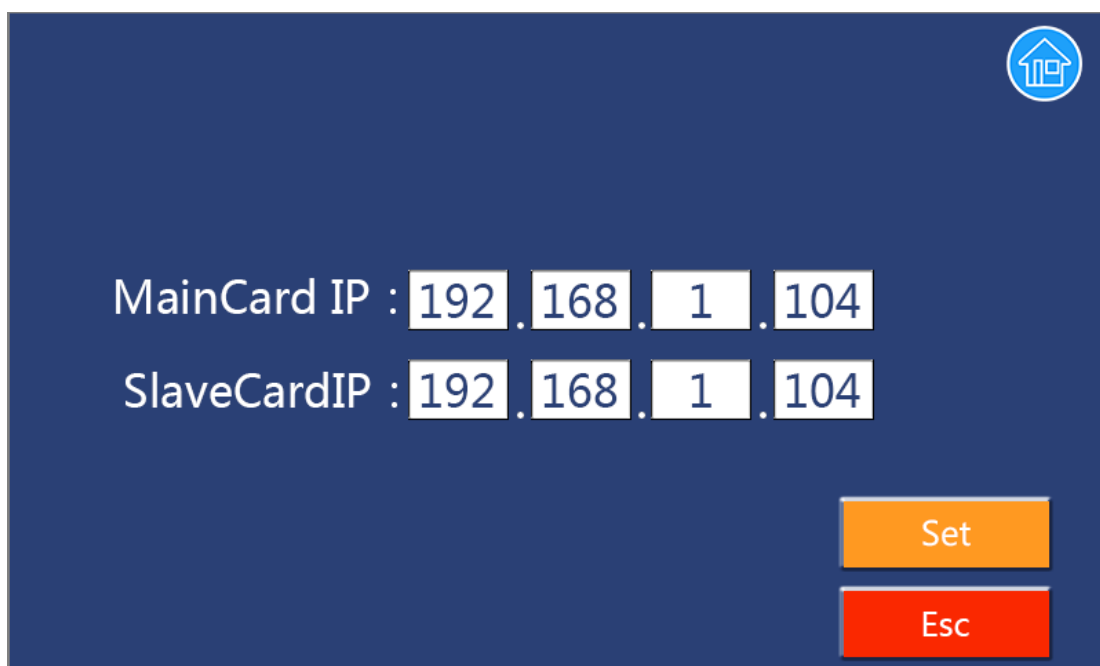
Figure 8.2.3-2 interface of IP setting

In the mode of two controller associated control, there are two groups IP setting, otherwise there is only one group.

8.2.4   Permission setting

Push the 'permission setting' button, the interface shows as below:

Figure 8.2.4-1 permission interface

The above information dedicates that the permission function is invalid, and, at this time, the license can't be changed. Only when controller's permission function is valid, the license can be changed, then, user can encode or decode the controller.

8.3   File operation

On the main interface, if "File" button is pressed, it will show as below:

Figure 8.3-1 interface of file operation

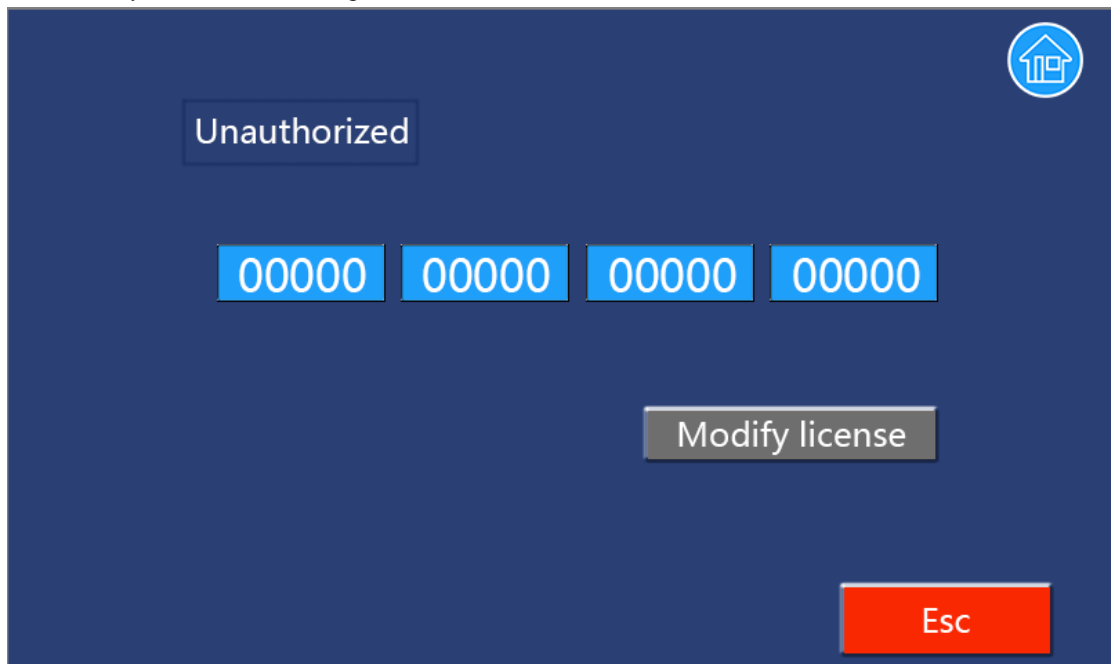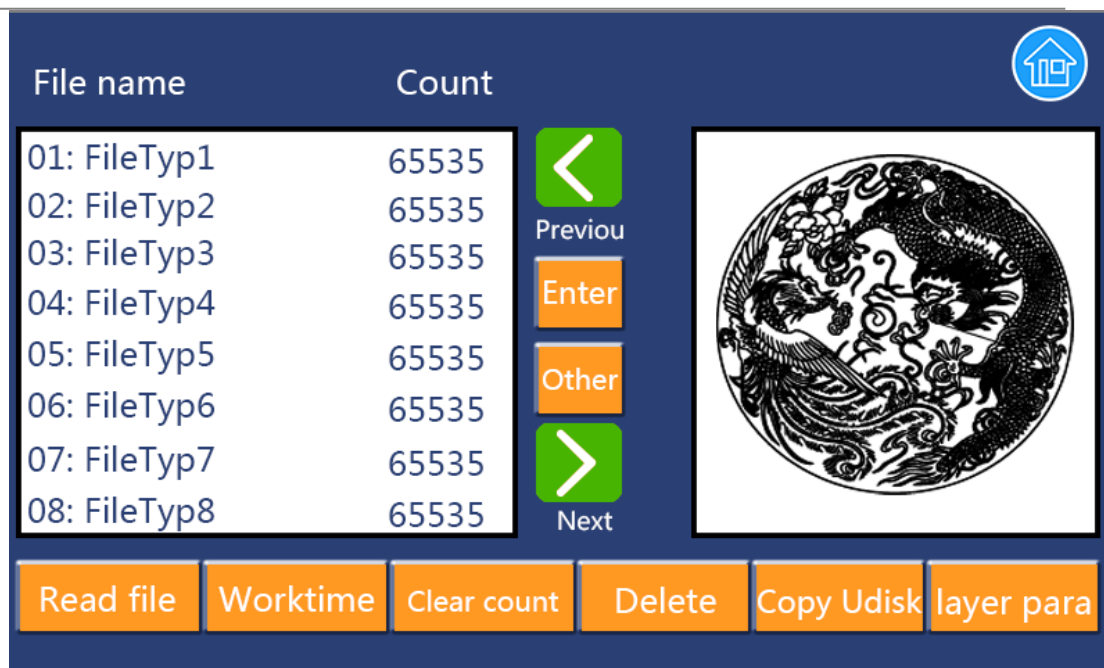When showing this menu, the system would read the memory file firstly, the file name and the work times would be listed in the area, and the selected file is previewed in the bottom right area.

On this interface, the items are introduce as below:

【Read mem file】:read the memory file list;

【Work time】: To forecast the running time of the selected file, and the time is accurate to 1ms;

【Clear count】: To clear the running times of the selected file;

【Delete】: To delete the selected file in the memory;

【Copy to Udisk】: To copy the selected file to Udisk;

【Layer Para】：Push this button, user can change the layer parameter of the selected file, such as the layer run speed.

【Other->U Disk】:If this button is pushed, it shows some item, introduction as below:

- **Read Udisk**: read the file list in the Udisk;
- **Copy to memory**: copy the target Udisk file to the memory;
- **Delete**: delete the selected Udisk file;

Prompt	This system supports such file formats of Udisk as FAT32 and FAT16, but it can identify them when the files are put under the root directory of Udisk. The file name of more than 8 characters will automatically be cut out by the system. The file name that has only English letters and digits will not show when they are copied to the mainboard. The files copied from the mainboard to Udisk will be placed under the root directory of Udisk.

【Other】: If the "Other" entry is pressed, the system will show as below:

- **Current work time**: To forecast the running time of the current file(the current file No. is showed on the main interface), and the time is accurate to 1ms.
- **Clear all count**:: To clear the running times of every file in the memory;
- **Delete all file**: To delete all memory files;
- **Format speedily**: o format memory speedily, and then all the files in memory will be deleted.
- **Format drastically**: To format memory drastically, and then all the files in memory will be deleted.

8.4   Menu operation

In the main interface, pushed the 'Menu' button, the screen will show a lower interface, in which, there are three items respectively named 'Screen origin setting', 'Langue setting' and 'Screen calibration'.

【Screen origin setting】：

In the lower interface, there are four points can be selected: top-left point, top-right point, bottom-left point and bottom-right point. If the origin position is incorrectly selected, the file's contrail will be false, it will be mirrored to the fact figure.

【Langue setting】：

In this interface, user can exchange the langue of the screen.

8.5   Debug operation

8.5.1   Main interface of debugging

On the main interface of the system, press the debug button (only when the system is idle or the system is suspended, the debug button can be pressed), and the interface pops up as follows:
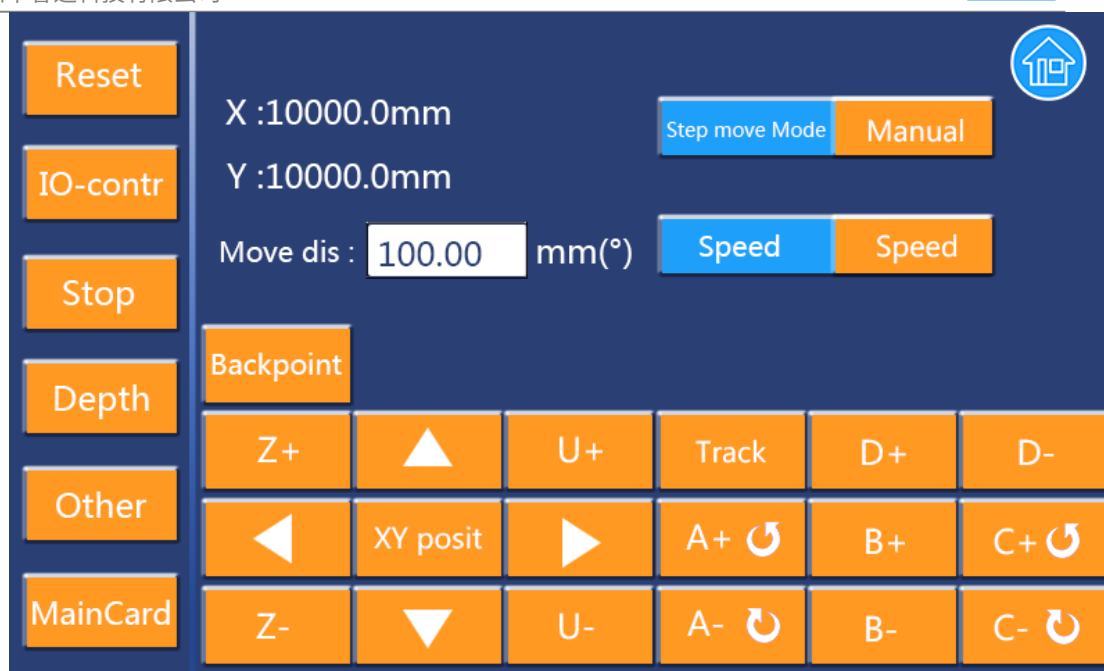
Figure 8.5.1-1 debugging main interface

In the interface, the left column is used to select some debug function. Most entries have lower level menu, and the right area is used for debugging and display.

On the left column, the master / slave card logic button is used to switch the master card or slave card of the dual asynchronous machine. When it is not a dual head asynchronous machine, the button is no useful and the master card will always be displayed. Stop button is used to stop all debugging / processing events, such as stopping the single axis for fixed distance, stopping processing and stopping other debugging events.

In the right area, the XY coordinates can be displayed in real time. In addition, three parameters for debugging can be set up:

[Step move mode]:

The manual or continuous moving mode can be switched to choose. When choosing the manual moving mode, the corresponding axis movement for a fixed distance is carried out by the direction key. When in manual mode, only pushing down the direction key is needed, and popping up is no response. When the selection is continuous movement mode, hold down a certain direction key, the corresponding axis will move until the key upspring, or when the maximum coordinates will arrive at the axis, the axis deceleration stops, and the coordinates can be guaranteed in the maximum range. Whether manual moving or continuously moving, the speed of movement is determined by the slow or fast switching parameters.

[Move distance]:

When the manual mode is selected to move, the specific distance can be set to 1um accurately. The distance value is invalid when the mode is continuous.

[Speed slow or fast]:

Fast / slow speed can be switchable, when the choice is fast, the moving speed is the fast speed value in the user's speed parameter, all the same, if slow speed is selected, the moving speed is the slow speed value in the user's speed parameter.

The other buttons in the right area of the main interface 8.5.1-1 are explained as follows:

【Back point】：

By pressing this button, the controller drives the XY to the location point set by the user. If other axes are enabled, they will be driven back to the zero coordinate of the axis.

【XY posit】：

This button is used to set location point for the XY axis (It takes effect only when single origin logic is enable), the controller will record the current coordinates of the current XY axes as the location point coordinates. The next processing will be processed with the point as the relative origin of the graphics (if the red light is positioned, the red light migration will be made). After setting up the location point, it has the function of power outage preservation, unless the target is pressed again next time.

【Frame】：

After pressing, the controller moves the border movement on the currently selected file. If the frame exceeds the processing area of the machine, HMI will be prompted.

【X~D axes direction keys】：

It is used to manually move the eight positive and negative movements of the X~D axis, including point movement or continuous movement.

8.5.2   Debugging for Resetting

On the debug main interface, click the reset button to enter the lower page. There are two columns [**system reset**] and [**axis reset**].

【System reset】：

When the button is clicked, all the axis will reset to search the origin limiter if the resetting function is enabled in the factory parameter.

【Axis reset]】：

After clicking the button, it will also enter the lower menu. There are 8 columns in the menu, which are the single axis reset buttons of the X~D axis, which can be realized by single axis reset for a specific axis, also, only when the resetting function is enabled, the axis can reset to search the origin limiter.

8.5.3   IO debugging

In the debug master interface, click on the IO control button and enter into the lower page. There are two columns of the input port and the output port, which can be used to observe and debug all the input and output ports of the controller.

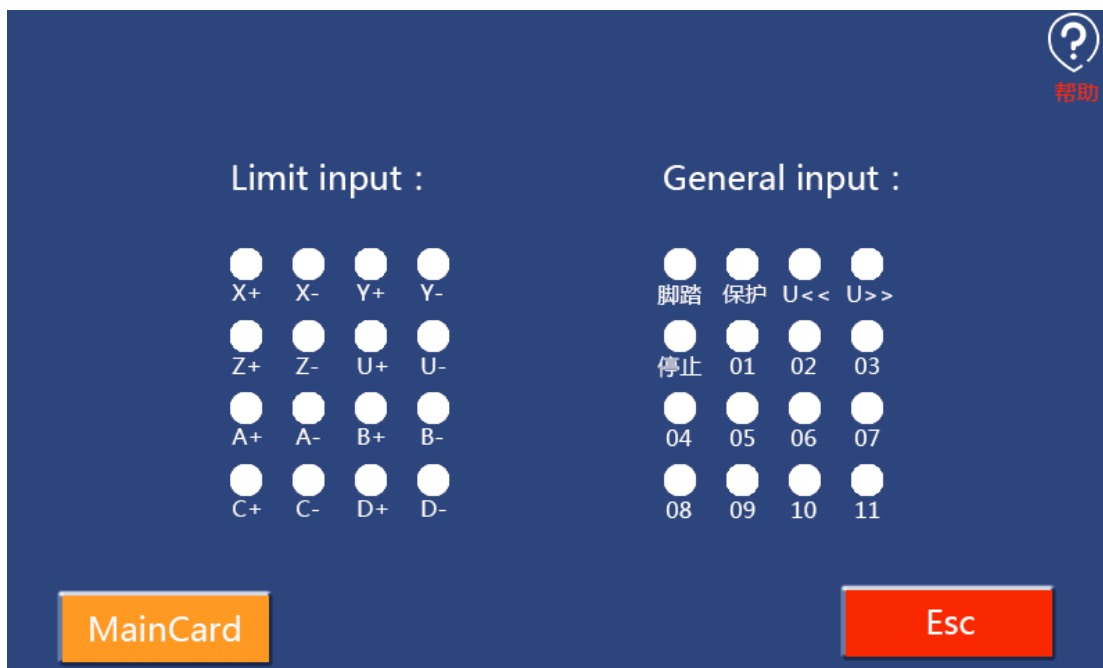Click [input] and the pop-up interface is as follows:

Figure 8.5.3-1 input debugging interface

The interface has a total of 32 input lights. On the left side, there are 16 limit input indicators, which correspond to the positive and negative limits of X~D's total of 8 axes. Alight on the right there is a 16 - way general input port.

For all input ports, when the input port is unwired or the input is high level signal, the indicator light is white, indicating that the input is invalid; when the input port is low level, the indicator light is red, indicating that the input is effective.

It can be intuitively observed in the interface to see if the input is valid. When a typical switch such as a limiter switch is debugged, when the limit switch of the machine is touched manually, and the light of the corresponding indicator is checked to judge the good or bad of the input port or the limit opening itself.

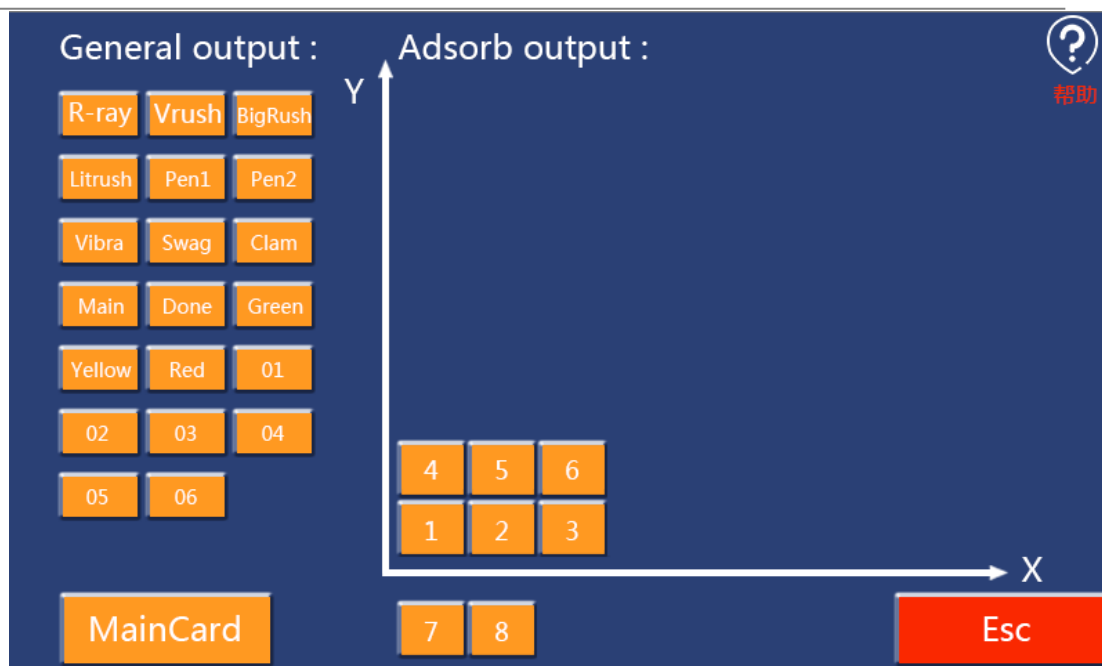Clicking on the output port, the pop-up interface is as follows:

Figure 8.5.3-2 output debugging interface

On the interface, the left side is 20 general output indicator lights. The meaning of each indicator is seen in Chapter fifth of this article. Entering the page. if a certain indicator is red, it indicates that the output port is in the state of conduction, otherwise, it is closed.

On the right side, the 8 way is used for adsorption. The coordinate system in this page is one-to-one correspondence with the actual coordinate system of the machine, depending on the location of the user's screen origin and whether or not the XY axis is exchanged. In the coordinate system, the number of total output points in the actual absorption area is determined according to the lattice numbers in the XY direction set in the adsorption parameters of the manufacturer's parameters. The above figure 8.5.3-2, as an example, shows that the number of adsorbed lattices in the X direction is 3, the number of the lattices in the Y direction is 2, a total of 6 Adsorption outputs, and the remaining 2 adsorption output points: 7 and 8 adsorption output, individually arranged under the coordinate system, indicating that these two output points are not used to control the attachment preparation, but can be used for other purposes.

For all 28 output points of the output page, if you click on an output, you can manually turn on or turn off the output. If the output is open before clicking, the output will be closed after clicking. If the output is closed before clicking, the output will be opened after clicking.

8.5.4 knife depth debugging

At the debug main interface, click the knife button and enter the lower level page as follows:
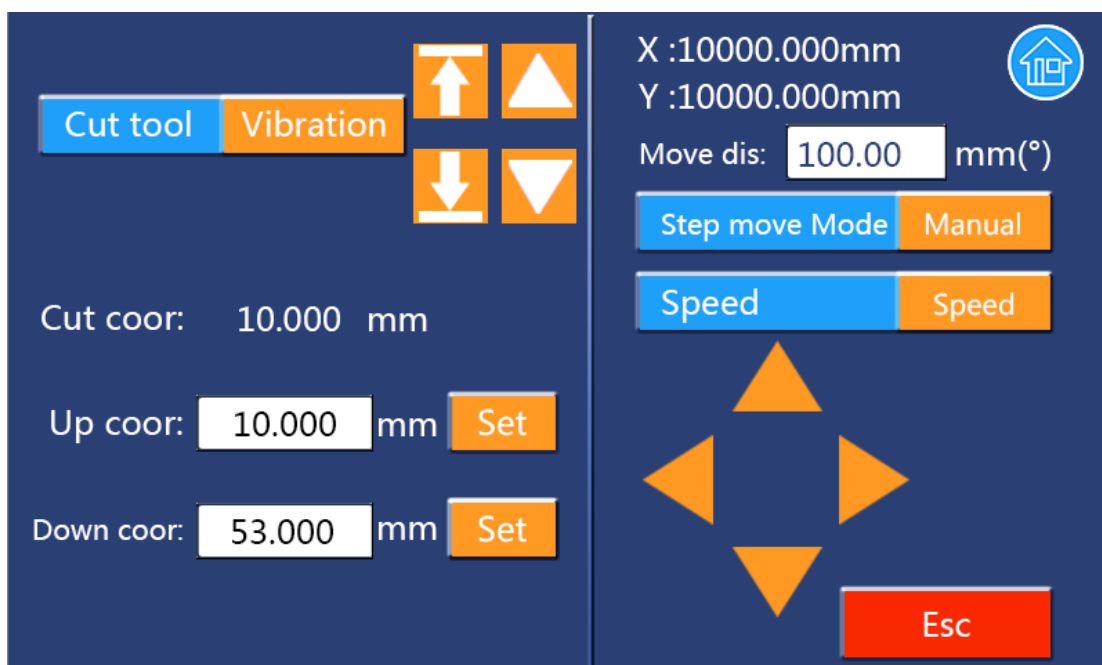

Figure 8.5.4-1 knife depth debugging interface

On this interface, the right side is the direction keyboard for XY axis debugging, including the choice of the master or slave card, the selection point moving or continuous moving mode, and setting the point moving distance value, and selecting the fast or slow gear of the speed.

The left area is used for cutting tool depth, in which the tool can be selected as a vibrating knife, a roller or a milling cutter. If a machine is equipped with a vibrating knife, a roller and a milling cutter at the same time, the controller is driven by the D/B/Z axis respectively.

The current coordinate bar shows the current coordinate value of the current tool. The "up coordinate" column shows the coordinate value of the tool set last time, and the "down coordinate" shows the setting of the knife coordinate value that the tool set last time.

Represents a key to drive the current cutter to zero coordinates;

Represents a key to drive the current cutter to the last setting of the cutter coordinates. If the desired tool depth coordinates are similar to the depth of the last set,

this button can be used to drive the tool to the last position of the knife, then user can move the tool fined up and down, when the coordinate is ok, press the set button, then the new coordinates is set.

 The two buttons are used to manually move the rising and descending of the current cutter, and you can also choose to move in a fixed distance or move continuously, and to move the fast or slow gear. When the tool is moved to the target position manually, pressing the set button, the current coordinates are set to be the new up or down coordinate.

At the same time, you can also click on the numeric dialog behind the lifting knife coordinates. After the number of the numeric keyboards that are popped, the coordinates of the corresponding lifting knife can be set directly.

	The lifting knife coordinates can be set in two ways: 1: directly click the digital dialog behind the lifting knife coordinate, and then enter the number to determine, so that the coordinate value of the lifting knife is set directly(at that time, user cannot press the set button). 2: by setting the set button, when the tool is driven to the target position, the current coordinate of the corresponding tool is set to the up or down coordinate.

8.5.5　Other debugging

Other debugging items belong to the machine manufacturer's debugging project, so when entering the page, you need to enter the manufacturer's parameter password. On the main screen, click the other button to enter the lower page:

Figure 8.5.5-1 other debugging interface

There are five options for this page. When debugging, the machine will have the corresponding action, during this period, HMI will pop up "system busy" prompt information, in this time user can not trigger other keys, if the stop key is pressed on the information prompt interface, the debugging process will be canceled.

一[Table debug]:

Click on the table debugging button to display the following menu:
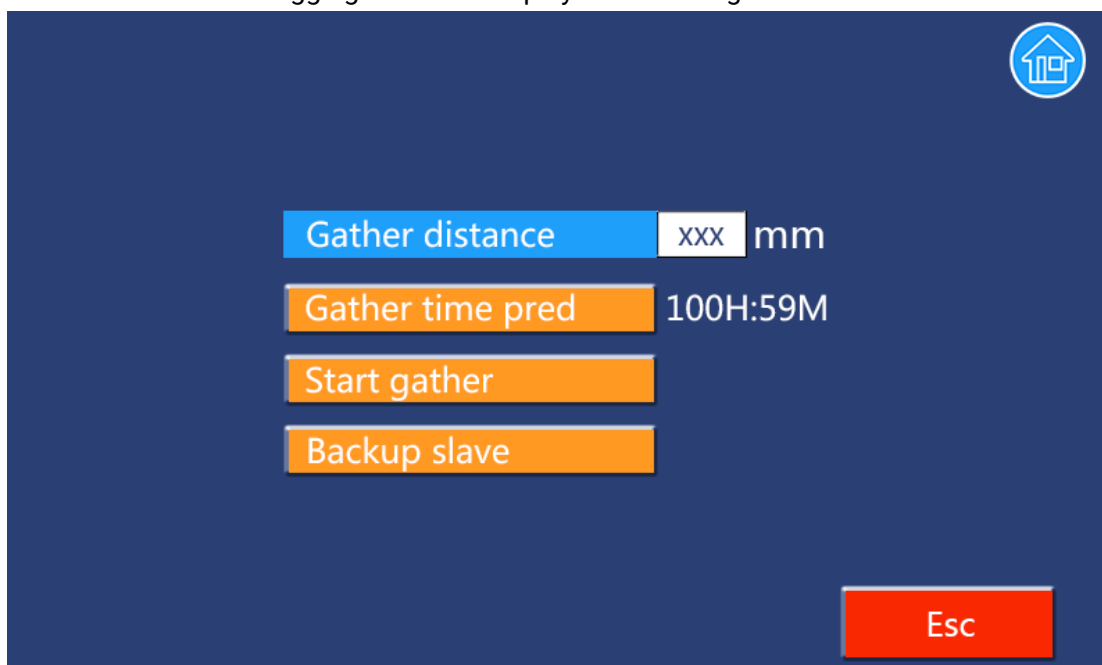

Figure 8.5.5-2 table debugging interface

Under this interface, the platform data of the machine can be collected and saved.

First, a reasonable collection interval value is set up, and the interval value can be set

in the range of 20~200mm. In general, the spacing 50mm can be set. The smaller the acquisition distance, the longer the acquisition time will be. You can click time button to predict the acquisition time. Click on the start button, then the controller will collect the width of the entire machine. After collection, HMI will have a hint of success.

After the success of the acquisition, in the user parameters, the vibration knife / roller / milling cutter can be used to make the table adaptive function. If the ability is made, the controller will make real-time dynamic compensation for the cutting tool position according to the machining trajectory. If there is no data acquisition to enable the platform adaptive function, when it starts processing, HMI will prompt no platform data and prohibit processing.

Prompt	When clicking [acquisition time prediction] and [starting acquisition], the HMI will indicate whether the user has secured a positive limit signal on the D axis, which name LimitD+, because the acquisition head will move down until the LimitD+ is triggered. So before collecting, it is necessary to ensure that the positive limit signal (LimD+) of the D axis has been received. Otherwise, it may lead to the mechanical damage to the machine and the head of the acquisition head.

二 [eccentrically debugged with the main card]:

The button is pressed, and the controller performs debugging on the eccentricity of the main cutter.

三 [eccentrically debugged with the slave card]:

The button is pressed, and the controller performs debugging on the eccentric of the slave cutter. This function is used for eccentricity debugging of slave head of double head asynchronous machine. If it is not a double ended asynchronous machine, the button must not be triggered.

四 [XY offset debugging]:

This button is used to debug the offset value of all devices relative to the XY direction of the vibration cutter. For all equipment, if the device is in the positive direction of the X/Y of the vibrating knife, the offset value is positive. If the device is in the negative direction of the X/Y of the vibrating knife, the offset value is negative.

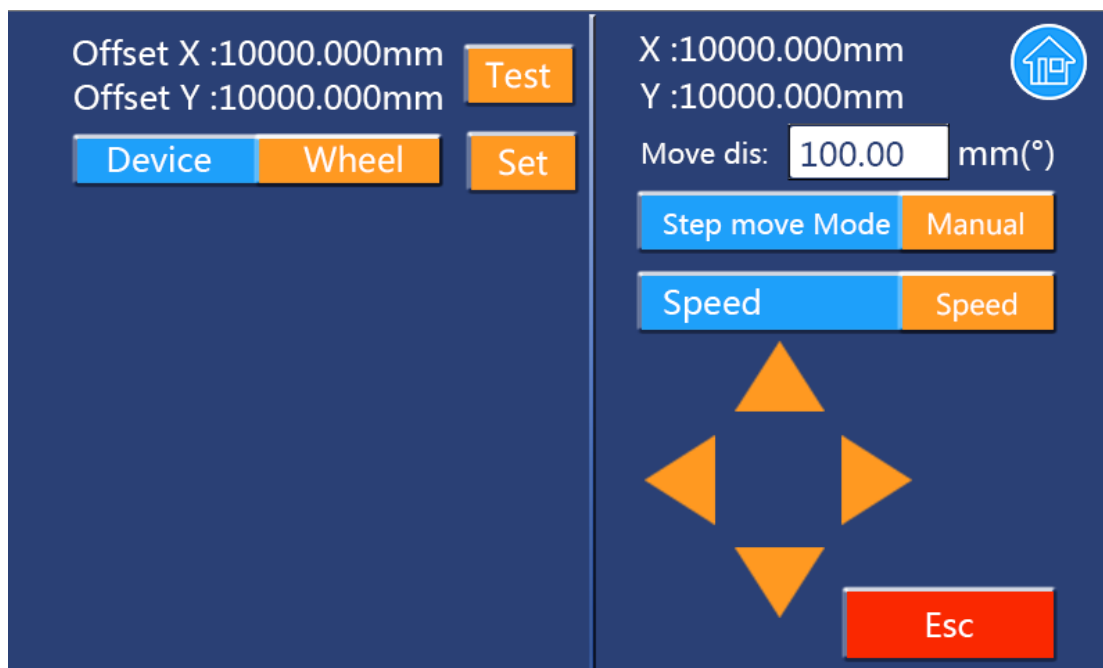After pressing the button, the following interface is popped out:

Figure 8.5.5-3   XY offset debugging

Similarly, the movement of the right area for the XY axis is no longer described here.

The top of the left area is the offset value set last time. When the controller is initially released, all offset values are 0. [test] button is used to debug the offset value displayed correctly.

	Every time you enter the page, or after switching the device, or after switching the Master / Slave card, you must press the test button before setting the new offset value, and then set the new offset. Otherwise, if the button is not pressed first, the set button is invalid.
Prompt	

In the equipment column, you can choose the equipment that needs to be debugged, and you can choose the press wheel, the milling cutter, the pen 1, the pen 2, the red light, the knife eye, the V/I flush, the big / small flush etc.

Take the offset of debug pen 1 as an example, the migration debugging process is described.

First choose the [device] type to be pen 1, which indicates that the offset of the pen1 is debugged. After selecting the pen 1, the last offset value of the pen 1 will be displayed on the left upper area. Then press the button, then the controller will determine whether the current position is allowed to lower the knife. If not, it will prompt the border to cross the boundary. If the knife is allowed, HMI will pop up the " system busy " prompt, then the machine vibrate, first cut a cross with the vibrating knife, cut off the vibration, and then draw a cross with the pen 1. The user can observe whether the two cross is completely overlapped. If it is completely overlapped, the offset value of the last set is correct. If it is not completely overlapped, the XY axis can be moved at this time, so that the center

position of the pen 1 is just aligned with the central position of the cross cut by the vibration knife, and then pushes the set button, the new offset value of the pen 1 is set. To see if the new offset is reasonable, you can click the test button again for testing.

When debugging, not each device offset will draw two crosses, for example, when debugging V flush migration, it is first to use a vibration knife to cut a cross, and then the controller drives V to the center of the cross, then check whether the V punch really points to the center position of the cross processed by the vibrating knife, if true, V punch offset if ok, otherwise, move the XY axis, make the V punch center on the center of the cross, then press the setting, then the new V offset is set.

五 [angle offset debugging]:

The button is used to debug the origin offset angle of the vibration knife and the pressure wheel. The concept of offset angle is explained by the coordinate system of the fourth chapter and the rotation direction of the rotation axis and the origin angle of the rotation axis.

After pressing the button, the following interface is popped out:
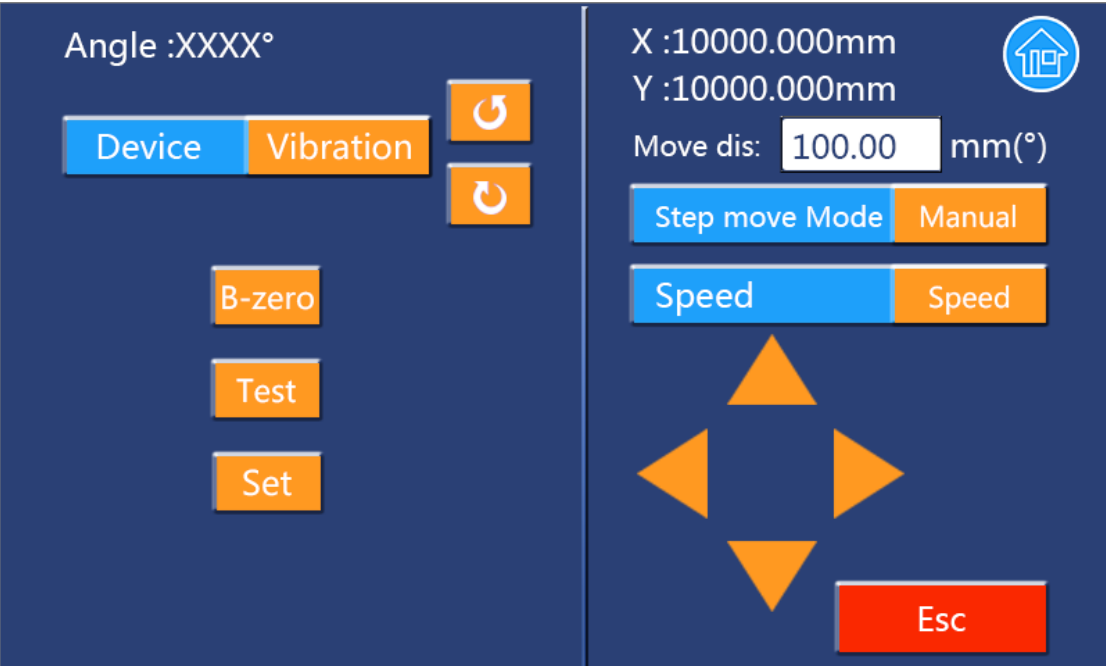
Figure 8.5.5-4 offset angle debugging interface

In the same way, the right area is used for the movement of the XY axis.

The top side of the left area is the last setting value. When the controller is initially released, all offset values are 0. The [Zero] button is used to drive the current device to the zero point. [Test] button is used to debug the current offset value is correct and reasonable. The set button is used to set a new corner value.

Prompt	Every time you enter the page, or after switching the device, or after switching the main / slave card, you must press the zero button to drive the knife to the zero point before setting the new offset value, then the new

| | offset value can be set, otherwise, if the button is not pressed first, the set button is no useful. Whether the new offset angle is reasonable can be tested and verified by the test button. |

In the [equipment] bar, you can choose the equipment that you need to debug specifically, and you can choose vibrating knife or pressure wheel.

Taking the offset angle of the vibration cutter as an example:

The debugging process of the offset angle is described. First, choose the type of equipment to be vibration cutter. After selecting the vibratory knife, the last offset angle of the vibratory knife will be displayed on the upper left side. Then press the zero button to drive the vibrating knife to the zero point (even if the vibrating knife is already at zero, each time it enters the interface, or when the master / slave card is switched, it is necessary to press the zero button first). At this time, it is observed whether the blade of the vibrating knife fits perfectly with the positive direction of the X axis, if it is all ok, it indicates that the last offset angle value is correct. If it is not completely overlapped, the rotation axis can be moved manually until the blade of the vibrating knife coincides completely with the positive direction of the X axis, then a new angle value can be set according to the set button.

After setting a new offset, in order to verify whether the new value is correct, you can continue to press the [test] button, and the controller will determine whether the current position allows running knife, and if not, the border will be prompted to cross the boundary. If the knife is allowed, HMI will pop up the "system busy" prompts, and then the machine will vibrate and cut a cross with the vibrating knife. At this time, we can observe whether the direction of the cross cutter cut by the vibrating knife is correct, so as to decide whether to adjust the origin offset angle angle.

8.6　Running operation

When the system is idle, press the [run] button on the main interface, and the following processing interface will be popped up:
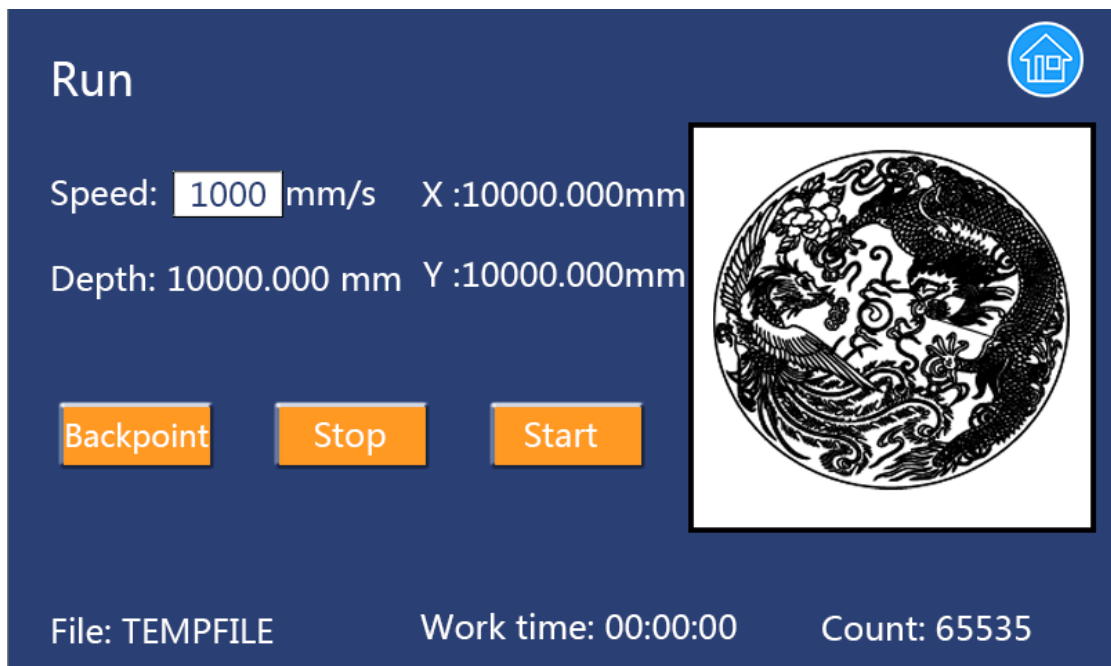
Figure 8.6-1 running interface

The upper left corner shows the current state of the system, which can be divided into three types: idle (or completed) / run / pause. The speed item shows the processing speed of the current machining graphics, the XY entry is the coordinate value of the current XY axis, and the knife depth is the depth coordinate value of the vibratory knife set by the current user.

The bottom area of the interface shows the file name of the current system selected file, and then the current processing time and the value of the current file processing.

The right area is the dynamic running track of the current processing document. When entering the page for the first time, the area is white blank. As processing proceeds, the system will gradually refresh the processed track in the track area.

There are three buttons on the interface, which are explained as follows:

[back to point]:

You can click the button when the system is idle or completed. After clicking, the system will drive the XY axis to the location coordinates set at the user's last setting, and rotate the axis back to zero. When the system is running or pause, the button is displayed in gray and can not be clicked.

[stop / track]:

When the system is idle / complete, the font is displayed as "track". Click the button, and the system will go on the border of the currently selected file, which is the same as the "track" button in the main debug interface. When the system is in operation or pause state, the button is displayed as "stop". When clicking the button, the processing flow can be cancelled.

[start / pause / continue]:

The button will switch different display words according to the system status. When the system is idle or completed, it is displayed as "start". At this time, clicking on the button will start the processing of the current file; if the system is in the processing state, the button is displayed as "pause", when the button is pressed, the current work can be paused; when the system is in a pause state, the button is displayed "continue", press the button at that time, you can continue processing the current file.

8.7 Prompting/alarm information

The prompting or alarm information is used to prompt user the machine is in running or some error status, such as:

NO.	information	note
1	Machine protected Work paused	The protection signal is triggered; user can only cancel the running work or reset the system.
2	Hard limiter protected	The hard limiter signal is triggered; user can only reset the system.
3	Mainboard encrypted	It prompts that the controller have been encrypted, user can only contact to the machine factory.
4	X/Y/XY Beyond	In tracking frame, it prompts that the file beyond the scope of machine.
5	Tracking Frame	In this time, other operation is invalid
6	Frame Beyond	It prompts that the running file beyond the scope of machine, the work is inhibitory.
7	Resetting	It prompts that one or more axes are resetting to origin.
8	System Busy	It prompts that the machine is busy, then other operation is inhibitory except stopping the running.

9 Manufacturer/User Parameters Explanation

9.1 Manufacturer parameters

（1）System parameters

Machine configuration

【Feed direction】：

Positive direction and Negative direction can be selected.

【Feeding axes】：X/Y/U axes can be selected.

【Enable feed back blow】：If it is selected, the controller will open the main switch of the fan with the clamp and reversed blow the material.

【Power-Off-Restart Delay】：

It can be set to be 0~3000ms. After the power-off of the electricity grid, the power supply of the system will not drop to 0 at once. There is a delay during this time. The delay value set here should basically consistent with the actual off-delay value. If the deviation of set value is larger, on the de-energizing for continuous engraving, either the figure processed for the second time is not closed with that before the cutoff, or it is coincided with that too much.

【Y-axis double driver】：

If machine has two Y-motor driver, then enable Y-axis double driver.

【HMI-XY exchange】：

If touch screen is parallel to machine's X axes, there is no need to exchange the 'HMI XY'; otherwise, user can exchange 'HMI XY'.

Multi-head auto layout parameters

【Multi-head number】：

The number of the all x axes in the multi-head auto layout machine.

【Driver type】：

Single belt or multi- belt are selected.

【Head distance N】：

This is the distance between the two X axis when they all return to the absolute origin in the multi-head auto layout machine.

【Machine mode】：The manufacturer mode and user mode are optional, if for the manufacturer mode, the machine allows user to move and process in the suspension coordinate system without reset; if the user mode is used, the machine must be reset to be controlled or processed.

XY leeway parameters

【X- leeway】：

When the X axis is reset, after touching the origin limit, the reset is completed. If the original offset is set, it will be offset after a certain distance. The position at this time is

the zero position of the X, but perhaps, the platform is the steel plate near the origin of the X axis, and this area is not allowed to be knives, so this distance is called the leeway of X-.

【X+ leeway】：

When the maximum amplitude of the X axis is set, drives X axis to the maximum coordinates, similarly, some area near the maximum coordinates is not allowed to be knives, then this length is called the X+ leeway. The concept of "Y-+" is similar to [X-+].

（2）*axle parameters*
X~D axle parameters：
【Direction Polarity】：

Modification of direction polarity can move the motor to the opposite direction. The modification purpose can move this axle to the origin on resetting. If this axle moves far from the origin on resetting, it means the direction polarity of this axle is wrong in setting and should be modified.

【Spacing Polarity】：

It is used to set the high and low level mode of spacing signal. When the motion axle arrives at the spacing position and input a low-level signal to the mainboard, the spacing polarity at this time should be set to be minus.

【scope】：

It means the farthest distance that the motion axle can move, which is determined in accordance with the actual condition of the machine.

【Origin Offset Distance/ Origin Offset Angle】：

On the linear motion axis, the parameter is called the origin offset. If this axle enables hard-spacing protection, generally this value should be set to be 2~5mm; if it is set to be 0, when this motion axle moves to the smallest coordinate, i.e. 0, this spacing may be validate, which may wrongly triggers the hard-spacing protection and scram the machine. If the hard-spacing protection is not enabled, this value can be set to be 0~5mm.

On the rotation axis, this parameter is called the origin offset angle. If the initial value is zero, when the rotation axis is reset, the cutter direction is not pointing to the positive direction of the X axis, and the rotation axis still needs to continue to rotate a specifically degrees to its own positive direction in order to make the tool cutter direction to the positive direction of the X axis, then the specifically degrees will be named the origin offset angle of the rotation axis.

【Control Mode】：

Double pulse or direction+single pulse are optional, in general, direction+single pulse is selected.

【Motor Stepping /Cycle Pulse】：

In linear motion axis, this parameter is called motor step, it means the impulse equivalent, the absolute distance gone by the corresponding motion axle when a pulse is delivered to the motor. Prior to the correct setting of this value, a large rectangle can be cut with the machine (the larger the figure is, the smaller the difference is). The motor

stepping can automatically be calculated according to the figure length and measuring length.

On the axis of rotation, this parameter is called cycle pulse, that is, when the tool rotates 360 degrees, the total number of pulses that the controller needs to send to the driver. If the current rotating shaft motor's fine fraction is 5000, the transmission ratio is 1:1, that is, the motor rotates for one cycle and the tool rotates for one cycle, then the cycle pulse is 5000, if the transmission ratio is 3:1, that is to say, if the motor rotates for one cycles, the cutter actually runs for 1/3 cycles, that is to say, the motor rotates for 3 cycles, then the tool can run for one cycle, that at this point the number of cycle pulses is 15000.

Prompt	For the XY axis, it is suggested that the reasonable motor fine fraction, the reasonable screw pitch and the transmission proportion be used to control the motor step distance between 4~10um. If the step distance is too large, the trajectory precision will be reduced, because the trajectory precision of the controller is fixed to 0.5 pulse equivalent values, and if the step distance is too small, the controller will increase the pulse transmission load, so that the machine can't run at high speed. For the rotating axis, it is recommended to control the cycle pulse at 5000~30000.

【Hard-spacing Protection】：
It is used for whether the hard-spacing protection of this axle is enabled.

【PWM Rising edge valid】：
To set the motor driver's pulse signal rising edge valid or falling edge valid. If this item is disabled, the pulse is falling edge valid, or, it's rising edge valid.

【Reset Enable】：
If the machine is provided with this axle, its "Reset Enable" should be opened; if no, its "Reset Enable" should be prohibited.

【Takeoff Speed】：
It means the speed of the motion axle in direct start from the idle condition. If this value is excessively large, it will make the motor lose steps, jar and even squeak; if small, it will reduce the running speed of the whole figure. If the inertia of the motion axle is larger (the axle is heavier), you can set a smaller takeoff speed; if smaller (the axle is lighter), you can increase the takeoff speed. For example, the typical value is 5~30mm/s.

Prompt	The takeoff speed of the manufacturer's parameters will be limited to other minimum speed parameters. For example, the turning speed in the processing parameters of the user parameters is the lowest starting speed in the whole processing, and this turning speed does not allow for a minimum of the manufacturer's XY takeoff speed. Similarly, for the key take-off speed, the take-off speed is not allowed to exceed the axle parameters.

【Maximum Speed】：

It means the maximum limit of motion speed that this axle can bear. This parameter has something to do with the driving force of motor, the inertia of motion axle and its drive ratio. For example, the typical value is 200~800mm/s.

Prompt	The maximum velocity of the axis parameter will limit the other parameters of the highest speed, for example, the speed of the cutting target, the target speed of the key move, the speed of the single axis motion, etc., are not allowed to exceed the maximum speed in the shaft parameters.

【Maximum Acceleration:】：

It means the maximum acceleration of the motion axle in accelerated or decelerated motion. If the acceleration is set too large, it will make the motor lose steps, jar and even squeak; if too small, it will cause the reduction of acceleration so as to reduce the running speed of the whole figure. For the axles with larger inertia, such as Y axle corresponding to the beam, its typical setting range is 800~3000mm/s2; for the axles with smaller inertia, such as X axle corresponding to the car, its typical setting range is 8000~20000mm/s2.

Prompt	The maximum acceleration of the axis parameters will limit the actual maximum acceleration used by other related axis motion. For example, the cutting acceleration, the acceleration of the idle moving, the key acceleration of the key moving, and so on, are not allowed to exceed the maximum acceleration in the factory parameters.

【Scram Acceleration】：

If this axle enables the hard-spacing protection, when this axle moves to the spacing position, it will scram operation at the scram acceleration. This value can be 2~3 times of the maximum acceleration for this axle.

Key parameters

【Key Move Takeoff Speed】：

It means the starting speed to move this axle by way of the keys on the keyboard, which can't be higher than the takeoff speed.

【Key Move Acceleration】：

It means the acceleration to move this axle by way of the keys on the keyboard, which can't be higher than the maximum acceleration of this axle.

【Key Polarity】：

It is used to control the movement direction of the axle that is moved through manual operation of the keys. After the direction polarity is correctly set, if you press the directional keys on the operating panel, this axle will move to the opposite direction. In such a case the polarity of keys should be modified.

（3）IO parameters

【If Enable Three-Color-Led or Buzzer】：

If enabled, the output ports in controller will drive the three-color-led and buzzer, then, these outputs be used to control other equipments.

【Selecting in Idle/Run/Pause/Error Status】：

In Idle/Run/Pause/Error Status, user can respectively select if turn on the led or buzzer.

（4）Parameter of vibratory knife

【Vibration cutter driving mode】：

The motor mode and IO mode are optional. When selecting the motor mode, the D axis is used to drive the vibration head to move up and down. If IO mode is used, the IO port is used to drive the vibration cutter head up and down.

（5）Milling cutter parameters

【Milling cutter offset X】：

This parameter means the milling cutter offset value corresponds to the vibration cutter head in the direction of X. If the milling cutter is in the positive direction of the X of the vibrating knife, the offset value is positive. If the milling cutter is in the negative direction of the X of the vibrating knife, the offset value is negative.

【Milling cutter offset Y】：

This parameter means the milling cutter offset value corresponds to the vibration cutter head in the direction of Y. If the milling cutter is in the positive direction of the Y of the vibrating knife, the offset value is positive. If the milling cutter is in the negative direction of the Y of the vibrating knife, the offset value is negative.

Prompt	By the manufacturer's parameters, it is possible to set a general offset value, or not, the final precise offset value can be accurately debugged on the offset value of various devices in the debugging function on the HMI touch screen. The concept of offset for all devices relative to the vibration cutter is similar to the interpretation of the offset value of milling cutters, which will no longer explain other offset values.

（6）Press well parameter

Interpretation of offset value is the same as the milling cutter.

【Press well drive mode】：

The motor mode and IO mode are optional. When selecting the motor mode, the B axis is used to drive the up and down movement of the press wheel. If IO mode is used, the upper and lower motion of the press wheel is driven by IO port.

【Press well rotation mode】：

Independent mode and common mode are optional. If selected as an independent mode, the rotation of the wheel is driven by the A axis; if the choice is a common mode, the rotation of the wheel is driven by the C axis (and at the same time the C axis is also used to control the rotation of the vibrating knife, so it is called the common mode).

【Press well diameter ratio】：

Refers to the ratio of the diameter of the rotary press well and the diameter of the rotary shaft of the vibrating cutter in the common mode. It can rotate 1 to 1, or 2 to 1.

【common axis offset angle】：

When the wheel or V puncher is selected as a shared mode, when the original offset angle of the vibrating knife is set correctly, when the C axis corresponding to the vibrating knife is reset and the vibratory knife points to the positive direction of the X axis, the pressure wheel or the V puncher does not necessarily point to the positive direction of the X axis, and there will be an offset angle. To rotate the a degree to the positive direction of the wheel or V puncher to the positive direction of the X axis, the common axis offset angle is +a degree at this time, and conversely, if the C axis need rotating in the negative direction of the a degree, the wheel or V puncher will point to the positive direction of the X axis, then the common axis offset angle is the -a degree.

（7）Punching parameters

It contains the offset of the Big/Small punch and the V/I punch. The offset interpretation is the same as the milling cutter offset.

【V puncher control mode】：Independent or shared mode is optional.

【V puncher diameter ratio】：It refers to the ratio of the diameter of the rotary shaft of the V puncher and the diameter of the rotary shaft of the vibrating cutter. It can only be 1 to 1.

（8）Pen parameter

It contains the offset of the pen 1/2. The offset interpretation is the same as the milling cutter offset.

（9）Red light location parameters

The offset value of red light is included. The offset interpretation is the same as the milling cutter offset.

【Enable red light location】：

Yes or no can be selected, if yes, the position of red light should be taken as the locating point when machining. If it is not enabled, the point directed by the vibration cutter head should be taken as the positioning point.

（10）Knife hole parameter

The offset value of a knife hole device is included. The offset interpretation is the same as the milling cutter offset.

【Enable knife hole】：

Yes or no can be selected, if it is enable, then the knife hole device will be used in the vibration cutter location.。

（11）Adsorption parameters

The system supports 8 adsorption regions at most. Assuming that the lattice numbers in the XY direction are X and Y, x*y can not exceed 8. For example, suppose that the lattice number of X direction is 4, the minimum number of lattices in the Y direction is

1 and the maximum is 2. When the lattice number of X is 4, the coordinates of three sections can be set separately. 0~X1 is the first section, X1~X2 is second, X2~X3 is third, and X3~ maximum coordinates is fourth, so we need to set X1, X2 and X3 coordinates.

（12）Controller information

This column contains some information on the motherboard, including cumulative travel, cumulative time and the version number of the motherboard. These parameters are available to the user and can not be modified.

9.2 User parameters

（1）Parameters for run：
Idle Move Parameters
【Idle Move Speed】：

This parameter decides the highest speed of all non-lighting lines for the machine in the movement process.
【Idle Move Acceleration】：

It means the highest acceleration of all non-lighting lines. Idle stroke speed and idle stroke acceleration can be set higher to reduce the working time of the whole figure, but if they are set too high, it may cause the jarring of track, so comprehensive consideration should be given to the setting.
【G0 Acc Factor】：

This parameter indicates how speedy the idle move acceleration is changing.
【Idle Move Delay】：

If this parameter is zero, then after idle moving there is no delay, or, there is delay and the speed will decrease to turn off speed.

Cutting parameters
【Turning Speed】：

It means the speed of turning at the acute-angle corner, which is also the highest speed in the whole cutting process.
【Turning Acceleration】：

It means the acceleration of turning at the acute-angle corner when cutting. If the two speeds are set too high, jarring will happen to the turning; if set too low, it will influence the cutting speed. This acceleration is the least value of the whole graph.
【Cutting Acceleration】：

It means the highest acceleration value in the whole cutting process.
【Acc Factor】：

This parameter indicates how speedy the cutting acceleration is changing.

【Speed Factor】：

This parameter indicates the cutting speed of the arc of various curvatures.
【Turning precision】：

This parameter reacts with the speed of rotation axis at any time, generally takes 100%.

【Angle of lifting】：

In the process of continuous trajectory cutting, the tool always moves with the knife direction, but for a larger angle, the tool can not be quickly turned to follow the tool quickly, which may lead to the knife direction and the XY movement track does not coincide and cause the knife broken. So a reasonable angle of lifting must be set. When the angle of the track is larger than that angle, the knife will be lifted first, then the tool is controlled to the new direction, and then the cutter is cut again.

	The machining parameter can not exceed the limit parameter value in the factory parameter. If the parameter exceeds the axis, the system will automatically use the axis parameter to cover the process parameters.
Prompt	

(2) Feeding parameters

【Before-feeding Time Lag】：

Settable at 0~300s. The lagged time can facilitate user's feeding and picking on the feeding device.

【After-feeding Time Lag】：

Settable at 0~9.9s. It can facilitate the feeding device's delaying in jarring after moving to the correct position and waiting for the 2nd work after the feeding axle stands still completely.

【Progressive feeding repay】：

Because of the imprecision of U axes' moving, there can set a value to repay the interval of the two lines graph on Y direction. This parameter is reserved.

【Progressive feeding】：

If this item is enabled, then the dummy array graph on Y direction will run in the same position, running one line graph, the U axes moving one time to feed, the moving length of U axes is the interval of the two lines graph on Y direction. This parameter is reserved.

【Last feeding】：

If feeding when the last times work end.

【If clamped when finish feeding】：

This parameter indicates that when the feed is processed, the material should be clamped after the feeding is finished.。

(3) Reset parameters

All X~D axes have the below parameters:

【Reset Speed】：

It means the speed of the axes reset to the origin

【Axle start-up reset】：

You can select "Yes" or "No" in the field of the above six parameters, which is used

to confirm whether each axle can be reset on the startup.

（4）Work speed parameters

Each axis of the Z~D axis corresponds to a working speed:

Z axis working speed: it is used to control the speed of milling cutters, or to control the speed of the second head in the two head shifting machine.

U axis working speed: feeding speed on U axis

A axis working speed: used to control the maximum speed of the press wheel processing.

B axis working speed: used to control the speed of the press wheel falling.

C axis working speed: used to control the maximum speed of the vibration cutter processing.

D axis working speed: used to control the speed of vibration cutter falling.

（5）Key speed parameters

Each axis of the X~D axis corresponds to a slow moving speed and fast moving speed.

【Key slow speed】：

It is the slow speed value of the moving axis of the keyboard.

【Key fast speed】：

It is the fast speed value of the moving axis of the keyboard.

（6）Delay parameters

The delay parameters include the opening or closing time of the equipment, and the up and down time of the knife or punching device. All delay time is in milliseconds (ms).

（7）Other user parameters

【Back Position】：

The origin (the relative origin) and the machine's absolute origin can be selected. This parameter decides the parking position of laser head after each work.

【Array Mode】：

Two-way array or one-way array can be selected. Two-way array means the to-and-fro cutting of array in sequence; one-way array means the cutting of array from one direction to another. On selecting one-way array, the elements of each array are the same in action mode and completely uniform in action fluency, which takes a little more time than two-way array. Two-way array is the default option.

【Go scale Blank】：

It means whether to extend a certain length outside the actual frame of the figure on the preview/cutting of frame.

【Automatic Adsorption Enable】：

It means whether automatic adsorption function is activated when starting work. If it is "yes", the controller will automatically adsorb in which adsorption area according to the locus coordinates. If it is "no", it is not automatically adsorbed. At this time, the operator can manually open a certain or some area of adsorption before starting the

work.

【Automatic Vibration Enable】：

Does the automatic start vibration function be activated when starting work? If "yes", the controller will first open the vibration before processing, and then the vibration delay, and then start processing; if "no", it does not automatically open vibration.

【Vibration knife/ Press well / milling cutter for adaptive plat】：

Each tool can be enabled to adapt the table.

If the adaptable function is enabled, and, if the controller has already collected the table, the controller will make real time dynamic compensation for the cutting tool position in the machining process, if the controller does not collect the table, then the HMI will prompt there no table data.

If the table function is not enabled, whether or not the controller has collected the table, the machining location of the cutter will not be compensated.