

Read this manual before operation

- The content include of electric connections and operating steps
- Read the manual to operate the systems

RDC6445GT5

Laser cutting system hardware user manual

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The product has been certified by the CE (Communate European) safety certification. It has passed the corresponding conformity assessment procedure and the manufacturer's declaration of conformity, in accordance with the relevant EU directive.

ROHS

This product has been certified by EU legislation (Restriction of Hazardous Substances) Safety certification; comply with relevant EU environmental regulations.

FCC

This product has been certified by the Federal Communications Commission for safety, Comply with us electronic safety regulations.

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When using this system, please make sure the operation is correct and the usage is safe. Some signs or text will be used to remind you to pay attention to the dangerous matters and some important information.



Dangerous:

Indicates a serious danger. In the process of use, if the operation is improper or the way of use is wrong, it may cause serious injury or even death to the user. Please do not operate it easily until you have made sure that the operation method is correct and the way of use is correct.



Warning:

Danger. In the process of use, if the operation is improper or the use is wrong, which may lead to the injury of the personnel, please do not operate the personnel and related personnel easily, until ensure the correct operation method and use method is correct before use.



Cautious:

Represents the potential risk of the product. In the process of use, if the use method is wrong or improper operation, it may cause damage to the product or some parts. Please do not use it until you have made sure that the operation method is correct and the usage is correct.



Important:

Represents important information to be paid attention to during the use of the product. Please do not ignore this information, this information will provide effective operational help.



This sign indicates laser radiation, which is usually posted on products with laser output. Please be careful with laser and pay attention to safety when using this kind of equipment.

Sign in、Devanning、Examine cargo

The product itself with plastic or metal shell, can protect the external electrical components from damage. The products are packed in foam bags and anti-static bags. If there is any external damage to the package, check the equipment and notify the carrier and carrier in writing of the damage.

Inportant:



After receiving the product, please check whether the outer package is intact, check whether the product is complete after unpacking and whether all parts are intact. If any damage is found, please contact ruida immediately.

Remove all cargo from package and keep packing material and wiring parts. Please take care of the safety of the goods when unpacking them. After taking out the goods, please check whether the parts are complete and intact. If any missing parts or damaged parts are found, please contact ruida technology immediately. Do not install or debug the equipment if any obvious damage is found.

The shipping list of RDC6445GT5 laser cutting system is shown in the following table: (as the product is continuous updated, the accessories received may be different from this manual)

Parts	Qty	Explanation
RDC6445GT5(EC)-General-Black design	1 (pc)	
RDC6445GT5(EC)-General-Black film-pure black case	1 (pc)	
RDPA42 terminal package	1 (pc)	
USB connection cable (2.0 dual magnetic ring A male to A male 3M) black	1 (pc)	
Network connection cable (dual RJ 5M-Blue)	1 (pc)	
USB adapter cable AM/AF (A male to A female with ear single magnetic ring 1M)	1 (pc)	
USB adapter cable (B male to A female with ear single magnetic ring 1M) black	1 (pc)	

Network port adapter cable 8PIN-1M	1 (pc)	
6445-Five core cable 1.5M	1 (pc)	

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Chapter 1 Overview

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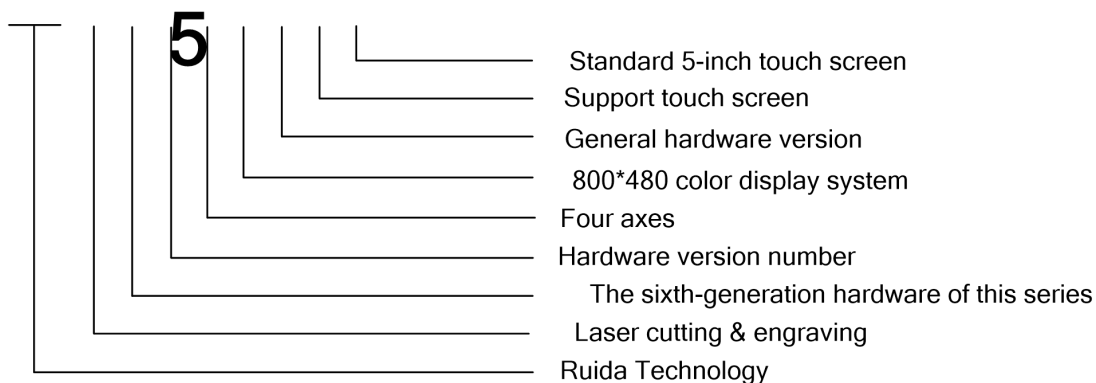
- RDC6445GT5 Control System Introduction
- Controller Model Description
- Comparison of Controller Performance

1.1 RDC6445GT5 Control System Introduction

RDC6445GT5 system is the latest generation of laser engraving/cutting control system developed by Ruida Technology. This control system has better hardware stability and anti-high voltage and anti-static characteristics. The HMI operating system based on a 5-inch touch color screen has a more friendly operation interface and more powerful functions. The controller includes complete motion control functions, large-capacity file storage, a more compatible dual-channel independent adjustable laser power control interface, a more compatible U disk driver, multi-channel general/dedicated IO control, and supports automatic selection of Ethernet communication and USB communication with PC.

1.2 RDC6445GT5 Controller model description

RDC6445GT5



Chapter 2 Installation Size

CONTENTS:

- Mainboard Installation Size
- Touch screen Installation Size

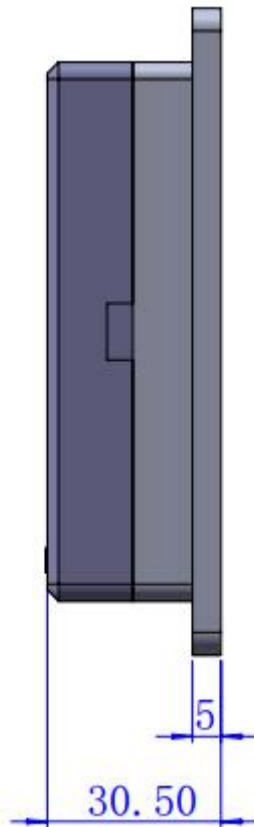
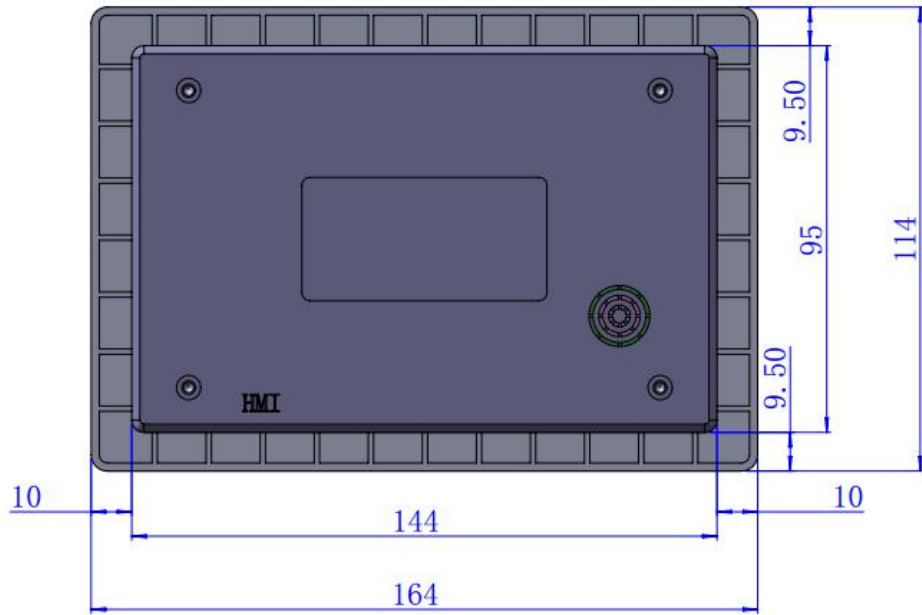
2.1 Mainboard Installation Size

All dimensions are in mm, accurate to 0.1mm (of which the four positioning holes are symmetrical):



2.2 Touch screen Installation Size

All dimensions are in mm, accurate to 0.1mm.



Chapter 3 Physical pictures and Interfaces Overview

CONTENTS:

- Mainboard Physical pictures
- Touch screen Physical pictures
- Control System Electrical Connectivity Diagram

3.1 Mainboard Physical pictures

For more detailed pin description, see Chapter 4 Interface Signal Description.

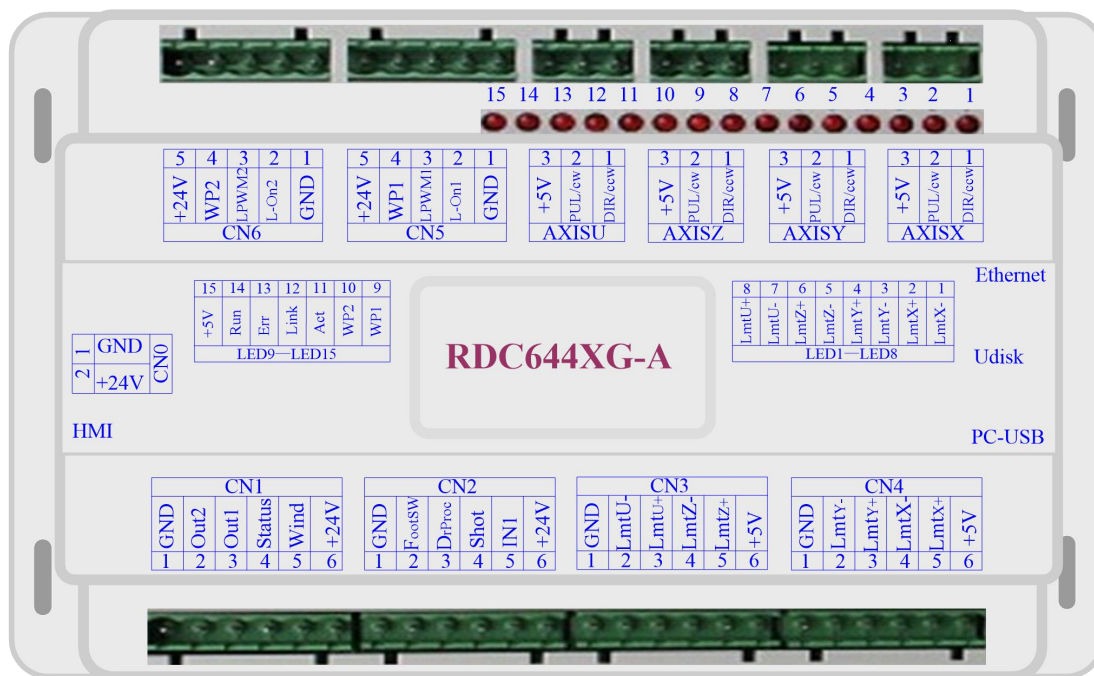


Figure 3.1-1 Mainboard Physical pictures

3.2 Touch screen Physical pictures

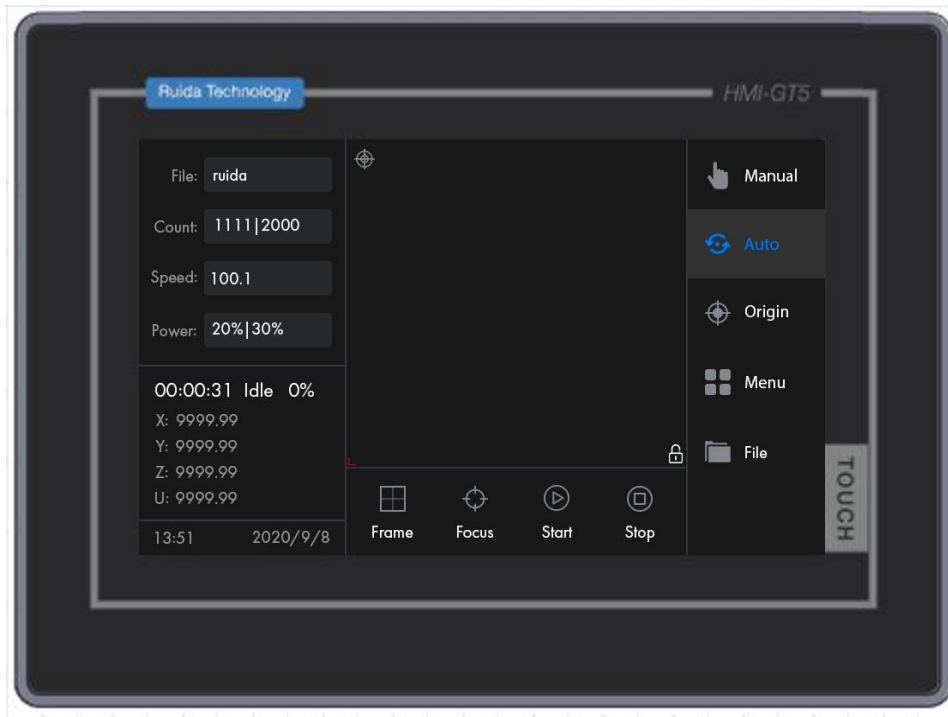


Figure 3.2-1 Panel Physical pictures

3.3 Control System Electrical Connectivity Diagram

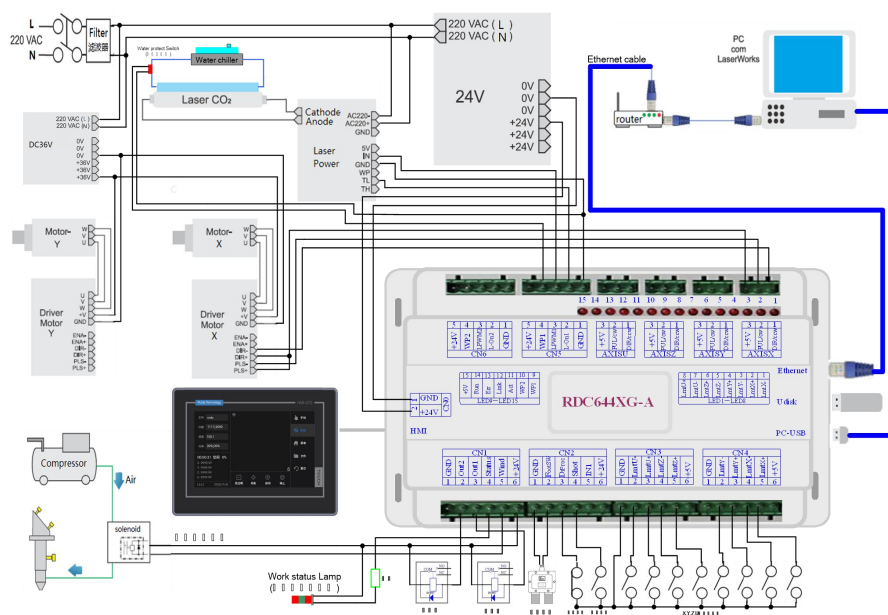


Figure 3.3-1 Control system electrical connectivity diagram


Chapter 4 Mainboard Interface Signal Description

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- Main Power Interface CN0
- Mainboard and touch screen Connection Port HMI
- U disk Interface
- PC-USB Interface
- Ethernet Interface
- General/Dedicated Output Port CN1
- Dedicated/General Input Interface CN2
- Four-Axis Limit Input
Interface CN3/CN4
- X/Y/Z/U Four-Axis Driver Interface AXIS_X~AXIS_U

4.1 Main Power Interface CN0

PIN	Signal	Definition
1	GND	GND (input)
2	+24V	24V Power positive (input)

 Caution	<p>This system adopts a single 24V power supply. It is recommended to use a power supply above 24V/2A. Meanwhile, this control system is compatible with a 36V power supply. A driver with a 36V power supply can directly connect to this control system's main power interface, but it is not recommended.</p>
---	--

4.2 Mainboard and touch screen Connection Port HMI

The connection cable between the mainboard and touch screen should be a parallel line of PIN to PIN.

4.3 U disk Interface


U disk is a USB-AM interface, which is the interface for the mainboard to the U disk.

4.4 PC-USB Interface

PC-USB is a USB-BM interface, which is an interface for the mainboard and PC through USB2.0.

4.5 Ethernet Interface


'Ethernet' is the Ethernet interface, through which the 10/100MHZ Ethernet communication between the mainboard and PC can be realized.

 Caution	<p>Please use a PIN-to-PIN Ethernet parallel line.</p>
---	--

4.6 General/Dedicated Output Port CN1

General/Dedicated output port definition

PIN	Signal	Definition
1	GND	GND (output)
2	Out2	General output, reserved.
3	Out1	General output, reserved.
4	Status	Dedicated output, working status signal port (or the second way pen signal). When it is an active status signal, if the port is connected with a relay, the relay coil will conduct when working, and there will be no effect when the working is paused. When the working is finished or canceled manually, the relay coil ends.
5	Wind	Dedicated output, when the fan control is enabled, this port outputs a fan control signal. Otherwise, it is the first paintbrush control signal. When the fan is connected, and the fan control is enabled, the fan's switch can be set in each layer separately. When an external relay is connected, the relay coil conducts when the fan is on, and the relay coil ends when the fan is off.
6	+24V	Power output (if the main power interface adopts a 24V power supply, the pin is 24V; if the main power interface adopts a 36V power supply, the pin is 36V)

 Prompt	All the output signals adopt optocoupler isolation. OC gate output, the maximum drive capacity is 300mA, which can directly drive 6V/24V relays.
---	--

4.7 Dedicated/General Input Interface CN2

PIN	Signal	Definition
1	GND	GND(output)
2	FootSW	Dedicated input, it is a footswitch input port. The connection method is: when the pedal is stepped down, input a low voltage signal to the port, and when the pedal is released, disconnect the port or input a high voltage signal to the port; when the pedaling

		time is no less than 100ms, if the machine is idle currently, it will start work. If the machine is running currently, the work will be suspended. If the machine is in a paused state currently, the suspended work will be restarted, that is, the function of the foot switch is similar to the “Start/Pause” key on the keyboard. If the time between the second stepping down of the foot switch and the first stepping down is less than 100 milliseconds, the second pedal action will be considered invalid by the motherboard.
3	DrProc	Dedicated input, protection signal input, if the machine needs to be protected in a certain state (such as cover-opening protection), the protection signal is input from this pin. This pin can be enabled or disabled. When the pin is disabled, the signal will not be queried by the mainboard. If the pin is enabled, when a high voltage is input or the input port is suspended, the machine is protected, the ongoing work will be suspended, and the laser will be turned off.
4	Shot	General input, laser hardware pulse switch input port, when a low voltage is connected, laser pulse can be performed, while a high voltage is connected, laser pulse do not be performed.
5	IN1	General input, function reserved.
6	+24V	Power +24V (output)

4.8 Four-axis limit input interface CN3/CN4

X/Y axis limit interface CN4

PIN	Signal	Definition
1	GND	Power ground (output)
2	LmtY-	Y-, the limit of Y-axis moving to coordinate 0
3	LmtY+	Y+, the limit of Y-axis moving to the maximum coordinate
4	LmtX-	X-, the limit of X-axis moving to coordinate 0
5	LmtX+	X+, the limit of X-axis moving to the maximum coordinate
6	+5V	Power supply +5V (output)

The limit polarity is optional. When the axis reaches the limit position, a low voltage signal is triggered, the LED corresponding light are on. When the axis leaves the limit position, a high voltage signal will be triggered or a limit signal will be disconnected to make the limit indicator lights are off. Then the limit polarity is negative conversely, if the corresponding indicator light is off when the axis gets close to the limit, and the corresponding indicator light is on when it leaves the limit, then the limit polarity is

positive. If the limit polarity is set incorrectly, the limit will not be detected when the system is reset, resulting in shaft collision.

Z/U axis limit interface CN3, pin definition is similar to X/Y axis limit interface CN4.

XYZU four-axis limit input port is compatible with 5V/12V/24V logic level input.


4.9 X/Y/Z/U Four-Axis Driver Interface AXIS_X~AXIS_U

The four motion axis interfaces are the same, taking the X-axis interface AXIS_X as an example.

Pin	Signal	Definition
1	DIR	Direction signal port (OC output)
2	PUL	Pulse signal port (OC output)
3	+5V	5V power supply positive (output, only for driver common anode connection)

To set the direction signal polarity of the driver. When an axis reset and moving in the opposite direction of the machine origin, it means that the axis's direction signal polarity is incorrect. At this moment, the axis can disconnect from the motor driver (otherwise, the mainboard cannot detect the limit, which may cause the axis to collide) and then wait until the axis reset before modifying the direction signal polarity of the shaft. After the modification, press the reset key to reset the mainboard.

The driver pulse signal can be set to be valid at rising or falling edge. Controller defaults to being valid at falling edge.


 Prompt	Both the pulse signal and direction signal are OC output. Therefore, the controller and the motor driver must adopt common anode connection, and the common cathode connection and differential connection are not supported.
--	---

4.10 Laser power control interface CN5/CN6

This control system has two independent and adjustable laser power control interfaces. The signal meaning and sequence of the two interfaces are the same, taking the first interface CN5 as an example




(the second laser power interface is CN6, and the pin definition is similar to CN5):

Pin	Signal	Definition
1	GND	Laser power ground (output)
2	L-ON1	<p>Laser enable control interface</p> <p>1.When the laser source is a RF laser source, this pin is not used;</p> <p>When the laser source is a glass tube, and laser on when power supply in low voltage, the pin is connected with the laser enable port to control the laser on / off. It is not supporting the laser power supply with high voltage and laser on.</p>
3	LPWM1	<p>Laser source/tube power control interface</p> <p>1.When the laser source is a RF laser source, this pin is connected with the laser source RF-PWM end;</p> <p>2.When the laser source is a glass tube, this pin is connected with the PWM end of the laser power supply to control the laser power</p>
4	WP1	<p>The input port for the water protection state of the first laser power supply. When the water protection 1 is enabled, the mainboard will detect the water protection 1 input port. If the port is in low voltage, it is considered normal. If the port is in high voltage, the mainboard will force the laser to be turned off, the ongoing work will be suspended, and the system will alarm as well. If the water protection 1 is not enabled, the mainboard will not detect the water protection 1 input port, and the user can choose not to connect the water protection 1.</p> <p>The water protection input port must use 24V logic level input.</p>
5	+24V	24V power positive (output)

 Prompt	<p>Please select the correct laser source type in the factory parameter settings.</p>
--	---

Chapter 5 Examples of Laser Power Interface

CONTENTS:

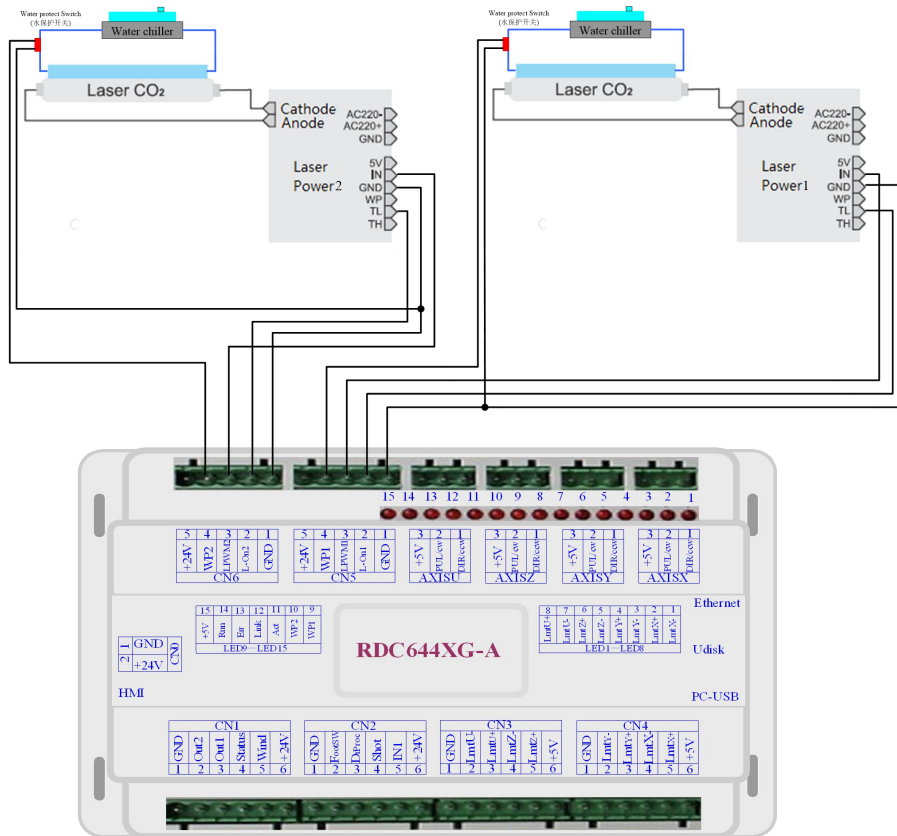
-  Overview
-  Glass Tube Laser Power Supply Wiring Diagram
-  RF CO2 Laser Source Wiring Diagram

5.1 Overview

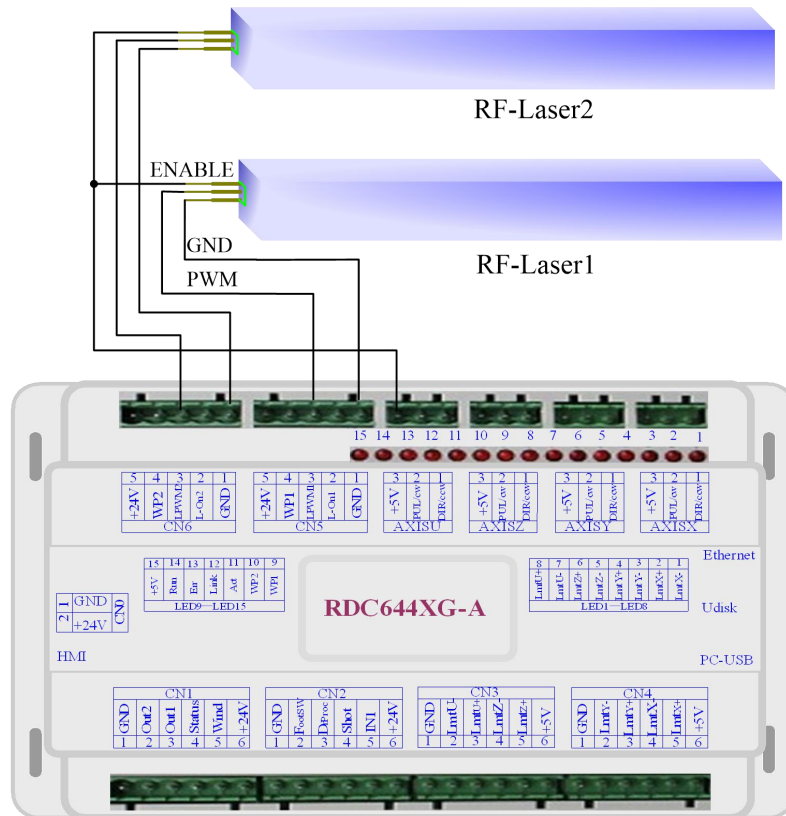
This control system has two independent and adjustable laser power supply control interfaces, which can control the glass tube laser power supply and RF CO2 laser source.

When connecting different types of laser power supply, please set the laser source type correctly in the factory parameters, otherwise it may cause the laser.

5.2 Glass tube laser power supply wiring diagram



5.3 RF CO2 laser source wiring diagram



Chapter 6 Examples of Stepping Motor Driver Interface

CONTENTS:

-  Overview
-  Driver connection diagram

6.1 Overview

The input signal of the stepping motor driver adopts optocoupler isolation technology. For the stepping pulse signals, some are the isolation side optocoupler diode from cutoff to conduction (that is, falling edge of the pulse signal input from the diode negative end is valid), and some are the isolation side optocoupler diode from conduction to cutoff (that is, rising edge of the pulse signal input from the diode negative end is valid).

When indicating whether the pulse signal of the motor driver is valid at the rising edge or the falling edge, the pulse signal input from the negative end of the optocoupler diode on the isolation side shall prevail.

Some of the motor driver input signals are independent, and some are internal common anodes. So some outward lead wires are 4, and some are 3 (only the pulse and direction signals are counted), as shown in Figure 6.1-1 and Figure 6.1-2.

Each motor driver interface of Ruida product model RDC644XG mainboard provides a direction signal, a pulse signal and a 5V signal for common anode connection. Both pulse signal and direction signal are OC output.

RDC644XG only supports the common anode connection, and cannot use common cathode or differential connection. The polarity of the direction signal can be set through the PC, and whether the pulse signal is valid at the rising edge or the falling edge can also be set via the PC.

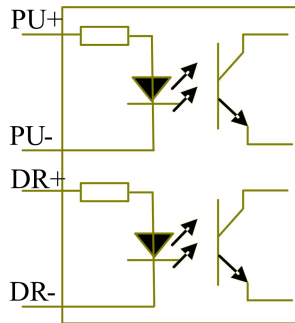


Figure 6.1-1 Four inputs, driver input signal independent

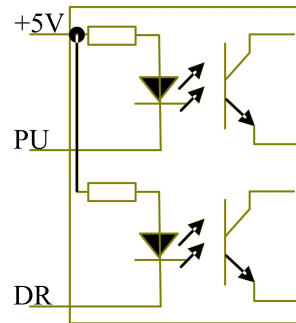
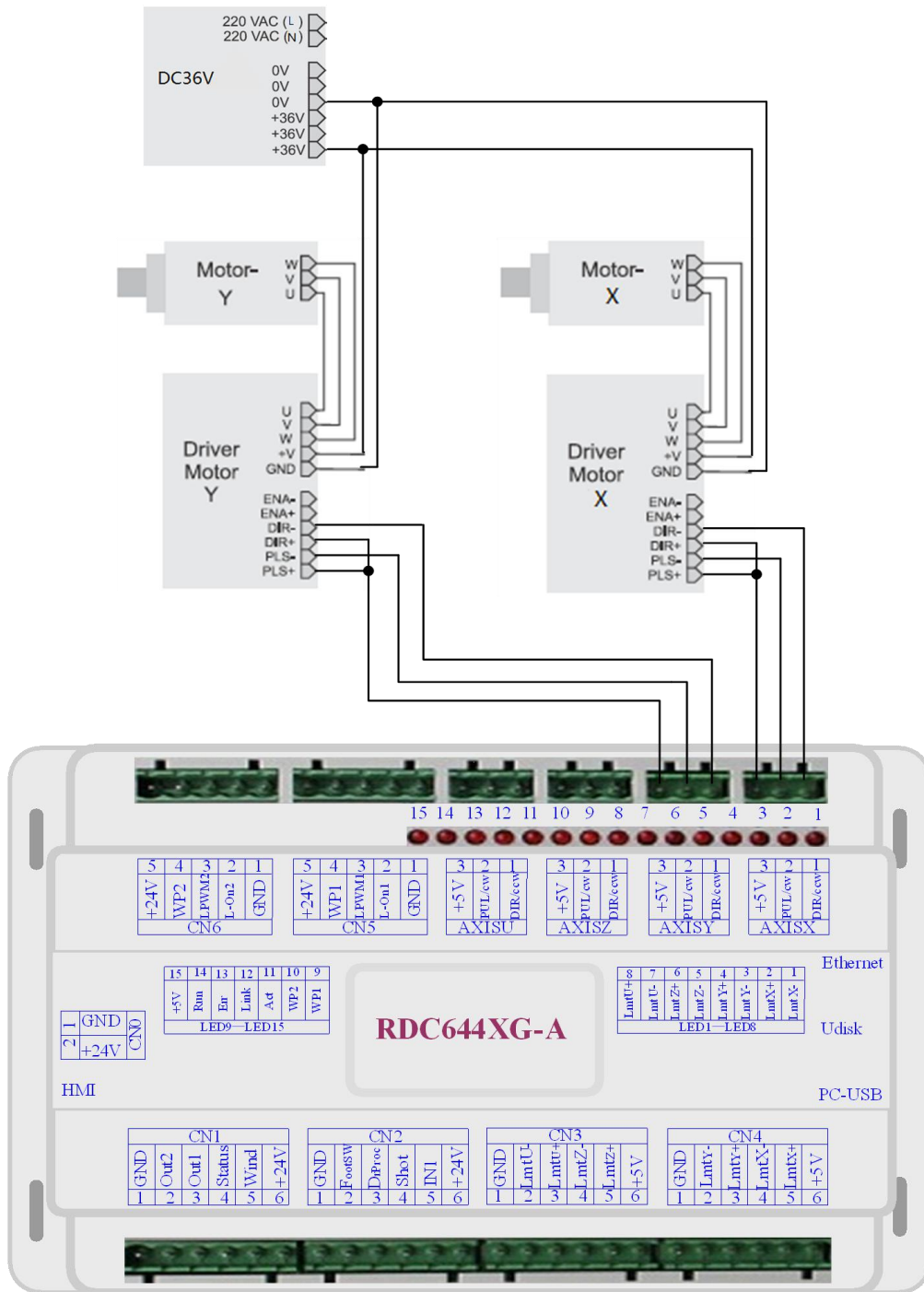


Figure 6.1-2 Three inputs, driver input signal common anode

6.2 Driver Connection Diagram



Chapter 7 IO Port Wiring Examples

CONTENTS:

-  Input Port
-  Output Port

7.1 Input port

The two water protection input ports WP1 and WP2 of this controller are 24V logic, and all other input ports are compatible with input 5V/12V/24V logic voltage

The connection diagram of the input port is as follows:

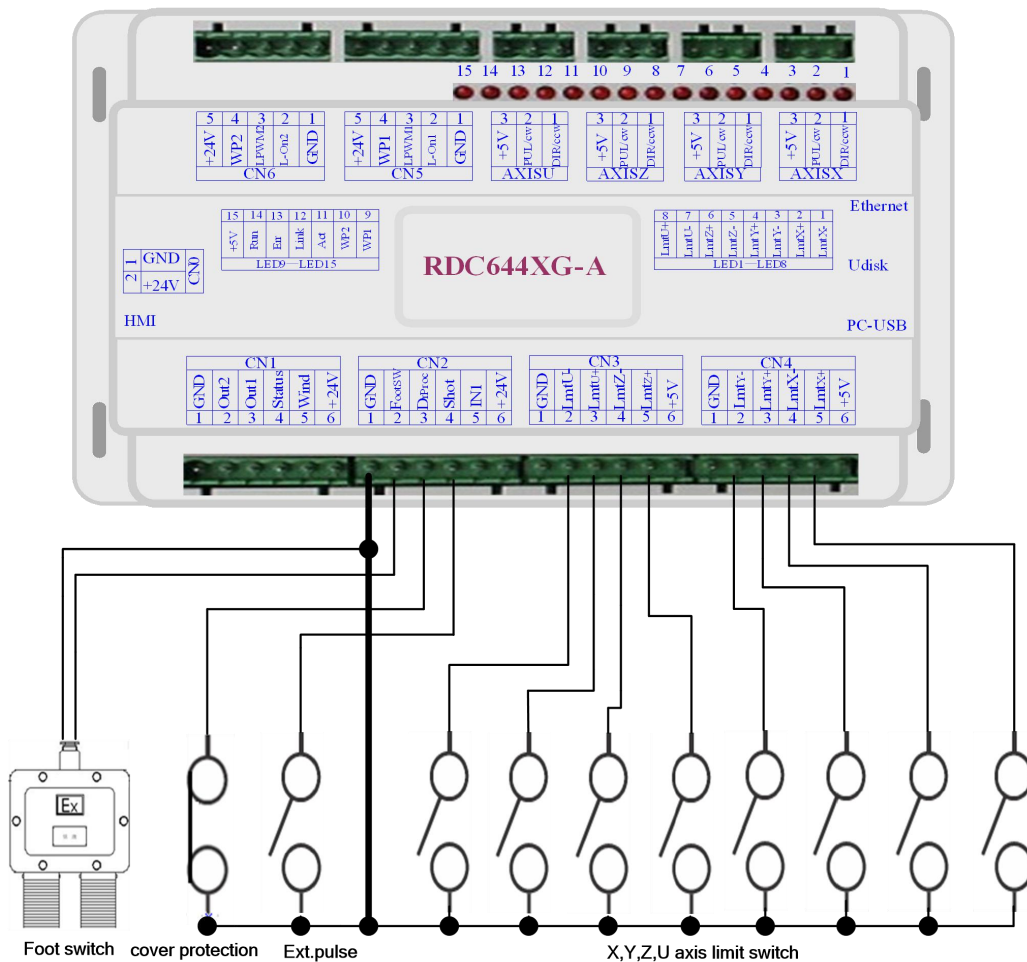


Figure 7.1-1 Example of input port connection

7.2 Output port

All the output signals of this controller adopt optocoupler isolation technology, OC gate output, and its maximum drive capacity is 300mA, which can directly drive 6V/24V relays, light-emitting indicators, buzzer alarm devices, etc.

Output port connection diagram is as follows:

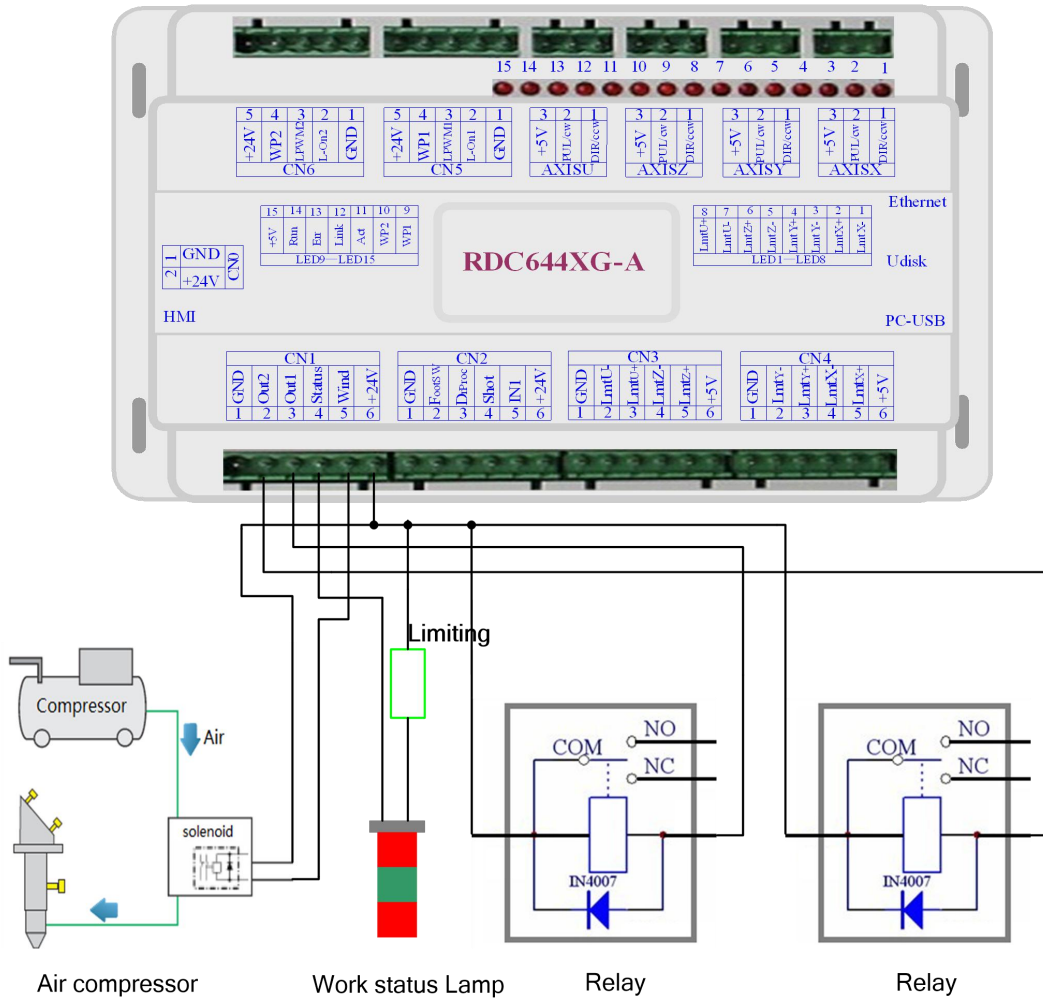


Figure 7.2-1 Example of output port connection

Chapter 8 HMI Operation Instructions

CONTENTS:

- Introduction
- Main interface functions
- Manual function
- Menu function
- User/Factory parameter settings
- File management
- Program upgrade

8.1 Introduction

The operation panel is a 5-inch touch screen, with beautiful interface, smooth and friendly operation, high-cost performance, etc. The panel can depict the motion track of the controller in real-time, allowing the users to check the current processing graphics. It supports file management, file preview, user and manufacturer parameter modification, supports multi-language interface switching and other functions, supports upgrading boot screen and program upgrade functions.

Touch screen characteristics:

- 5.0 inches TFT touch screen
- 800*480 resolution
- 24-bits true color
- RS232 standard serial communication
- Buzzer

8.2 Main interface functions

8.2.1 Main interface

When the system is powered on and reset, the main interface will be displayed. As shown below:

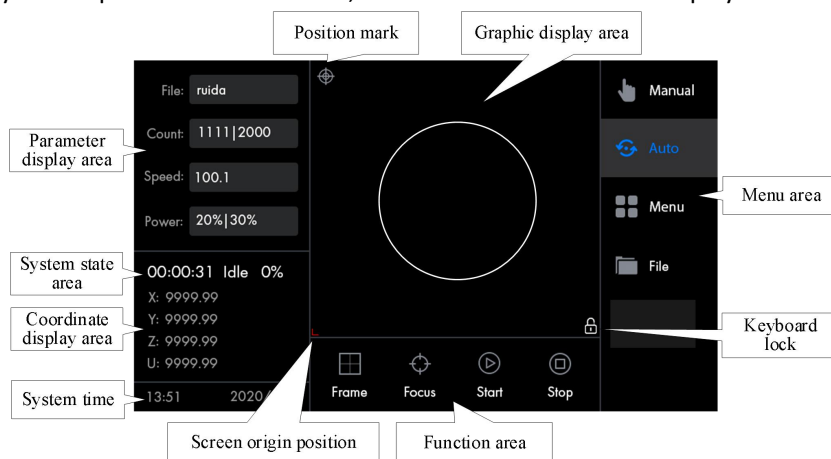




Figure 8.2.1

- **Graphic display area:** this area is used for file preview display and for depicting the processed file image during processing.
 - **Parameter display area:** display the name of current processing file name, the number of pieces (the number of current files and the total pieces of all files), the speed value and power value (the 1st route and the 2nd route).
 - **Coordinate display area:** display the coordinate values of the X, Y, Z, U axis respectively.
 - **System state area:** display the system state (idle, pause, complete, run, feed), processing time and processing progress respectively.
 - **Menu area:**
 - Manual: enter the manual function interface
 - Automatic: enter the automatic function interface, the system will be display this interface by default after power-on.
 - Menu: enter the menu interface.
 - File: enter the file management interface.
- **Function area:**
 - Frame: frame
 - Focus: Z-axis focusing

- Start: start processing.
- Stop: stop processing.
- Keyboard lock: when clicking on the system time area, the interface will be locked, and the icon  will be displayed on the screen. Clicking it the again to unlock successfully.
- Network connection status: when the system is connected to the network cable, the icon  will be displayed on the screen.
- Position mark: it will be displayed after clicking it in the manual interface
- Screen origin position: The graph display area takes this coordinate point as a reference for depicting.

8.2. Speed settings

Click “Speed parameters” in the main interface, and the following interface will pop up:

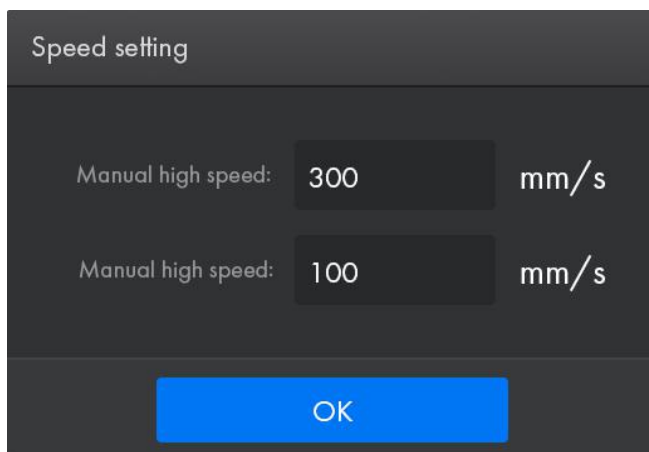


Figure 8.2.2-1

When the system is idle, the speed parameters are manual high speed and manual low speed, which respectively represent the maximum and minimum speed of the manual motion shaft, which is convenient for debugging; when the system is running or paused, this speed parameter is processing speed, indicating the current file processing speed. The parameter setting method is as follows:

Click the parameter box to pop up the numeric keyboard, as shown in the figure below:

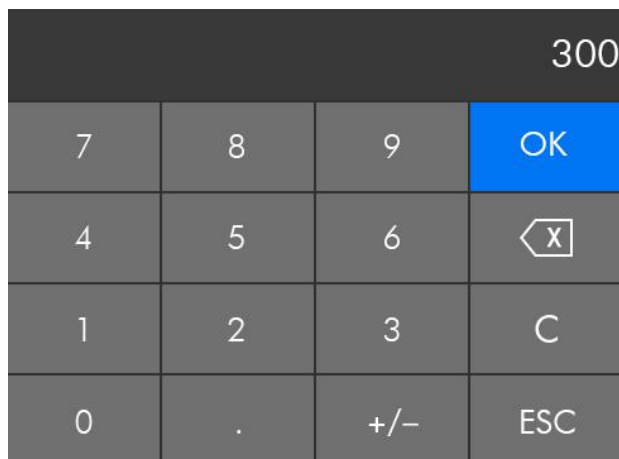


Figure 8.2.2-2

Parameters can be modified at this time, after modification, press the “OK” key to confirm the modification and return or press the “ESC” key to cancel the modification and return to the previous interface, and finally press the “OK” key to return to the main interface.

8.2.3 Power settings

Click “Power parameters” in the main interface, and the following interface will pop up:

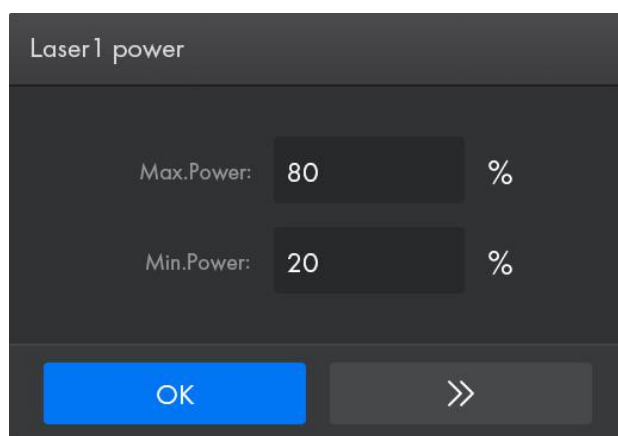


Figure 8.2.3

The maximum and minimum power of Laser 1 can be set at this time. Click “More” to set the maximum and minimum power of Laser 2. The parameter setting method is the same as above.

8.3 File parameters

Click “File name” in the main interface, and the following interface will pop up:

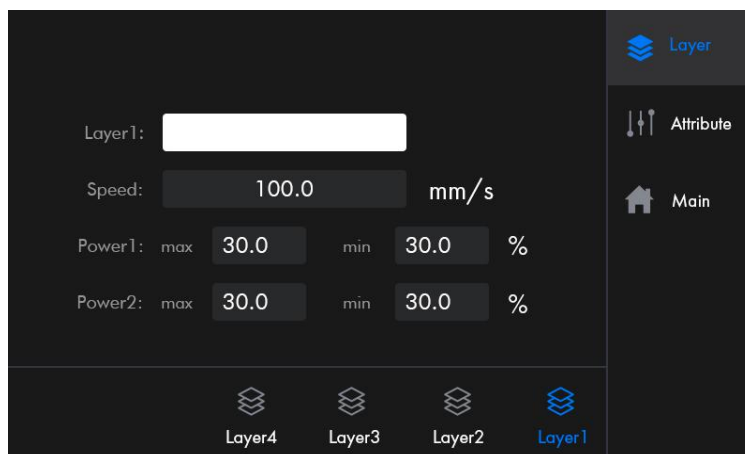


Figure 8.3

On the right side of the interface is the menu bar, including “Layer”, “Properties” and “Main Interface”, which respectively indicate file layer information, file properties and return to the main interface. The layer menu is selected by default and marked in blue in the interface. Click “Main Interface” to return to the main interface.

8.3.1 Layer information

In the file parameter interface, click “Layer” on the right to display the layer information of this file. The layer information can be obtained after previewing the file or starting the processing, otherwise it prompts that there is no layer information. The interface is shown in Figure 8.3.

The bottom of the interface shows all the layer numbers of the file. If the total number of layers exceeds 6, user can browse through the page button on the left. After selecting a layer, the corresponding layer information will be displayed synchronously. For the modification method of the layer parameters, please refer to the previous section, so it won’t be repeated here. After modifying the parameters, the parameters are saved in the file permanently.

8.3.2 File properties

In the file parameter interface, click “Properties” on the right to display the file information. Including “Repeat”, “Feed”, “Array” and “Working hours”, which respectively represent repeating processing, feeding parameters, array information and working hours preview. “Repeat” is selected by default in the interface and marked in blue. As shown below:

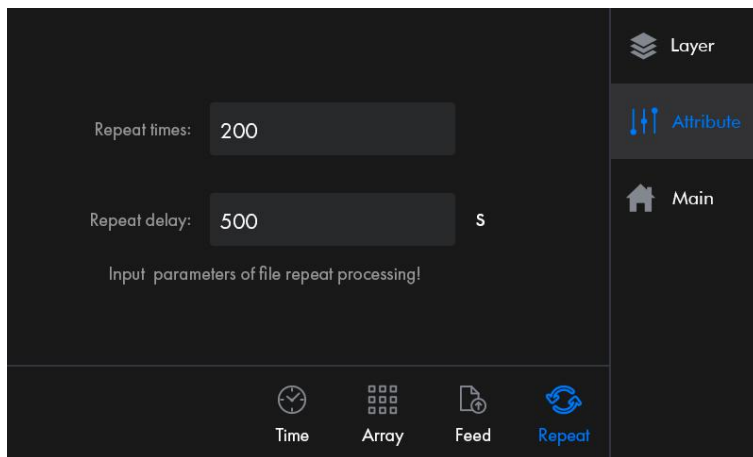


Figure 8.3.2

- Repeat processing

After clicking the “Repeat” button, the interface is shown in Figure 8.3.2.

The number of repetitions means the number of repetitive processing, and the repetition delay means the time interval for the next start of processing. Once the repeat parameter is set to be valid, it is valid to all processing files. When the system is powered on again, the parameter will be cleared automatically.

- Feeding parameters

After clicking the “Feeding” button, the interface displays as follows:

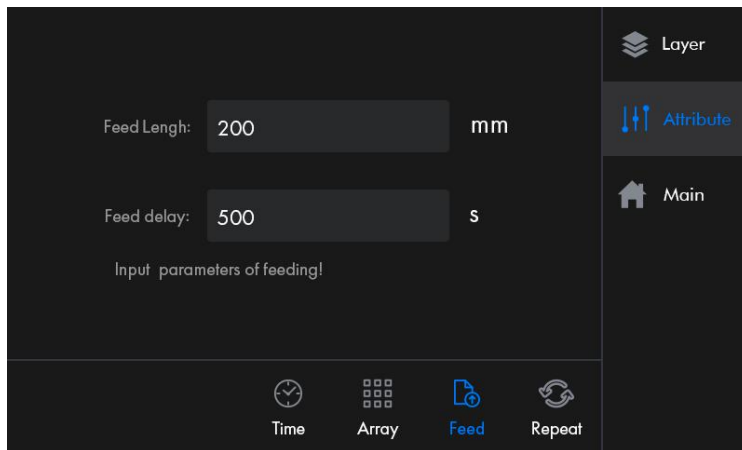


Figure 8.3.2-1

The feeding length means the feeding axis stroke, and the feeding delay means the delay interval after feeding.

- Array information

After clicking the “Array” button, the interface displays as follows:

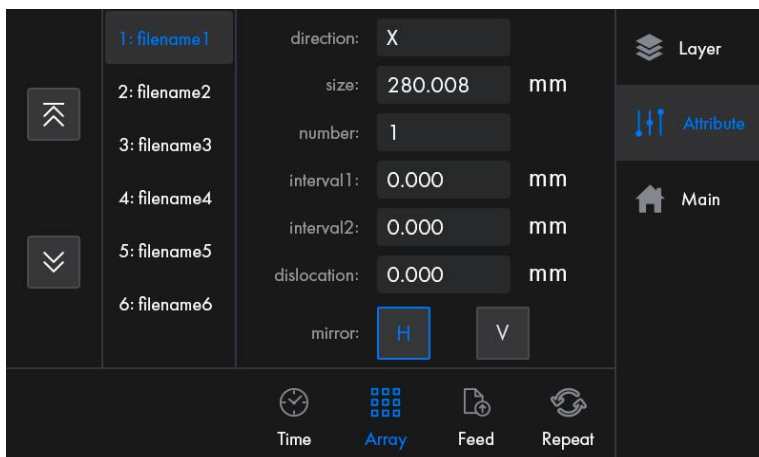


Figure 8.3.2-2

The list on the left of the interface is a list of all the array names contained in this file, which can view through the page button on the left. After selecting an array, the information will be displayed on the right at the same time.

- Direction: array X/Y direction parameter selection, and other parameters will also change after selection.
- Size: the X/Y size of array graphic elements. This parameter cannot be modified.
- Quantity: the number of array graphic elements in the X/Y direction
- Interval 1: the graphic element interval value of the odd-numbered rows of the array.
- Interval 2: the graphic element interval value of the even-numbered rows of the array.
- Dislocation: the dislocation value of the array graphics in the X/Y direction.
- Mirror image: H represents whether the even-numbered rows are mirrored in the X/Y direction, V represents whether the even-numbered columns are mirrored in the X/Y direction, and the blue mark indicates that mirroring is enabled.

 Prompt	If the file contains multiple array names, the array information of this file is not allowed to be modified.
-------------------	--

- Working hours preview

After clicking the “Working hours” button, the interface displays as follows:

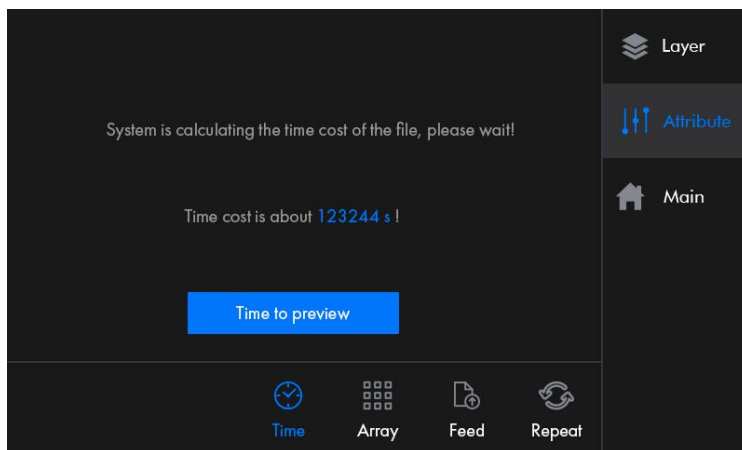


Figure 8.3.2-3

After clicking the “Working hours preview” button, the system calculates working hours for this file. If the file is relatively complicated, calculation time will increase accordingly, please wait in patience here.

8.4 Manual functions

Click the “Auto” button in the main interface, and the following interface will pop up:

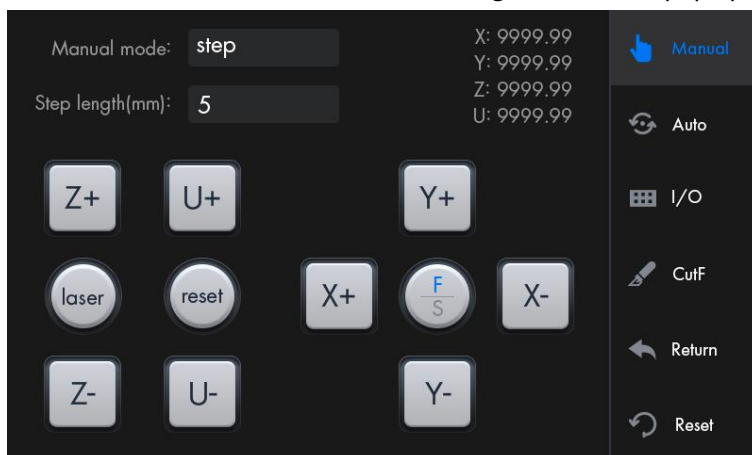





Figure 8.4

This interface is mainly used for manual debugging, including the axis motion, pulse, positioning, IO diagnosis, frame cutting, return and system reset. Press the “Auto” key to return to the main interface.

8.4.1 Manual axis moving

Press X+/X-, Y+/Y-, Z+/Z- and U+/U- buttons to move the corresponding axis. Manual mode can choose inching or continuous, when the continuous mode is selected, press the button to start moving the axis, and release the button after stopping the motion; when the inching mode is selected and the inching

distance (not 0) is set, the axis will start to move after pressing the button, and the axis will continue to move until the set inching distance is reached after releasing the button. The fast and slow key () can switch the shaft motion speed, when F is blue, it is fast, otherwise it is slow. The speed can be set in the “Speed Settings” interface.

When press the key (), the laser on ,and the laser off when released. The positioning key () marks the current position of the laser head as a positioning point.

8.4.2 IO IO Diagnosis

Click the “I/O” button to enter the IO diagnosis interface, as shown in the figure below:

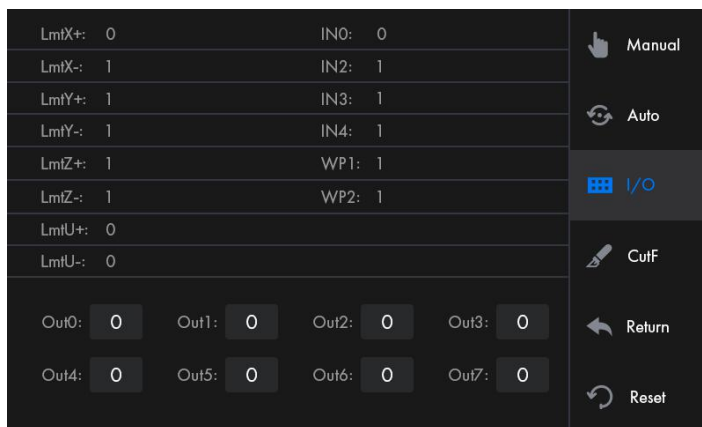


Figure 8.4.2

LmtX+, LmtX-, LmtY+, LmtY-, LmtZ+, LmtZ-, LmtU+, LmtU- correspond to positive and negative limit ports of each axis. IN0, IN1, IN2, IN3, IN4 correspond to reserved input ports.WP1 and WP2 correspond to the 1st water protection and 2nd water protection alarm ports. It is 1 when the input port is triggered, otherwise it is 0.

Out0 - Out7 correspond to the output ports; currently these buttons do not support operations.

8.4.3 Frame cutting function

Click the “Cut Frame” button to enter the frame cutting setting interface, as shown in the figure below:

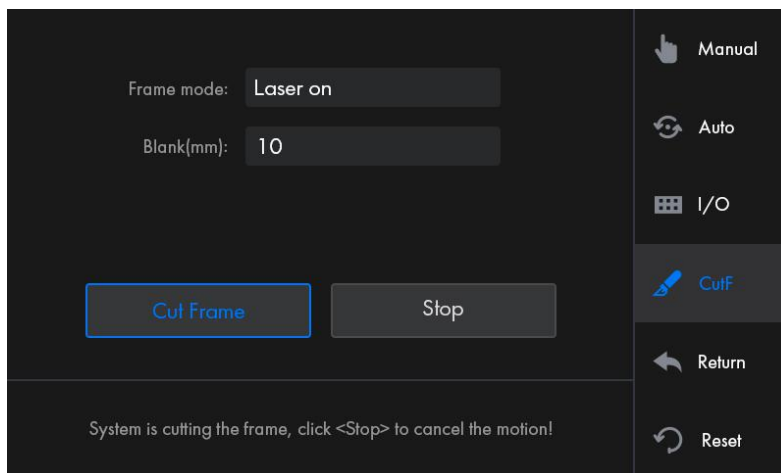


Figure 8.4.3

There are three options for frame mode: laser on, laser off and four-corner dotting. After selecting the mode, press the “Cut Frame” key to start and press the “Stop” key to stop.

8.4.4 Return function

Click the “Return” key to enter the frame cutting setting interface, as shown in the figure below:

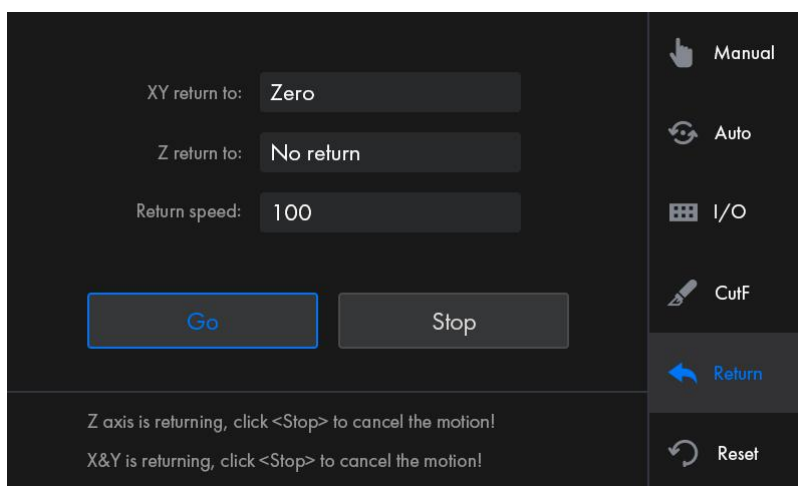


Figure 8.4.4

XY return position options are mechanical origin, positioning point, non-return and stop point. Z return position options are mechanical origin, non-return and stop point. After selecting the return position, press the “Return” key to perform the return action, and relevant motion status will be displayed at the bottom of the interface at the same time. Press the “Stop” key to stop the motion.

8.4.5 Reset function

Click the “Reset” key to reset the system and return to zero for each axis, etc.

8.5 Menu function

Click the “Menu” button in the main interface and enter the menu interface, as shown below:

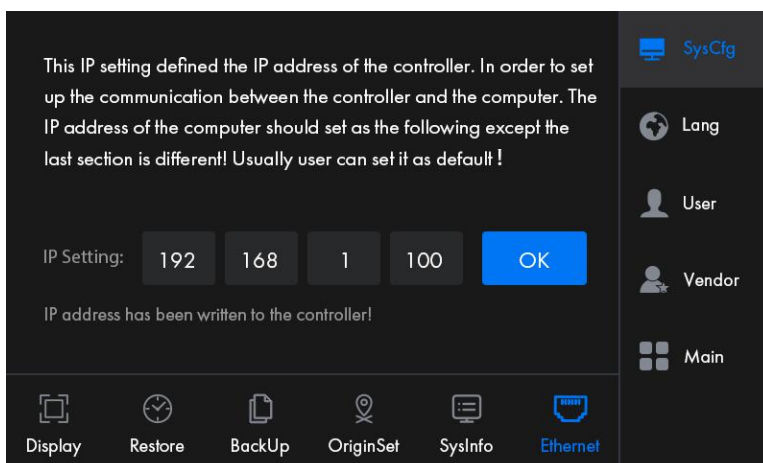


Figure 8.5

The menu function includes system setting, language setting, user parameter and manufacturer parameter submenu. The buttons at the bottom of the interface indicate the function settings corresponding to each submenu.

8.5.1 System Settings

IP Settings

Click the “Network Settings” button and the interface is shown in Figure 8.5.

Click the value to be modified, and press the “OK” key after modification, parameter setting. It will take effect.

System information

When pressing the “Mainboard Information”, the following interface will pop up:

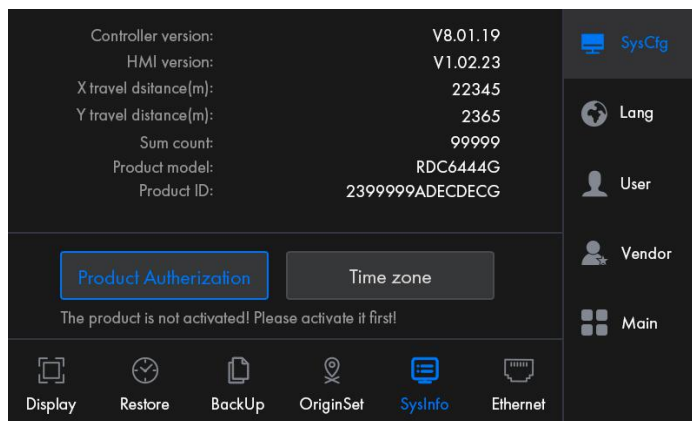


Figure 8.5.1-1

This interface includes mainboard information, product activation and time setting functions.

- Product activation: enter the lower-level product activation interface.

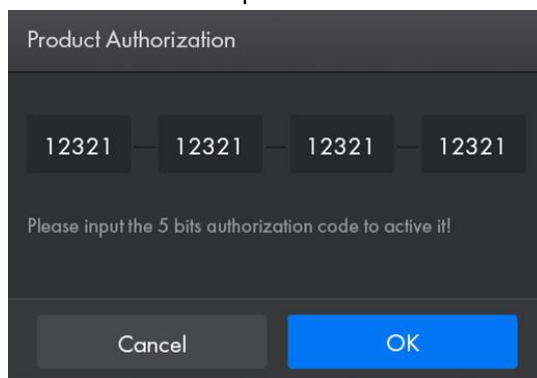


Figure 8.5.1-2

After modifying the authorization code, press the OK key to modify the authorization, and cancel to return the upper interface.

- Time settings: enter the lower-level time setting interface.

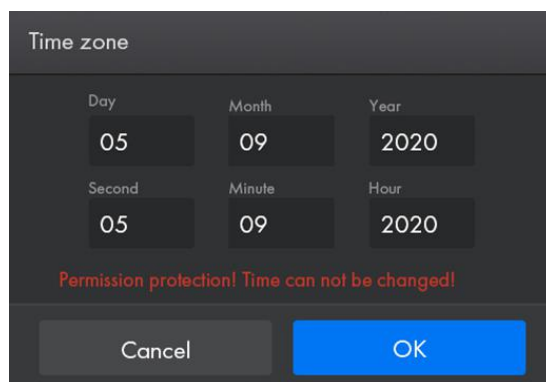


Figure 8.5.1-3

After modifying the time, press the OK key to modify the time, and cancel to return to the upper interface. When the system is in an encrypted state, the time can not be modified.

Multi-positioning point settings

When pressing the “Position settings” button, the following interface will pop up:

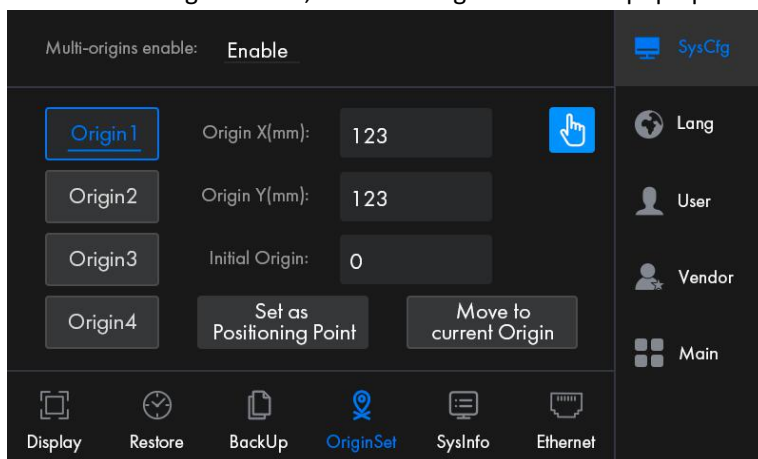


Figure 8.5.1-4

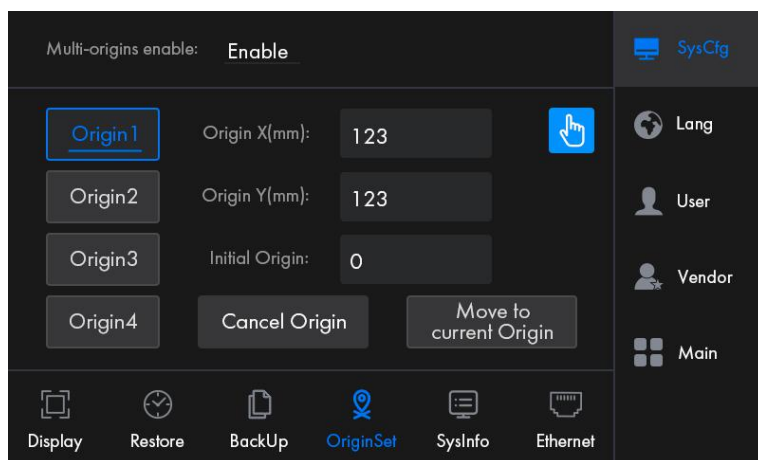


Figure 8.5.1-5

The multi-positioning point enable at the top of the screen is used as the main switch to turn off or turn on the multi-positioning point function. When it is disabled, it is a single positioning point state. After enabling the multi-positioning point function, it is in multi-positioning point state.

In multi-positioning state, there are four positioning points in total. The method of setting the positioning point coordinates is as follows:

Set by coordinate marking box:

1. Select the positioning point button to be set, and the position point 1 is selected in the figure.

2.Input the coordinates that need to be set as the positioning point in the edit box for the positioning point X(mm), and positioning point Y(mm). If user not sure whether the input coordinates are the position you want, click the “Move to Positioning Point” button, and the machine will automatically move to the current input coordinate position. Then click the “Set as Positioning Point” button, the status of the positioning point button becomes selected and enabled **定位点1**, and when the enabled “Positioning Point” button is selected, text description of the button “Set as Positioning Point” changes to “Cancel Positioning Point” as shown in Figure 8.5.1-4.


3.If the coordinates of the positioning point that has been enabled need to be set,user need to click “Cancel Positioning Point” first, and then set repeat operation 2.

Set by the axis moving:



Figure 8.5.1-6

1.Select the positioning point button to be set, the positioning point 1 is selected in the figure.

2.Click the finger button in the upper right corner of Figure 8.5.1-3 to enter the axis operation interface, as shown in Figure 8.5.1-5. Observe the position of the machine laser head through the motion shaft. When it is the position you need, click the button  on the left to return to the upper-level interface, and then click “Set Positioning Point” to set it successfully.


3.If the coordinates of the positioning point that has been enabled need to be set, user need to click “Cancel Positioning Point” first, and then set repeat operation 2.

Each sub-item is introduced as follows:

- Multi-positioning point enable: “Yes” and “No” are optional. When “No” is selected,

system uses a single positioning point logic. Press the “Position” key on the keyboard to set the positioning point, and only the setting positioning point takes effect. When “Yes” is selected, system uses a multi-positioning point logic, and the “Position” key on the keyboard is invalid. The value of each positioning point needs to be set in the menu, see the following.

- Start positioning point: 0~4 optional, display the positioning point to be used for the next figure to be worked. No.0 positioning point represents the positioning point set by the “Position” key on the panel in the single positioning point logic. 1~4 indicates the positioning point number in the multi-positioning point logic. The next positioning point can be modified to any point from 1 to 4, so as to control the starting point position during the next work (provided that the positioning point is enabled). It cannot be modified to No.0 positioning point (if it is a single positioning point logic, the No.0 positioning point is always taken).
- Positioning point 1~4 enable: when the multi-positioning point logic is enabled, the four positioning point can be disabled and enabled individually.

 Prompt	<p>Once the multi-positioning point logic is selected, assuming that the initial positioning point number is 1, and all four positioning points are enabled, when the memory file is started (including the keyboard startup and PC startup), or when the PC uses the direct output to start the work and the option of “Take original positioning point as positioning point” is selected, a different positioning point will be used each time the work is started. The rotation sequence of positioning points is 1->2->3->4->1->2..... If the PC adopts the direct output to start the work, and the “Take the current point as positioning point” is selected, the system will always use the current point as the positioning point.</p>
--	---

Backup Factory Parameters

When pressing the “Backup Parameters”, the following interface will pop up:

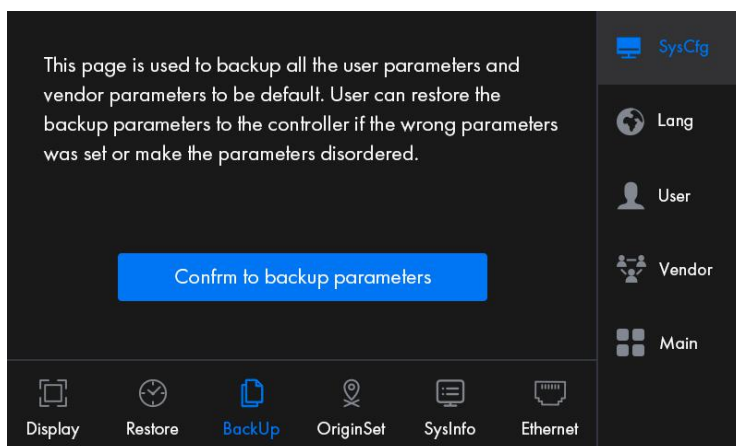
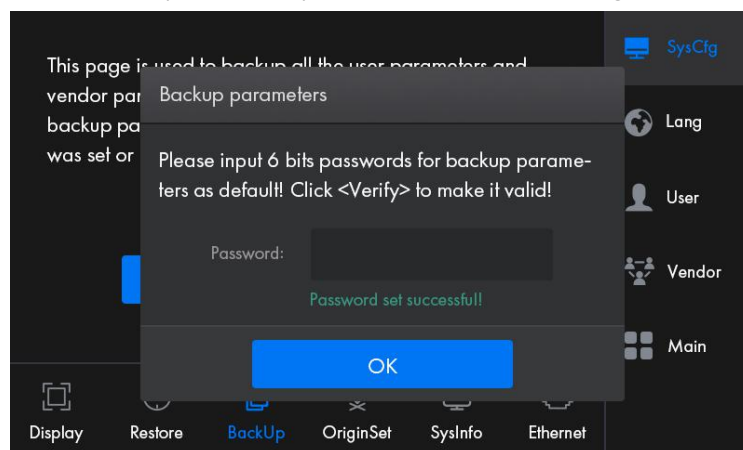



Figure 8.5.1-7

This is the backup parameter function. If the current set parameters need to be backed up, click the blue button on the screen, and enter the password input interface as shown in Figure 8.5.1-7:



Input the password and wait for the backup to succeed.

 <p>Prompt</p>	<p>Use the function of “Backup Factory Parameters” to backup all the debugged factory parameters and user parameters. Afterwards, at any time, all factory and user parameters can be one-click restored by “Restore Factory Parameters”.</p>
--	---

Restore Factory Parameters

When pressing the “Restore Parameters”, the following interface will pop up:

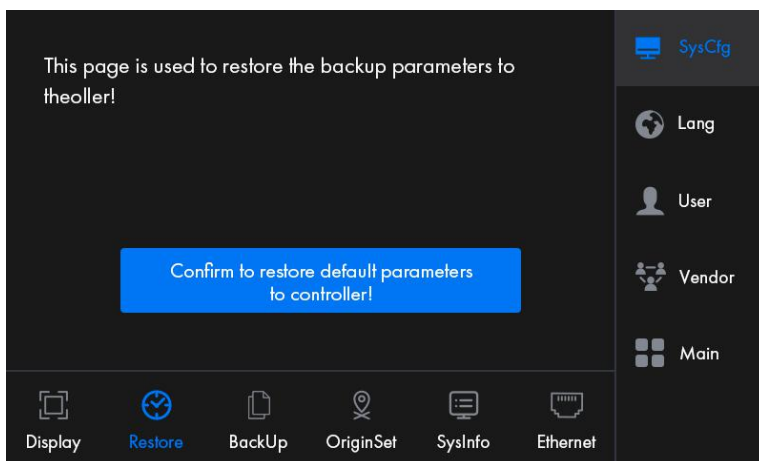


Figure 8.5.1-9

This is the restore parameter function. If you need to restore the parameters, click the blue button on the screen, and enter the password input interface as shown in Figure 8.5.1-9:

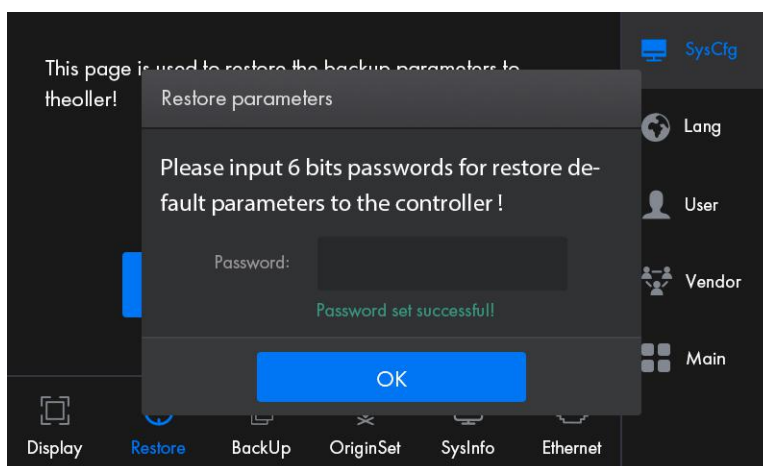


Figure 8.5.1-10

Input the password and wait for the restoration to succeed.

Screen Origin Settings

When pressing "Display Settings", the following interface will pop up:

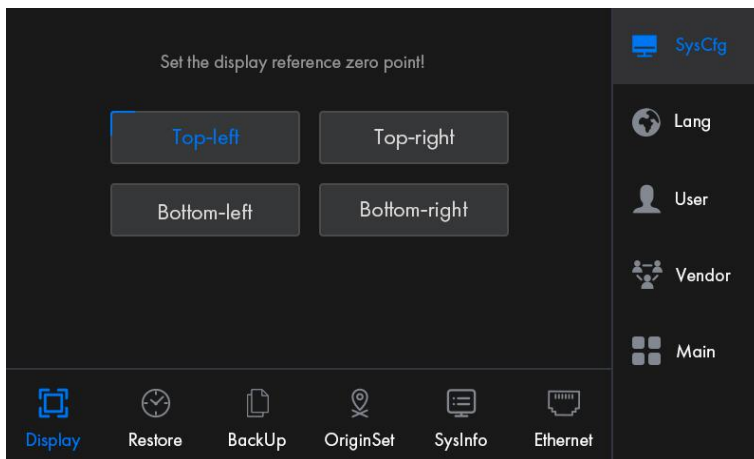


Figure 8.5.1-11

Set the origin position of the display screen here. Choose different screen origin positions to mirror the displayed graphics in different X/Y directions.

To set the origin position of the display screen, just click the corresponding position button.

8.5.2 Language settings

When pressing the “Language” button, the following interface will pop up:

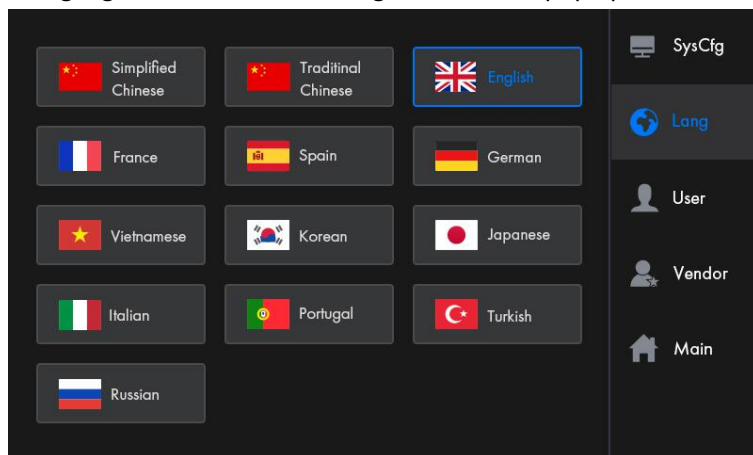


Figure 8.5.12

After selecting a language, the setting takes effect and returns to the main interface automatically.

8.5.3 User parameters

When the “User” button is pressed, the following interface pops up:

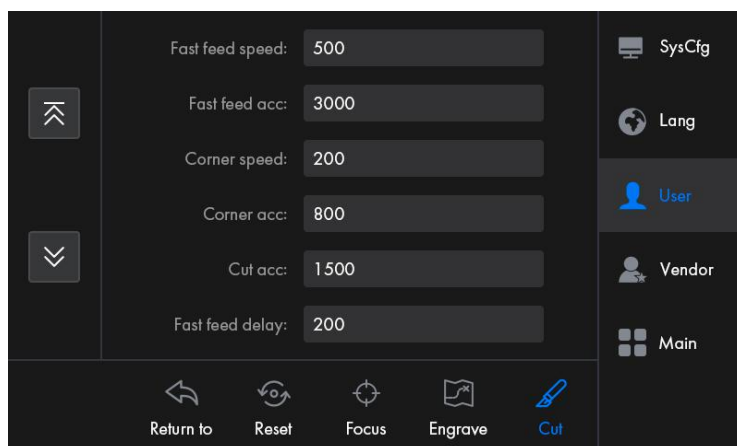


Figure 8.5.3-1

User parameters include cutting parameters, engraving parameters, focusing parameters, reset parameters and return parameters.

Parameter modification method:

1.If it is a numeric class parameter, a numeric keyboard will appear after clicking the parameter area, as shown in the figure below:

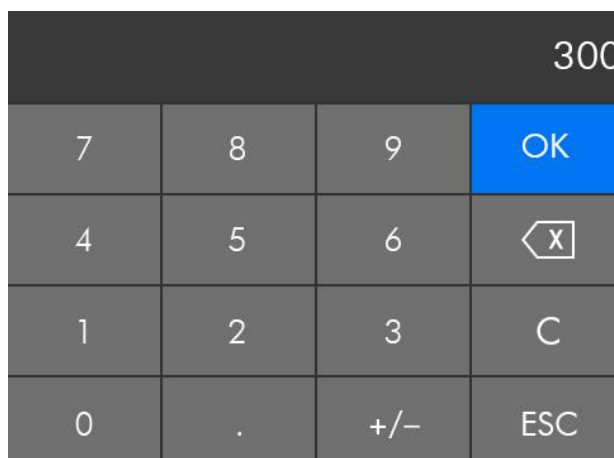


Figure 8.5.3-2

Input the required parameter value and click the “OK” key to modify the parameters.

2.If it is a selected class parameter, here is the example of automatic focus, as shown in the figure below:

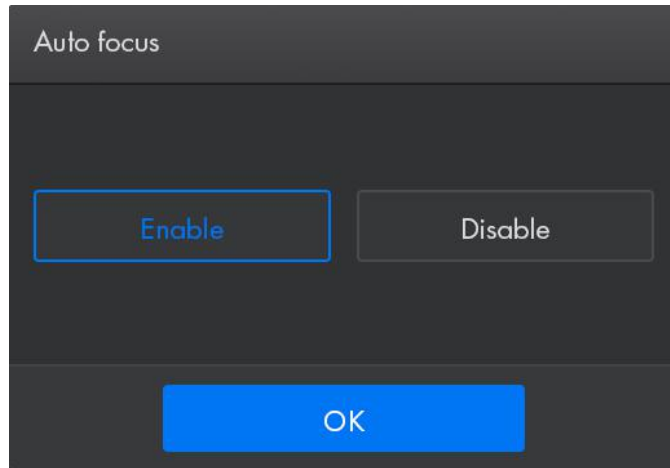
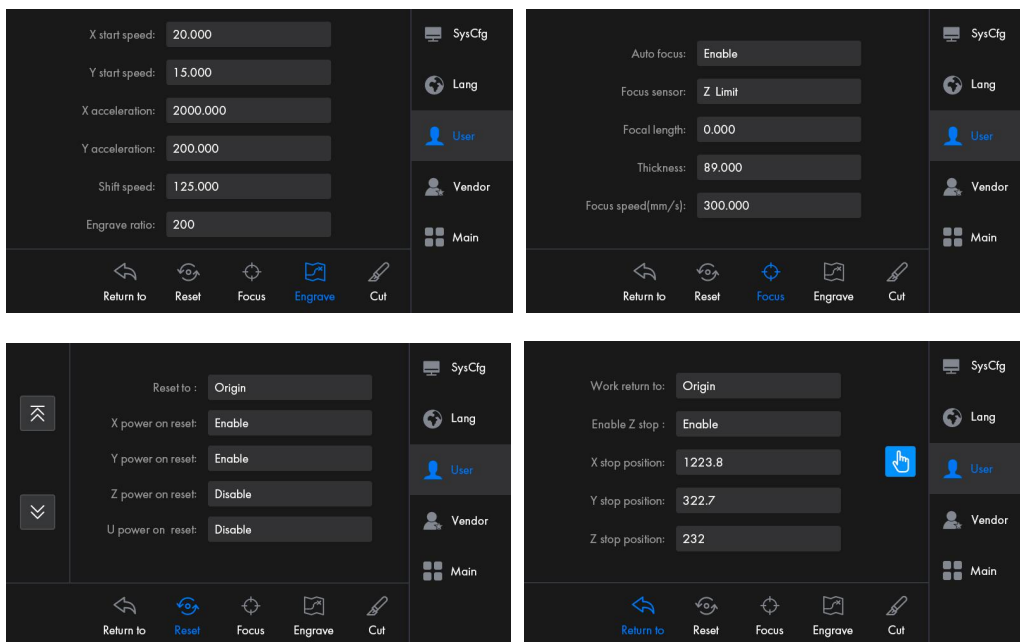


Figure 8.5.3-3

Select the item to be set, and then click OK, the parameter selection box disappears, and the parameter modification is completed.

Other parameter interfaces are as follows:



For details of the parameters, please refer to Chapter 9.

8.5.4 Factory Parameters

When the “Factory Parameters” button is pressed, the following interface pops up:

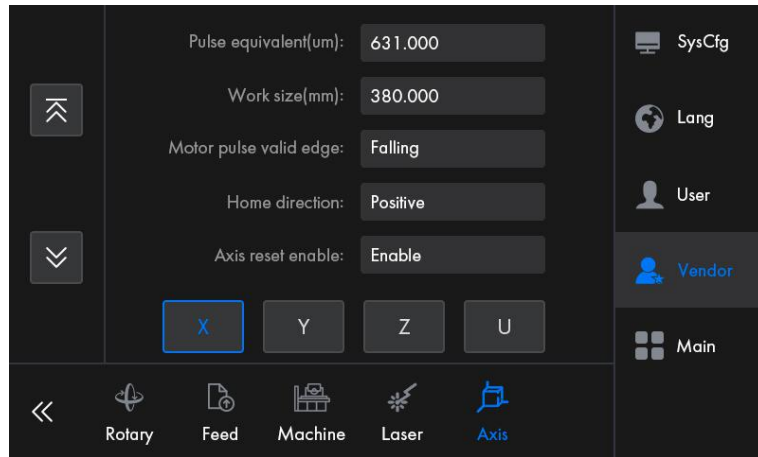
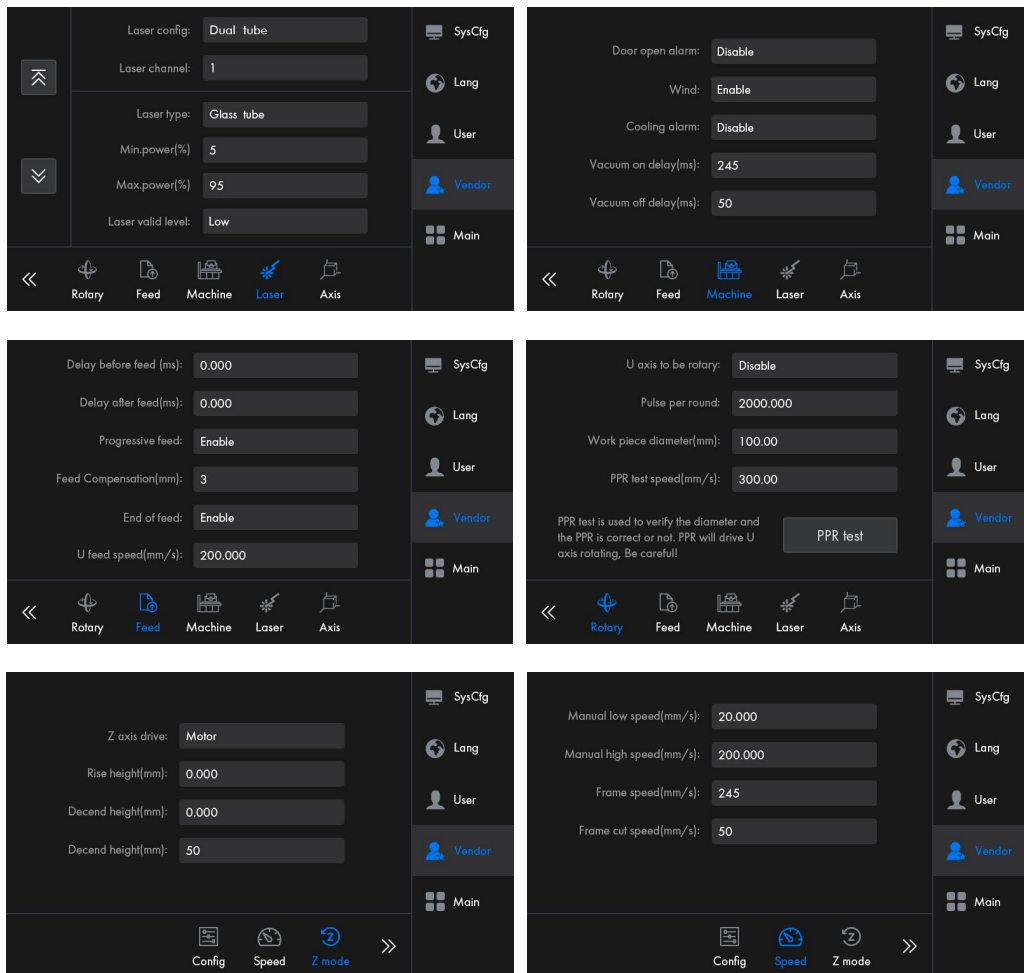
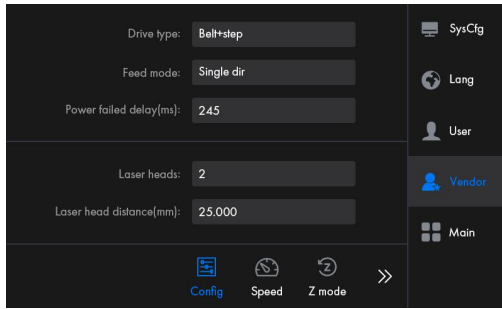


Figure 8.5.4-1

Factory parameters includes: feeding parameters, rotation parameters, Z-axis control, speed parameters, system configuration, machine parameters, axis parameters and laser parameters. Select one of these interfaces to display all parameters of this type, and user can scroll through the pages through the page button on the left.

The parameter interfaces of other types are as follows:





Factory parameter setting method is the same as the user parameter, please refer to Chapter 9 for detailed parameter explanation.

8.9 File management

8.9.1 Memory file

In the main interface, press the "File", the following interface pops up:

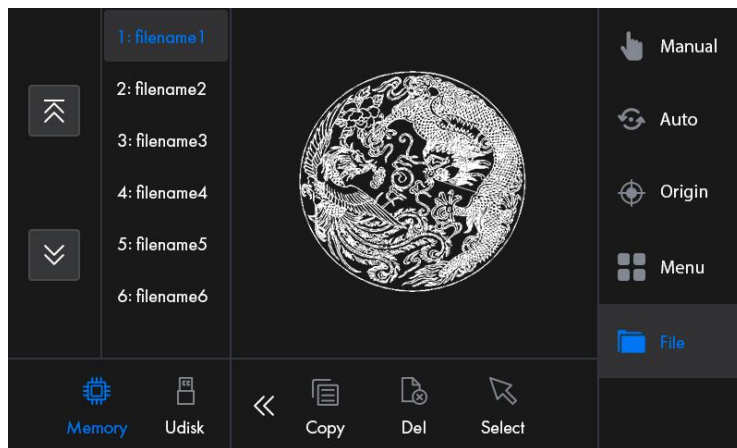


Figure 8.9.1

When entering this interface, if there is a memory file, the file name will be displayed on the list, and the selected file will be previewed in the preview area on the right. When there are multiple files, press the up and down keys on the left to turn pages to find the file, click on the selected file, the file will be previewed, and the graphics will be displayed in the preview area. When you press the "Select" key, it means that the file is about to be processed. The memory and U disk buttons in the lower left corner can switch between the memory interface and the U disk interface, and have the functions of reading files and reading U disk.

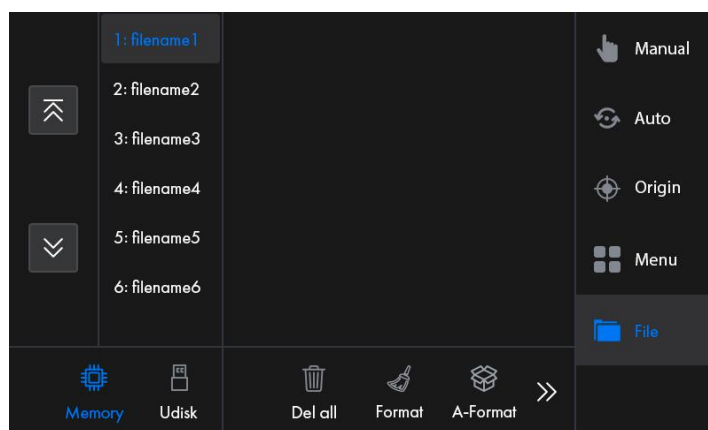
At the bottom of the interface, the related file operations are copy, delete, select, delete all, empty and format.

The content of each entry at the bottom is as follows:


- Memory: switch to file interface and read file.
- U disk: switch to U disk interface and read U disk files.
- Copy: copy the selected file to U disk.
- Delete: delete the selected file
- Select: select the currently selected file as processing file.
- Delete all: clear all memory files
- Clear: quickly clear memory.
- Format: format memory.

8.9.2 U disk files

Click the “U disk” button to switch to the U disk file interface, as shown in the figure below:



- Copy to memory: copy the selected file to memory.
- Delete file: delete the selected file.
- Mainboard upgrade: upgrade mainboard program through U disk.
- Touch screen upgrade: upgrade panel program through U disk.

 <p>Prompt</p>	<p>This system supports FAT32 and FAT16 file formats of U disk. The file must be placed in the root directory of the U disk to be recognized by the system. The file names exceeding 8 characters will be automatically cutoff by the system. File names other than English and numbers copied to the motherboard will not be displayed. The files copied from the motherboard to the U disk will be placed in the root directory of the U disk.</p>
--	--

8.10 Program upgrade

8.10.1 Touch screen program Upgrade

- Software upgrade

Open the system supporting software RDWorksV8, and successively select “Settings”, “System settings” and “Mainboard Information” in the upper menu bar, as shown in the figure below:

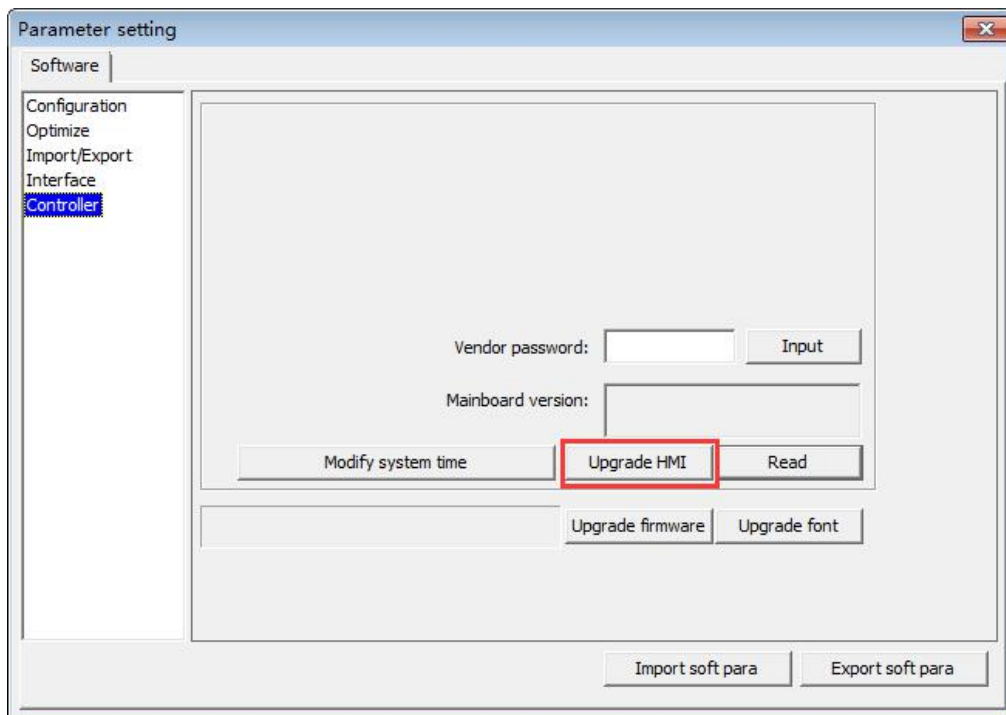


Figure 8.10-1-1

Click the “Upgrade HMI” button to pop up the following interface:

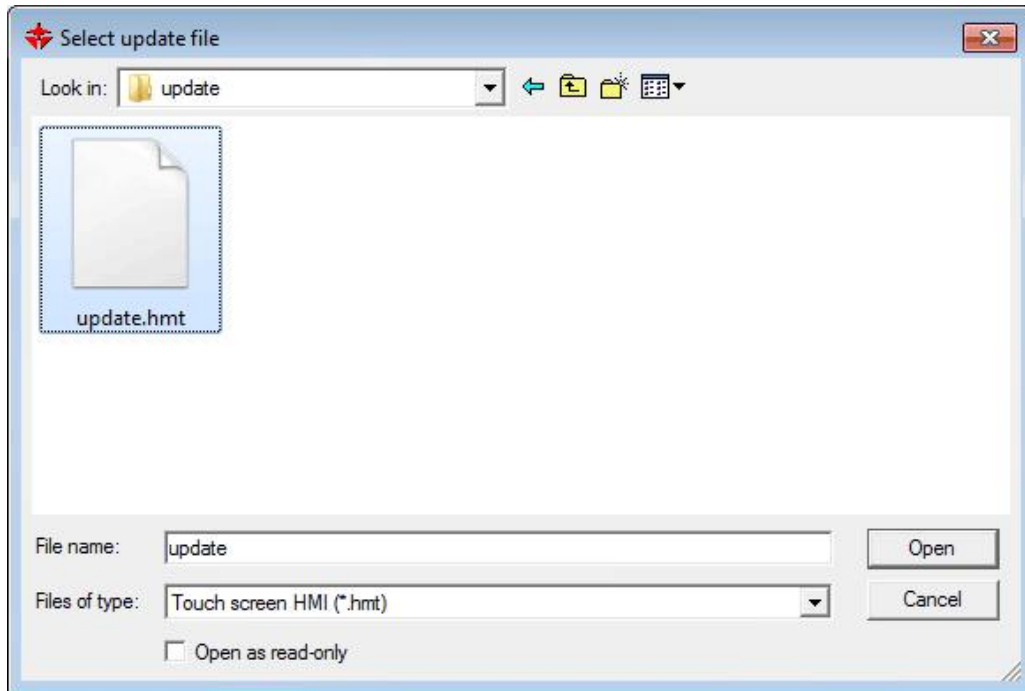


Figure 8.10.1-2

Select “Touch Screen HMI (*.hmt)” as the file type, select update.hmi file, and finally click the “Open” button to start the upgrade.

● SD Card upgrade

The panel supports using the SD card to upgrade the program with the steps as follows:



1. Prepare a micro SD card in FAT32 format.

2. Copy the update.hmt file to the root directory of the SD card, and then insert the SD card into the SD card socket on the panel, paying attention to the front and back.

3. After the system is powered on, click anywhere on the panel screen several times quickly and continuously, and there will hear a bell, indicating that the touch screen starts to upgrade. Please wait with patience during the upgrade. When the upgrade is completed, the touch screen will ring continuously and slowly, indicating that the upgrade is successful. Pull out the SD card, power on again, and the upgrade is completed.

4. If it can't hear a bell, repeat step 3. When an error occurs during the upgrade process, it will ring continuously and quickly, indicating that the upgrade has failed. At this time, check whether the upgrade file is correct or replace the SD card, and then restart the operation.

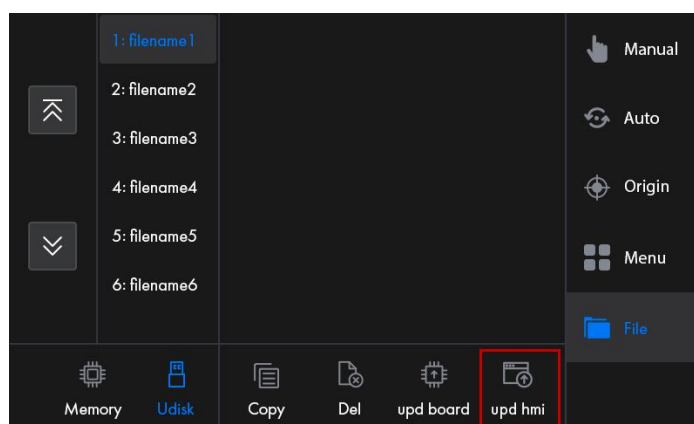
● U disk upgrade

U disk upgrade steps are as follows:

1.Prepare a U disk in FAT32 format.

2.Copy the update.hmt file in the the root directory of the U disk, and then insert the U disk into the USB interface of the mainboard.


3.In the U disk page of file management interface on the panel, click the “Panel Upgrade” button, as shown in the figure below:



4.Here the upgrade process will be displayed on the touch screen. Please wait with patience during the upgrade process. After the upgrade is completed, it will prompt that the upgrade is successful.

5.If the touch screen prompts that the upgrade has failed, check whether the upgrade file is correct or not and then restart the operation. If the touch screen prompts that the U disk fails to read, you need to re-plug the U disk or replace another U disk, and then restart the operation.

6.After completing the upgrade, the system needs to be powered on again.

 Prompt	<p>U disks recommend Kingston, SanDisk, the file format is FAT32 with capacity below 32GB. The file names can be maximum 8 English letters or 4 Chinese characters, such as RDC6445G.hmt and upgrate.hmt. Only one hmt file can be stored in the U disk, otherwise the upgrade may fail.</p>
--	--

8.10.2 Boot screen upgrade

Open RDWorksV8, and select “File”, “Vendor Parameters” and “Panel Screen” in the upper menu bar, as shown in the figure below:

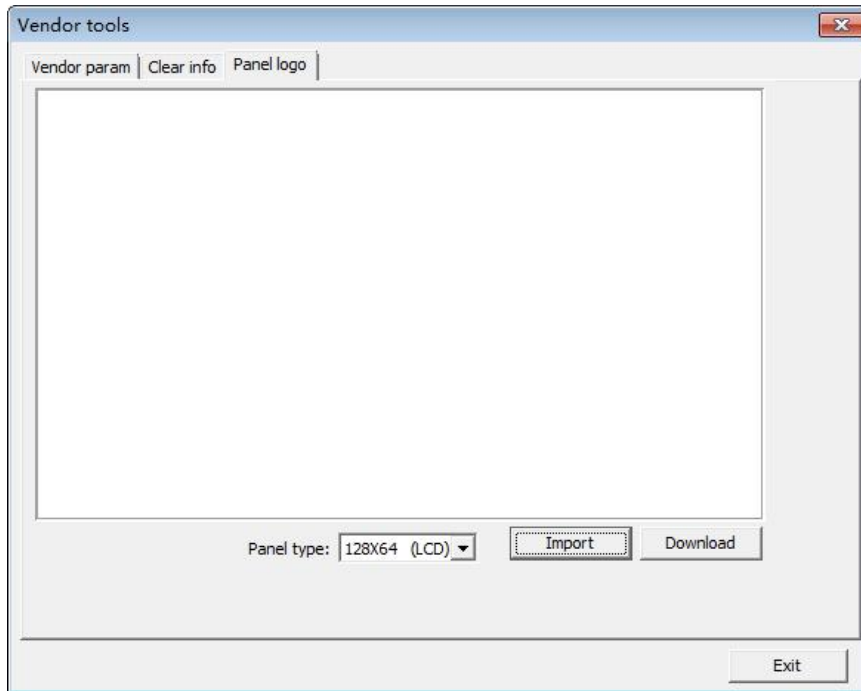


Figure 8.10.2-1

Select 800X480(TFT) as the panel type, and then click “Import Bitmap”, as shown in the figure below:

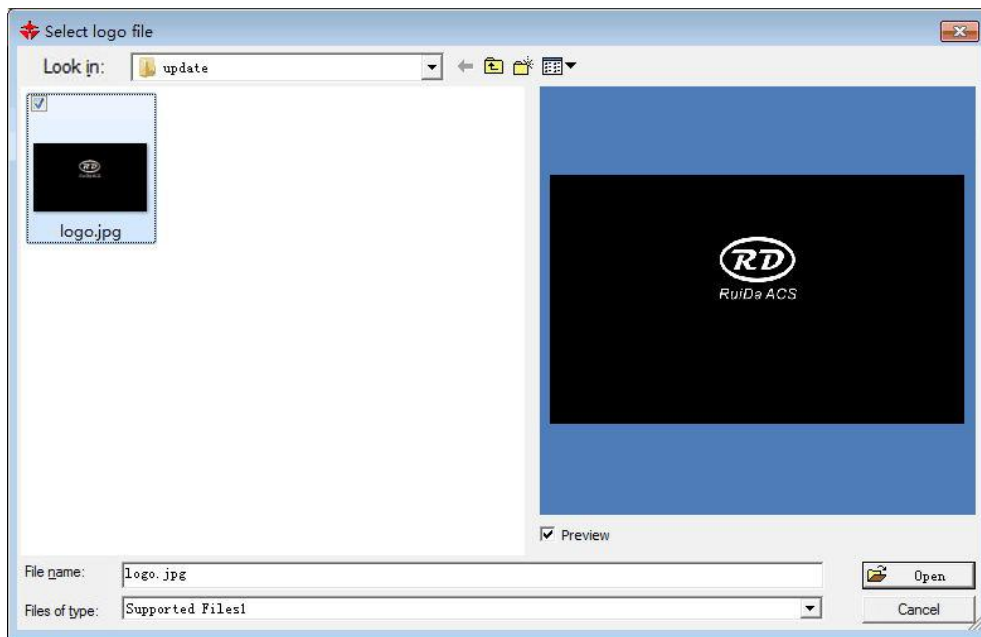


Figure 8.10.2-2

File types support jpg, bmp and other formats. Select a picture and click the “Open” button, as shown in the figure below:

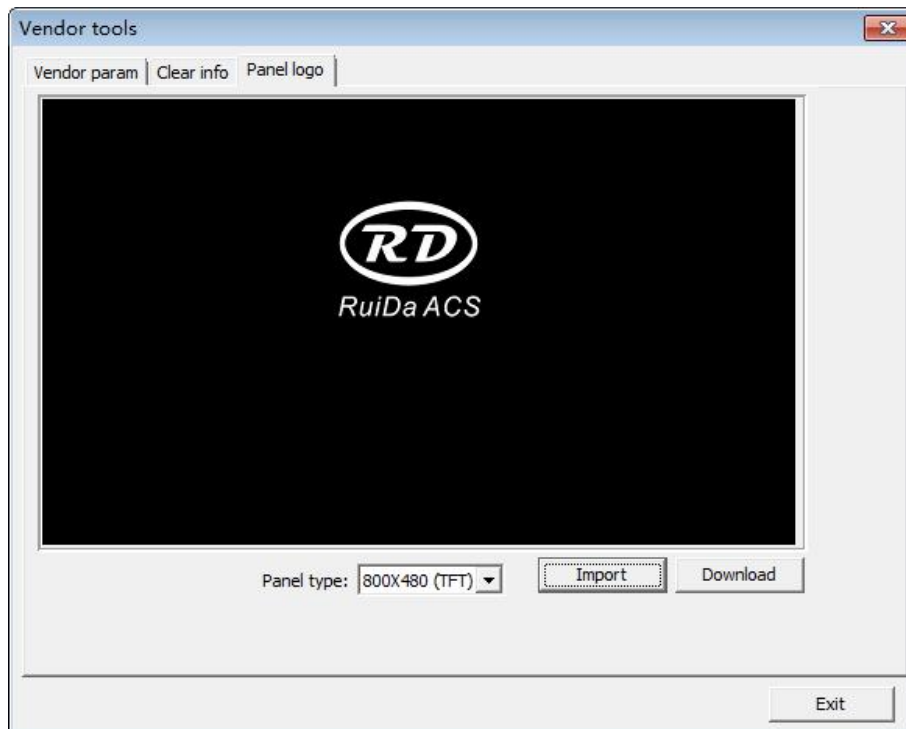


Figure 8.10.2-3

Then click the “Download” button to start the upgrade, and the upgrade progress will be displayed on the panel. After upgrade completed, it prompts that the upgrade is successful. User can check the updated boot screen after restart.

8.10.3 Mainboard program upgrade

- Software upgrade

Open RDWorksV8, and select “Settings”, “System settings” and “Mainboard Information” in the upper menu bar, as shown in the figure below:

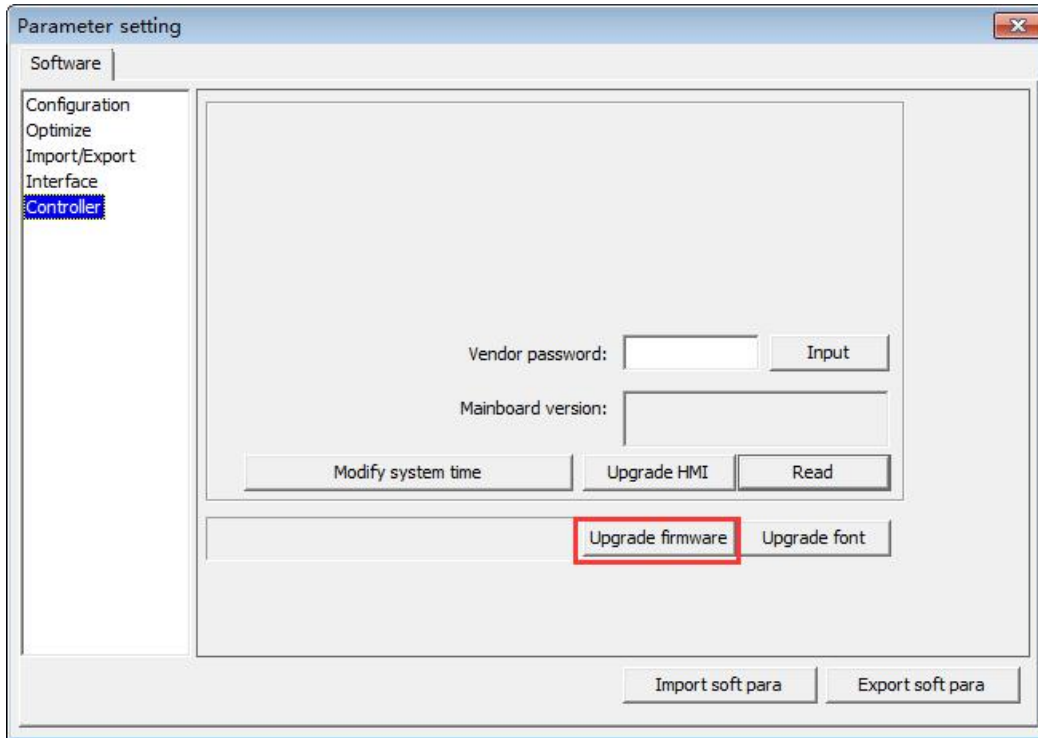


Figure 8.10.3-1

Click the “Mainboard Upgrade” button to pop up the following interface:

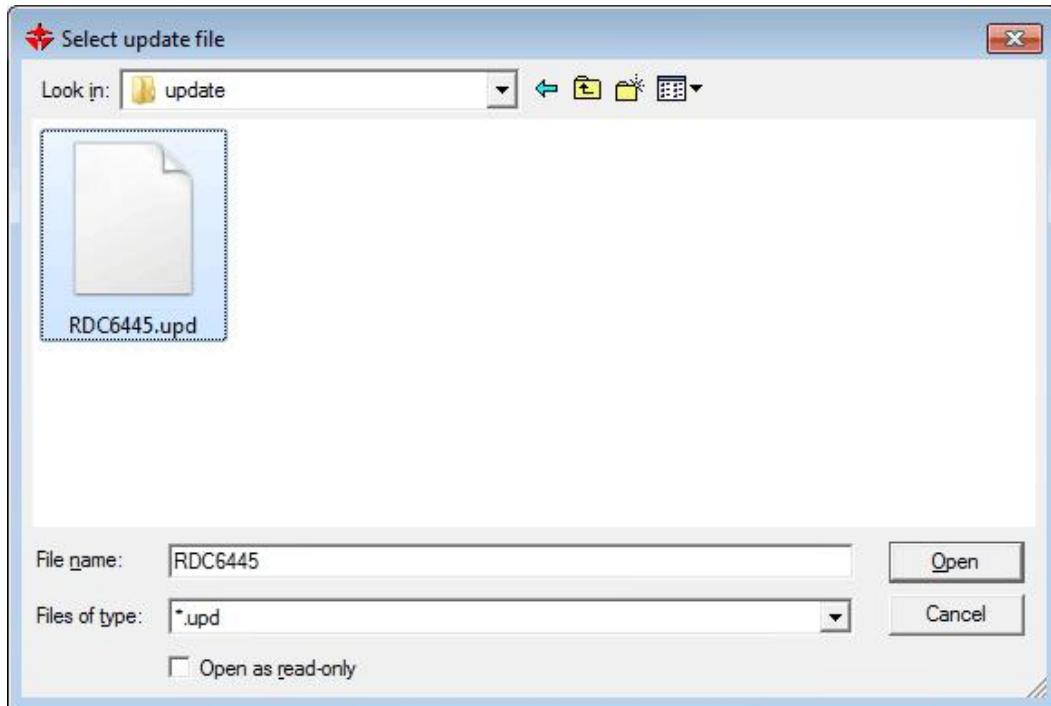


Figure 8.10.3-2

Select RDC6445.upd file, and then click the “Open” button to start upgrading, the upgrade progress will be displayed on the touch screen. After the upgrade is completed, it prompts that the upgrade is

successful, and the system needs to be powered on again.

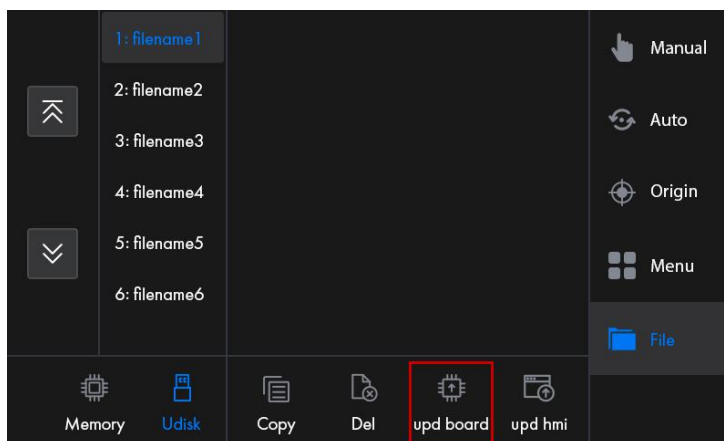
- **U disk upgrade**

The steps to upgrade the U disk are as follows:

1.Prepare a U disk in FAT32 format.

2.Copy the RDC6445.upd file to the root of the U disk, and insert the U disk into the USB interface of the mainboard.


3.In the U disk page of the file management interface on the touch screen, click the “Mainboard Upgrade” button, as shown in the figure below:



4.At this time, the upgrade progress will be displayed on the touch screen. Please wait during the upgrade. After completing the upgrade, it prompts that the upgrade is successful.



5.If the touch screen prompts that the upgrade fails, check whether the upgrade file is correct, and then restart the operation. If the touch screen prompts that the U disk fails to read, you need to re-plug the U disk or replace another U disk, and then restart the operation.

6.After completing the upgrade, the system needs to be powered on again.

 <p>Prompt</p>	<p>U disks recommend Kingston, SanDisk, and the file format is FAT32 with capacity below 32GB. The file names can be maximum 8 English letters or 4 Chinese characters, such as RDC6445G.hmt and upgrate.hmt. Only one hmt file can be stored in the U disk, otherwise the upgrade may fail.</p>
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Chapter 9 Vendor / User Parameters

CONTENTS:

-  Vendor parameters
-  User parameters

9.1 Vendor parameters

(1) Motor parameters

X/Y/Z/U axis parameters

- Direction polarity: modify the direction polarity to make the motor move in the reverse direction. The purpose of modification is to make the axis move to the origin when reset. If the axis moves away from the origin direction when reset, it means that the axis direction polarity setting is wrong and should be modified.
- Limit polarity: used to set the high and low voltage mode of the limit signal. When the motion shaft reaches the limit position, input a low voltage signal to the mainboard, the limit polarity at this time should be set to negative.
- Breadth: the maximum distance that the motion axis moving, it depends on the actual situation of the machine.
- Origin offset: if the hard limit protection is enabled for this axis, usually the value should be set to 2~5 mm. If set to 0, when this motion shaft moves to the minimum coordinate 0, the limit may be valid, which will trigger the hard limit protection function wrongly and the machine emergency stop. If the hard limit protection is not enabled, the value can be set to 0~5mm.
- Control method: double pulse and pulse + direction mode is optional. It depends on the motor drive type actually configured on the machine, generally pulse + direction mode.
- Motor step distance: the pulse equivalent of the motor. When a pulse is sent to the motor, the absolute distance of the motion axis. Before the value is set correctly, the machine can cut a larger rectangle (larger graphics can make the error smaller), and automatically calculate the motor step distance through the length of the graphics and the measured length.
 - Hard limit protection: used to enable the hard limit protection function of this axis.
 - PWM rising edge valid: used to set whether the pulse signal of the motor drive is valid on rising edge or on falling edge. When this item is not enabled, the controller uses a falling edge to be valid; when this item is enabled, the controller uses a rising edge to be valid.
- Enable reset: if this axis is configured on the machine, the “Reset Enable” option for this axis should be turned on, if not, the option should be disabled. The meaning of this parameter is to control the “Boot Reset” option in user parameters and the “Shaft Reset” function in function keys, preventing the user resetting the motion axis that does not exist.
- start speed: the speed at which the motion axis directly starts up from stationary state. If the value is too large, it will cause the motor to lose steps, shake or even howl. If the value is set too small, the running speed of the entire graph will be reduced. If the inertia of the motion axis is large (the axis is relatively heavy), user can set a smaller start speed. If the inertia of the motion axis is small (the axis is relatively light), the start speed can be appropriately increased. Typical value is 5~30mm/s.
- Maximum speed: the maximum ultimate motion speed that the axis can withstand. This parameter is related to the drive capacity of the motor, the inertia of the motion shaft and the transmission ratio. Typical value is 200~500mm/s.
- Maximum acceleration: the maximum acceleration value of motion axis during

acceleration and deceleration. When the acceleration is set too large, it will also cause the motor to lose steps, shake and even howl; setting too small will cause slow acceleration and reduce the running speed of the entire graphics. Corresponding to the axis with large inertia, such as the Y axis corresponding to the beam, a typical setting range is 800~3000mm/s². Corresponding to the axis with small inertia, such as the X axis corresponding to the trolley, a typical setting range is 8000~20000mm/s².

➤ Emergency stop acceleration: if the hard limit protection is enabled for this axis, when the axis moves to the limit position, it will perform emergency deceleration shutdown at an emergency stop acceleration. The value can be 2~3 times the maximum acceleration of the axis.

Key parameters

➤ Key start speed: the starting speed when the axis is moved by the keyboard key, which can't be higher than the start speed of the axis.

➤ Key acceleration: the acceleration value when the axis is moved by the key, which can't be higher the maximum acceleration of the axis.

➤ Manual movement reverse: used to control the movement direction when manual key moves the axis. When the direction polarity parameter is set correctly, if the axis moves in the reverse direction by pressing the direction key on the operation panel, just enable the key to reverse.

(2) Laser Parameters

➤ Laser tube configuration: single tube / double tubes optional, set depending on the quantity of laser tubes actually configured by the factory.

➤ Laser channel: used to select to display / modify the parameters of channel 1 or channel 2.

➤ 选。

➤ Laser source type: glass tube, RF laser source (without pre-combustion pulse) and RF laser source (with pre-combustion pulse) are optional.

➤ **Laser source attenuation coefficient**

➤ 。

➤ Laser tube enable: when the configuration of laser tube is double tubes, laser source 1 and 2 can be enabled respectively.

➤ **Minimum power**

➤ **Maximum power**


➤ **Laser frequency**

➤ **Pre-combustion frequency**

➤ Pre-combustion pulse width: when it is a RF laser source and a pre-combustion pulse is required, the characters of pre-combustion pulse can be configured through pre-combustion frequency and pre-combustion pulse width.

The laser frequency is used to set the pulse frequency of the control signal used by the laser source. The glass tube is set to about 20KHZ generally while the RF tube is about 5KHZ generally; the maximum/minimum power (%) is used to set the ultimate power value of this laser source, that is,


during operation, the maximum power set by the user can't be higher than the maximum power value set here, and the minimum power value set by the user cannot be lower than the minimum power value set here; if the power has attenuated after using the laser source a period of time, the laser power can be fine-tuning by setting the laser source attenuation coefficient. The attenuation coefficient is 0 when it is not attenuated.

 Prompt	If only a single channel laser tube is configured, only one channel of laser parameters will be displayed.
---	--

(3) Other vendor parameters

Machine configuration

- Transmission mode: generally, the "Belt Stepping Type" should be selected. When other types are selected, the control algorithm will change slightly.
- Feeding mode: one-way / two-way optional. When it is a one-way feed, it can always feed in one direction without checking the coordinates; when a two-way feed is selected, the system will check the maximum and minimum coordinates. Feed materials in one direction at odd times, and feed materials in the other direction at even times. The initial direction of the first time can be changed by setting the direction polarity or modifying the positive and negative values of the feed length. This parameter is valid only when the "Z Axis Function" is configured as "Feeding Axis".
- Power outage delay: 0~3000ms can be set. When the power grid is cut off, the system power supply will not drop to 0V immediately. There is a delay during this period, the delay value set here should be basically consistent with the actual power outage delay value. If the setting value deviation is relatively large, when the power is cut and engraving is continued, the graphics processed for the second time and the graphics before the power outage are either unclosed or overlapped too much.
- Quantity of laser heads: select the quantity of the working laser head.
- **Double heads spacing:** when double laser heads, the safe distance between the two.
- **Cover opening protection:** when this item is enabled, the controller must be connected to the cover opening protection circuit, otherwise the machine will not work.
- Fan enable: if you want to use the Wind signal of output port to control the switch of the fan in layers, you must enable this parameter, otherwise the Wind signal outputs other signals.
- Water cooling alarm: when the water protection is enabled, the controller must be connected to the water protection circuit, otherwise the machine will not emit light. If the water protection is not enabled, the water protection circuit can be disconnected and the controller will not detect it.
- Adsorption on delay: delay time before adsorption on.
- Adsorption off delay: delay time after adsorption off.
- Power off delay: 0~300.

 Prompt	After modifying the configuration parameters in the factory parameters, such as direction polarity, control method, laser source type and laser frequency, the system needs to be reset, and the modification takes effect when the reset is completed.
---	---

Feeding parameters

- Delay before feeding: the time can be set from 0 to 300s. After the previous work is completed and the value is delayed, the feeding axis starts to move. During the delay period, it is convenient for users to load and pick materials on the feeding device.
- **Delay after feeding:** the time can be set from 0 to 9.9s, which is convenient for the feeding device to move in place, delay to shake and wait for the feeding axis completely static before performing the second work.
- **Progressive feeding:** if the progressive feeding function is enabled, the virtual array graphics in the Y direction will be processed at the same position. For each processing, the feeding axis moves one time.
- Progressive feeding compensation: because of the inaccuracy of the feeding axis motion, the feeding length can be compensated by setting this item.
- Finish feeding: after enabling, the last processing will end after feeding.
- U axis working speed: the working speed of U axis.

Rotary engraving

- Enable rotary engraving: after enabling rotary engraving, the actual Y axis accuracy will be matched according to the diameter, circumferential pulse setting, and axis pulse accuracy setting. Besides, the Y axis breadth display of the main interface will also switch between the rotation and plane processing methods.
- Circumferential pulse: the number of motor pulse corresponding to one rotation of the workpiece.
- Workpiece diameter: the diameter size of parts to be processed.
- Circumferential pulse test speed: working speed during testing.

Z axis mode

- Z axis drive: select the Z axis drive mode as motor/IO.
- Lifting height: the lifting height of the Z axis in IO mode.
- Falling height: the falling height of the Z axis in IO mode.
- Z axis working speed: the working speed of Z axis.

Speed parameters

- **Manual low speed:** the speed of manual motion shaft at slow speed.
- **Manual high speed:** the speed of manual motion shaft at fast speed.
- **Frame speed:** the speed of frame when laser off.
- **Cutting frame speed:** the speed of walking frame when laser on.

9.2 User parameters

(1)Cutting parameters (only affect the cutting mode)

- Idle speed: this parameter determines the highest speed of all laser-off straight lines during the motion of the machine.
- Idle acceleration: the highest acceleration of the laser-off straight lines. Larger setting of idle speed and idle acceleration can shorten the working time of the entire graph. But setting too large may cause the trajectory to jitter. Comprehensive consideration is required when setting.
- Turning speed: the speed at sharp corners when cutting, which is also the lowest speed in the whole cutting process.
- Turning acceleration: the acceleration value at sharp corners when cutting. Large setting of turning speed and turning acceleration may cause the turning to jitter. But setting too small will affect the cutting speed.
- Cutting acceleration: the highest acceleration value of laser-on segments during the whole cutting process
- Cutting mode: divided into fast cutting and precision cutting. Fast cutting gives priority to cutting speed, while precision cutting gives priority to cutting effect.
- Acceleration method: divided into T-shaped acceleration and S-shaped acceleration. T-shaped acceleration will make the whole cutting process faster, but the cutting effect caused by too fast T-shaped acceleration mode will be inferior to that of S-type acceleration.
- Delay after idling: if this parameter is 0, no delay will be performed after idling, otherwise the speed will be reduced and delayed after idling.

(2)Engraving parameters (only affect the scanning mode)


- **X axis starting speed**
- **Y axis starting speed**
- **X axis acceleration**
- **Y axis acceleration**

The above four parameters are used to set the starting speed and acceleration of the two axes during scanning. The larger the starting speed and acceleration value, the faster the scan.

- Scan line feed speed: this parameter is dedicated to controlling the highest speed of vertical movement from the previous line to the next line in scanning mode. If the line-to-line spacing is large during scanning, or the distance between each block is large when scanning block graphics, and each line or each block needs to be accurately positioned, you can set the scan line feed speed to a lower value.
- Scan mode: general mode and special mode are optional. If enabled the special mode, the laser power should be increased. The lower the light spot percentage, the more the laser power attenuation, to achieve the same scan depth, the larger the laser power should be set. The purpose of selecting the special mode is to make the laser source emits light in a short time with high power. In depth scanning, the effect of flat bottom is obtained, but it should be noted that if the light spot adjustment is not appropriate, this purpose may not

achieved, and the high-power short-time light output mode will have a certain influence on the life of the laser source. The system defaults to select the general mode.

- 。
- Light spot size: when the general mode is selected as the scan mode, this parameter is invalid; when the special mode is selected, this parameter is effective. The controller controls the parameter between 50% and 99%.

 Prompt	The cutting and scanning process parameters cannot exceed the limit parameter values in the axis parameters. If the axis parameter is exceeded, set the process parameter as illegal, and the system will automatically overwrite the process parameter with the axis parameter.
---	--


(3) Reset parameters

- Reset speed: X/Y axis linkage reset speed to the origin.
- **X axis power-on reset**
- **Y axis power-on reset**
- **Z axis power-on reset**
- **U axis power-on reset**

The parameter fields of the above four parameters are “Yes” or “No” optional, which are used to configure whether each axis is reset when it is turned on.

(4) Frame parameters

- Frame mode: “Laser off and walk the frame” means idling, which can realize the frame preview function; “Laser on and cut the frame” can manually cut the processed graphics; “Four corners dots” means that laser is on at the four corners of the frame. mark a dot, turn off the laser in other places, and you can visually check the size and position of the graph through four points. The speed of frame is the speed value set on the keyboard when the system is idle. Laser on, the minimum/maximum power of the laser is the corresponding value set on the keyboard when the system is idle (the pulse power is when four-corners dotting is the set maximum power value).

 Prompt	If over frame, there will be displayed on the interface. If user press the OK key at this time, the system will use the maximum/minimum coordinates to cut off the frame, and then perform the operation of frame. User can cancel this frame operation.
---	--

When Preview /cutting a frame, whether to extend a certain length outside the actual frame of the graph.

(5) Other user parameters

- Array processing method: two-way array and one-way array can be selected, which only works for virtual arrays. Two-way array: cut the array back and forth in sequence; one-way array: always cut the array from one direction to the other. When one-way array is selected, the action mode of each array unit is exactly the same, and the movement fluency is completely the same, but it takes a bit longer than two-way array. The two-way array is selected by default.
- Return position: positioning point and machine origin can be selected. This parameter

determines the parking position of the laser head after completing each work.

- Focal length: the distance from the focal point of the laser head lens to the origin of the Z axis. When there is no auto focus function, this parameter is invalid.
- Material thickness: the thickness of a processed object.
- Non-contact focus: when the selection is Yes, the focus mode is non-contact focus, otherwise it is contact focus. This parameter defaults to contact focus mode.

The above three parameters are used to set the auto focus function. Auto focus mode can be divided into two modes: contact focus and non-contact focus, and each mode is divided into two motion methods.

Contact focus:

Motion method one: D axis directly drives the laser head to move downwards until it touches the surface of the material. At this time, the controller considers this position to be the origin of the D axis. Then the D axis moves a certain distance in the opposite direction, and this distance is the focal length value in the parameter setting. In this mode, the material thickness parameter is invalid.

Motion method two: D axis drives the platform to move upwards until the material touches the laser head. At this time, the controller considers this position to be the origin of the D axis. Then the D axis moves a certain distance in the opposite direction, and this distance is the focal length value in the parameter setting. In this mode, the material thickness parameter is invalid.

Non-contact focus:

(1) Motion method one: D axis directly drives the laser head to move upwards until it touches the limit switch placed at the top. At this time, the controller considers this position to be the origin of the D axis. Then the D axis moves a certain distance in the opposite direction, which is the maximum stroke of the D axis (the distance from the origin of the D axis to the machine plane) minus the sum of the focal length value and the material thickness value in the parameter setting.

(2) Motion method two: D axis drives the platform to move downwards until the platform touches the limit switch placed at the bottom. At this time, the controller considers this position to be the origin of the D axis. Then the D axis moves a certain distance in the opposite direction, which is the maximum stroke of the D axis (the distance from the origin of the D axis to the machine plane touching the laser head) minus the sum of the focal length value and the material thickness value in the parameter setting.

- Reverse clearance X: reverse clearance of X axis. Set this value according to whether the machine actually has reverse clearance, accurate to 1um. If the value is not zero, the control system will compensate for the reverse clearance.
- Reverse clearance Y: reverse clearance of Y axis; set this value according to whether the machine actually has reverse clearance, accurate to 1 um. If the value is not zero, the control system will compensate for the reverse clearance.

Chapter 10 Common Problems and Solutions

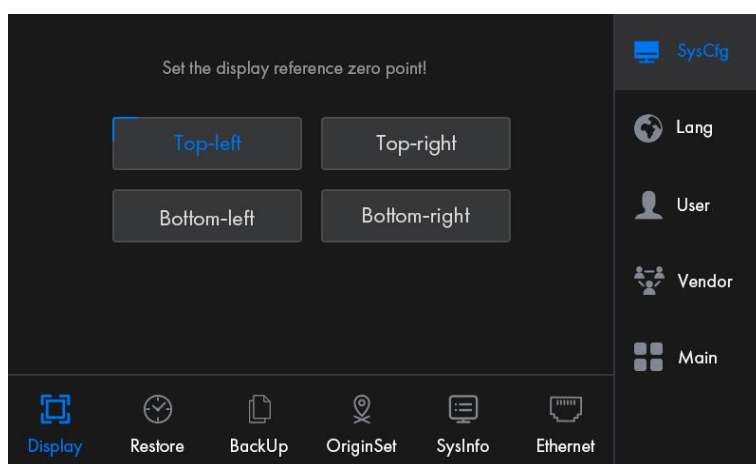
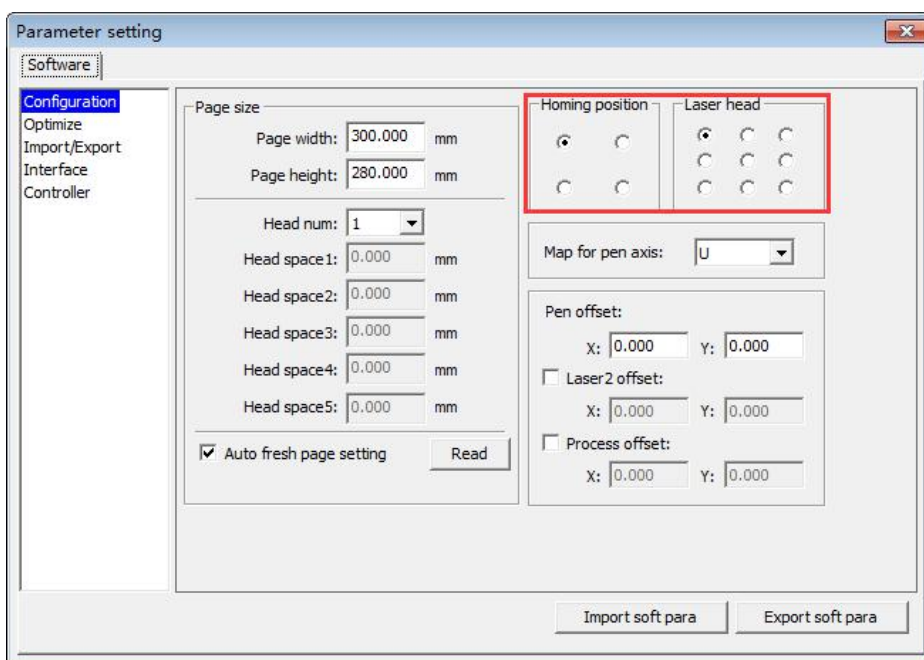
CONTENTS:

- Common problems
- Alarm information

10.1 Common problems

Q: The direction of the graphics displayed on the panel is inconsistent with the one displayed by the PC software?

A: this situation is generally caused by the inconsistency between the screen origin and the origin set by the mainboard; it can be solved by confirming that the laser position and origin position set on the software are consistent with the origin position set on the mainboard, and the screen origin position set on the panel is consistent with the origin position set on the mainboard.



10.2 Alarm information

The system will detect faults in real time and prompt the corresponding information or alarms to avoid unnecessary losses. The alarm information is described as below:

Alarm type	Reasons	Solutions
Water protection failure	Water cooling system failure, incorrect sensor wiring	Check the water-cooling system and refer to the relevant wiring description in the user manual for correct wiring
	Temperature, sensor abnormal	Lower the water temperature and check if the sensor returns an effective signal
Cover protection	Sensor wiring incorrect	Refer to the relevant wiring description in the user manual for correct wiring
	Sensor abnormal	Check if the sensor returns an effective signal
Over breadth	Graphics processing position over the breadth	Re-check if the processing positioning position is reasonable
X/Y/Z/U axis Over breadth	Graphics processing position over the breadth	Re-check if the processing positioning position is reasonable
Insufficient motion buffer distance	Caused by too fast graphics processing speed	Increase acceleration or arrange graphics to the center for processing

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