Users should read this manual before using the controller.

- This manual contents is the system operation manual
- Read this manual carefully to ensure proper electrical connection

# **KT332N**

Laser cutting&engraving control system user manual

## NOTICE

- We reserves the right to modify the products and product specifications in this manual without prior notice, and reserves the right to modify any documents attached to this product.
- Users should read this manual carefully when using the products described in this article. We are not responsible for direct, indirect, special, incidental or corresponding losses or liabilities caused by the use of this manual or this product incorrect.We do not assume the following direct or indirect liabilities or losses:
  - Users use this manual or this product improperly
  - Loss caused by users failing to follow relevant safety operation procedures
- The loss caused by natural forces makes the machine in dangerous. The user is responsible for designing effective error handling and safety protection mechanisms in the machine. Our Intelligence has no obligation or responsibility for the incidental or corresponding damage caused.

# **CERTIFICATION STATEMENT**

### **CE** Certification statement

This product has passed the European Union CE (Communate Europpene) safety certification, has passed the corresponding conformity assessment procedures and the manufacturer's declaration of conformity, and complies with the relevant EU directives.

### **ROHS** Certification statement

This product has passed the "Restriction of Hazardous Substances" safety certification established by EU legislation and complies with relevant EU environmental protection regulations.

### FCC Certification statement

This product has passed the Federal Communications Commission safety certification and complies with relevant US electronic product safety regulations.

# **SAFETY INFORMATION**

Please make sure that the operation is correct and the method is safe when using the system. Some signs or words will be used to remind you of dangerous matters and some important information.

Danger:



It indicates a serious danger. In the process of using, if improper operation or wrong usage method may cause serious injury or even death to the personnel, please do not use it easily until the operation method is correct and the usage method is correct.



#### Warning:

It indicates a serious danger. In the process of using, if improper operation or wrong usage method may cause injury to the personnel, please do not operate it until the operation method is correct and the usage method is correct.

Cautious:



It indicates potential product risk. In the process of using, if the use method is incorrect or the operation is improper, it may cause damage to the product or some parts. Please do not use it until it is ensured that the operation method is correct and the use method is correct.



#### Important:

It indicates important information that needs attention during the use of the product. Please do not ignore this information, it will provide effective operation assistance.



This mark indicates laser radiation, which is generally attached to products that output laser. When using such equipment, please be careful with laser and pay attention to safety.

# **Receiving, Unpacking, Inspection**

The product has a plastic or metal casing to protect the exterior electrical component from damage. The product is wrapped in a foam bag and packed in an antistatic bag. If the package has any external damage, please check the goods and notify the carrier of the damage situation in writing.

#### Important:



After receiving the products, please check whether the outer packaging is in good condition, whether the product is complete after unpacking, and whether the parts are in good condition. If you find damage, please contact with us immediately.

Keep the packaging materials and wiring accessories when unpacking. Please be careful when disassembling the package. After unpacking the goods, please check if the parts are complete. If you find that the parts are missing or the parts are damaged, please contact with us immediately. If you notice any obvious damage to the device, do not install the device or commission the device.

KT332N cutting system delivery list is shown in the following: (As the product is constantly updated, the accessories that may be received are difference)

Component	Quantity	Description
KT332N(EC)	1	Version number V23.01.XX
KTPA001	1	
KTPA001 connectors	1	
USB cable(2.0 double magnetic ring -3M) black	1	Connecting the machine case to the PC (USB communication)
USB Adapter cable AM/AF(with single magnetic ring-1M)	1	case to the controller U disk interface
USB Adapter cable (with single magnetic ring -1M) Black	1	Connecting the machine case and the controller USB communication interface
6445- Five-core cable 1.5M	1	Standard wiring length is 1.5M
User manual	1	Download from website

## Contents

Chapter 1 Overview	1
1.1 KT332N introduction	2
Chapter 2 Controller dimension	3
2.1 Dimension of controller	4
2.2 Dimension of pannel	4
Chapter 3 Overview of the product	6
3.1 Controller overview	7
3.2 Panel Overview	7
3.3 Control system electrical connection diagram	8
Chapter 4 Controller specification	9
4.1 Main power interface POWER	9
4.2 Controller and display board connector HMI	10
4.3 Udisk interface	10
4.4 PC-USB interface	10
4.5 General / dedicated output	10
4.6 Dedicated / general input interface INPUT	11
4.7 Three-axis limit input interface LIMIT	11
4.8 X/Y/U Three-axis driver interface AXIS_X~AXIS_U	12
4.9 Laser power control interface LASER	. 12
Chapter 5 Example of laser power interface	14
5.1 Overview	15
5.2 Glass tube laser power wiring diagram	15
5.3 RF CO2 laser wiring diagram	15
Chapter 6 Example of stepper motor driver interface	17
6.1 Overview	18
6.2 Drive wiring diagrams	19
Chapter 7 IO port wiring example	20
7.1 Input	21
7.2 Output	22
Chapter 8 HMI operation instructions	23
8.1 Introduction	24
8.1.1 Overview	24
8.1.2 Key function description	25
8.2 Main interface functions	26
8.3 Speed setting	27
8.4 Power setting	27
8.5 Layer function	. 28
8.6 Menu function	29
8.6.1 Parameter settings	30
8.6.2 Motion parameter	30

8.6.3 Frame setting	30
8.6.4 Blow Setting	
8.6.5 Speed setting	34
8.6.6 Machine configuration	
8.6.7 Rotate function settings	
8.6.8 Jog settings	
8.6.9 Pulse setting	30
8.6.10 Axis reset	34
8.6.11 Multiple points positioning setting	
8.6.12 Screen origin setting	35
8.6.13 Keypad Lock Settings	
8.6.14 Language settings	
8.6.15 Diagnosis	40
8.6.16 System Information	41
8.6.17 Back up factory parameters	
8.6.18 Restore factory parameters	40
8.6.19 Controller management	41
8.6.20 Time setting	41
8.6.21 Authorization Management	41
8.7 File management	43
8.7.1 Memory file	43
8.7.2 File parameters	
8.7.3 Array Information	46
8.7.4 Auto feeding parameters	47
8.7.5 Memory operation	46
8.7.6 U disk file	
8.8 Password input and setting	
8.8.1 Password entry	48
8.8.2 Password setting	48
8.9 Tips and alarms	
8.10 Parameter setting operation	49
8.10.1 Option parameter box	50
8.10.2 Numeric parameter box	
Chapter 9 Detailed manufacturer / user parameters	52
9.1 Vendor parameters	53
9.2 User parameters	56

# **Chapter 1 Introduction**

MAIN CONTENTS OF THIS CHAPTER:



### **1.1 KT332N Introduction to Control System**

KT332N control system is the latest generation of standalone laser engraving and cutting control system developed by our company. This control system has better stability and anti-interference performance. HMI is based on the 3.5-inch TFT screen which has more friendly operation interface and powerful functions. 128M flash memory on board and an independent laser power control port on board. General and dedicated output and input are integrated on board. Communication support USB2.0.



This system has 2 panel with different color and can be

# **Chapter 2 Controller dimension**

### MAIN CONTENTS OF THIS CHAPTER:



Dimension of Panel

### 2.1 Dimension of controller

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





### 2.2 Dimension of panel

All dimensions are in mm, accurate to 0.1mm







# **Chapter 3 Overview of the product**

### MAIN CONTENTS OF THIS CHAPTER:







### 3.1 Controller overview

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





3.1-1 controller

### 3.2 Panel overview



3.2-1 panel

### 3.3 Electrical connection diagram of control system



3.3-1 Electrical connection diagram of control system

# **Chapter 4 Controller specification**

### MAIN CONTENTS OF THIS CHAPTER:



- Controller and panel interface HMI
- U-disk interface
- PC-USB interface
- General and dedicated OUTPUT
- General and dedicated INPUT
- Limit input interface LIMIT
- X, Y, U axes interface
- Definition of X, Y,U axis
  - Laser power interface LASER

### 4.1 Main power supply interface POWER

NO.	Signal	Definition
1	GND	24V Power ground (input)

2 +24V 24V (input)



This control system uses a single 24V power supply. In order to leave a certain margin, it is recommended to choose a power supply of 24V / 2A or more. At the same time, the control system is compatible with 36V power supply, that is, the driver's 36V power can be directly connected to the main power interface of the control system, but this is not recommended

### 4.2 Controller and panel interface

The cable that connects the controller and the panel is supplied as an accessory to customer. Please connect the controller and the panel correctly with this cable.

### 4.3 U-disk Port

There is a USB port named U-disk on the controller. It is compatible with U stick and can read and write the U stick.

### 4.4 PC-USB interface

PC-USB is a communication port that can build up the communication between the controller and the computer. It supports USB2.0 protocol.

### 4.5 Ethernet port

KT332N has the Ethernet port and USB port. KT332G only have USB port.

### 4.6 General and dedicated output

General and dedicated output definition

PIN	Signal	Definition
1	+24V	Power supply. Which can supply power to other devices
		Dedicated output. When auxiliary air control is enabled, this
		port outputs a control signal to control the valve or other
ο Δυχ Δίκ		relay to release auxiliary air. This port is multiplexed with
	Διιχ Δir	pen control signal. When auxiliary air control is disabled, this
2		port is assigned as pen control.
		The output type is open collector.
		The output can be set to be synchronized with laser or
		synchronized with work.
		Dedicated output, working status signal port (or the second
3	Status	pen signal). This port is multiplexed with second pen control
		signal. When auxiliary air control is disabled, this port is

		assigned as second pen control. the multiplexing function is
		also enabled by auxiliary air control is enabled or not.
		Output is an open collector type. When working, this output
		connect to GND.
4	Out1	General output, reserved.
5	Out2	General output, reserved.
6	GND	Signal Gnd



All output signals are isolated by opto-couplers. OC output, the maximum driving capacity is 300mA, which can directly drive 6V / 24V relay.

### 4.6 General/ dedicated input interface INPUT

PIN	SIGNAL	Definition
1	GND	Power ground (output)
2	IN1	General input, reserved
3	IN2	General input, for a remote laser shot control. When connected to GND, it can perform laser pulse.
4	IntLock	Dedicated input, protection signal input. If the machine needs to be protected in a specific state (such as cover open), the alarm signal is input to this port. This port can be enabled and disabled. When this port is disabled, this signal is neglected by the controller. If this port is enabled, the machine is protected when the input is in high voltage or the port is float. Once the alarm triggered, motion will be stopped and the laser is switched off synchronously.
5	Ex-Run	Dedicated input. Extern start input. Usually for foot control switch start the machine. Low level is valid. When system is idle, if a low level signal is sent to this port, machine will be start. If the machine is working, a low level signal is sent to this port, machine will be stopped. Send again, machine will go on working.
6	+24V	Power supply + 24V (output)

### 4.7 Limit input

X/Y axi	s limit int	erface CN4	
	PIN	SIGNAL	Definition
	1	+5V	Power ground (output)
	2	LmtU+	U+, U axis moves to the limit at the maximum coordinate

3	LmtU-	U-, U axis moves to the limit at 0 coordinate
4	LmtY-	Y-, Y axis moves to the limit at 0 coordinate
5	LmtX-	X-, X axis moves to the limit at 0 coordinate
6	GND	Power + 5V (output)

On the controller, only one limit switch is needed. The limit is installed on the negative direction of the axis. The protection of motion is by the soft limit.

The polarity can be set according to the limit switch type, such as PNP or NPN. And there is a led indicator on the controller can show the limit is triggered or not.

This port is compatible with 5V, 12V or 24V.

### 4.8 X, Y, U axis interface AXIS\_X, AXIS\_Y, 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 terminal (TTL)
2	PUL	Pulse signal terminal (TTL)
2	+5\/	5V power supply (output, only for driver common
3	+50	positive connection)



The pulse signal and direction signal are both OC output, so the controller and motor driver must use the common anode connection method. Common cathode and differential connection methods are not supported.

### 4.9 Laser power control interface LASER

PIN	SINGAL	Definition
1	GND	Laser power ground (output)
2	L-ON	Laser emission control.
		Laser machine/laser tube power control interface
		1. If it is the RF laser, this pin is connected to the laser
3	LPWM	RF-PWM to control laser power.
		2.If it is the glass tube, this pin is connected to the PWM of
		laser power to control laser power.
		It is the first laser power supply water protection status input
		port. When water protection 1 is enabled, the controller will
4	WP	detect the water protection 1 input port, if the port is in low
		voltage, it is normal. If it is in high voltage, the controller will
		forcibly turn off the laser, and the processing work will Pause
		and the system will alarm. If the water protection 1 is not
		enabled, the controller does not detect the water protection 1
		input port. The user doesn't need to connect the water

protection 1.

#### Water protection input must use 24V voltage input

5 L-AN

Laser power analog signal output. For glass tube laser power supply, it is recommended to use this pin for power signal.



Please select the correct laser type in the factory parameter settings. When a glass laser tube is used, and the control signal cable is very long from the controller to the laser power, if L-AN is for the power control, the long cable will cause interference and make the laser power unstable. So for this situation, PWM signal can replace the L-AN to control the glass tube's power. And decrease the interference.

# **Chapter 5 Laser power interface**

### MAIN CONTENTS OF THIS CHAPTER:



- Glass tube laser power wiring diagram
  - -RF CO2 laser wiring diagram

### 5.1 Overview

This control system has two independently adjustable laser power control interfaces, which can control glass tube laser power and RF CO2 laser.

When connecting different laser power types, please set the laser type correctly in the factory parameters, otherwise it cause to the switching light may be incorrect.

### 5.2 Glass tube laser power wiring diagram



### 5.3 RF CO2 laser wiring diagram



# Chapter 6 Stepper motor driver interface

### MAIN CONTENTS OF THIS CHAPTER:



Step motor wiring diagram

### 6.1 Overview

KT332N only supports the common anode connection method, and common cathode is not suggested.





Figure 6.1-1 Four-input, driver input signal is independent

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

PU+ and DR+ are usually connected to +5V and the PU-, DR- are connecting with the signal port on the controller.

Motor drivers are usually sensitive to fall edge or rising edge. So user should read the motor driver user manual carefully and get the information that the motor can move when rising edge or falling edge comes.

### 6.2 Drive wiring diagram



# **Chapter 7 IO wiring**

### MAIN CONTENTS OF THIS CHAPTER:



### 7.1 Input

The water protection input port WP of this controller is only compatible with 24V. All other input ports are compatible with input 5V / 12V / 24V.

The wiring diagram of the input port is as follows:



Figure 7.1-1 Example of input port

### 7.2 Output

All output signals of this controller are output based on opto-coupler isolation technology and OC gate output. Its maximum driving capacity is 300mA, which can directly drive 6V / 24V relays, light-emitting indicators, buzzer alarm devices, etc. If user wants to drive valve, a relay is strongly recommended to be added between the controller and the valve.

The output wiring diagram is as follows:



Figure 7.2-1 Example of output port connection

# **Chapter 8 HMI operation**

### MAIN CONTENTS OF THIS CHAPTER:



### 8.1 Introduction

### 8.1.1 Overview

KT332N-HMI panel (hereinafter referred to as "panel") is a HMI interface based on a 3.5 TFT LCD screen. The panel can display cutting path in real time, allowing users to understand the current processing patterns, supporting file management, file preview, parameter modification, and support for switching between multiple language interfaces.



Figure 8.1.1-1 Panel image

Panel characteristics:

- 3.5-inch TFT
- 320×480 Resolution
- 64K color
- RS232 Standard communication
- Buzzer

### 8.1.2 Key Function Description





When user presses the arrow key (manual move) directly, it will be slow; when you press and hold the "FAST/SLOW" key, now press arrow key, high speed will be loaded. Note: Press and hold "FAST/SLOW" key and then press the Esc key will execute a return origin point action.

### 8.2 Main interface function



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

- Graphic display area: This area is used to trace the processed file image during file preview display and processing.
- Processing parameter display area: Display the file number, speed and maximum power of the current processing file.
- Coordinate display area: Display the coordinate value of the current position of the laser head
- Layer parameter area: Display the layer parameters of the current processing file or the layer parameters of the preview file. The parameters from left to right are: layer color, layer speed, and layer maximum power.
- Working status area: Used to display the current working status of the system, which are idle, paused, completed, running. The processing time is displayed on the right.
- Processing progress bar: Display the current processing progress
- Number of pieces: Display the processed quantity of the current processing file.
- Frame size of processing file: The range of the processing file is displayed.
- Version number: Program version number for panel and motherboard.
- System time: Display the current system time

In the completed / idle state, the keys can respond, and users can perform file processing, parameter setting, file preview and other operations.

In the running / pause state, some keys do not respond, such as positioning key, border key, file key, etc.

### 8.3 Speed setting

Press [ENT] in the main interface, and the speed parameter in the upper right corner is selected by the red selection box, as shown in the figure below:

Speed	100mm/s
Power:	99.9%/33.3%
X:	10000.0
Y:	10000.0
U:	10000. 0



Press ENT again, the following interface pops up:

Speed: 100 mm/s
Press <ent> key.</ent>

Figure 8.3-2

Refer to Section 8.10 for parameter setting operation. After setting, press [ENT] to save the modified parameters, and press [Esc] to exit from interface.

### 8.4 Power setting

Press [ENT] in the main interface, and the speed parameter in the upper right corner is selected by the red selection box, as shown in the figure below:

Speed	100mm/s
Power:	99.9%/33.3%
Χ:	10000.0
Y:	10000.0
U:	10000.0



Press the up and down keys to move the red selection box to select the power parameter, as shown in the figure below:

Speed:	100mm/s
Power	99.9%/33.3%
Χ:	10000.0
Υ:	10000.0
U:	10000.0

Figure 8.4-2

Press ENT again, the following interface pops up:

MaxPower:	99.9	%
MinPower:	33.3	%
Press <ent< td=""><td>`&gt; key.</td><td></td></ent<>	`> key.	

Figure 8.4-3

Refer to Section 8.10 for parameter setting operation. After setting, press [ENT] to save the modified parameters, and press the [Esc] key to exit the interface.

### 8.5 Layer function

When the systems is completed / idle in the main interface, if there is layer information in the layer parameter area, as shown below:

100	99.9%
100	99.9%
100	99.9%
100	99.9%

Figure 8.5-1

Press [ENT] to enter the parameter area. Use the up and down arrow keys to select the layer parameter area. At this time, the "red selection box" appears in the first line of the layer list, as shown in the figure below:

100	99.9%
100	99.9%
100	99.9%
100	99.9%



User can press the up and down keys to select the layer number, and the "select block" will also move. Select the layer number to be modified and press [ENT] ,the layer setting interface will pop up, as shown in the figure below:



Figure 8.5-3

Refer to Section 8.10 for parameter setting operation. Press [Esc] to exit the interface and return to the main interface.

### 8.6 Menu function

Press [Menu] in the main interface, the pop-up menu interface is as follows:



#### Figure 8.6

Press [ENT] to enter the lower menu, and press [Esc] to return to the previous menu.

### 8.6.1 Parameters setting

Press [Parameter Setting] in the menu interface, and the parameter setting interface pops up as follows:





Press [ENT] to enter the lower menu, and press [Esc] to return to the previous menu.

### 8.6.1.1 Motion parameter

In the parameter setting interface, press [Movement parameter], and the movement parameter setting interface will pop up as follows:





Refer to Section 8.10 for parameter setting operation. Press the [Esc] key. The interface exit and returns to the previous interface.

### 8.6.1.2 Frame setting

In the parameter setting interface, press [Frame setting], the frame setting interface pops up as follows:

100	mm/s
1000	mm/s
100	mm
Read	Write
	100 1000 100 Read

Figure 8.6.1-2

Refer to Section 8.10 for parameter setting operation. Press the [Esc] key. The interface exit and returns to the previous interface.

### 8.6.1.3 Blow Setting

In the parameter setting interface, press [Blow Setting], and the blowing setting interface pops up as follows:

Auxi.air mode:	Blow When laser	
Open auxi.air delay:	10.0	ms
Close auxi.air delay:	10.0	ms
	Read	ite



Refer to Section 8.10 for parameter setting operation. Press the [Esc] key. The interface exit and returns to the previous interface.

### 8.6.1.4 Speed setting

Press [Speed Setting] in the parameter setting interface, and the speed parameter setting interface pops up as follows:





Refer to Section 8.10 for parameter setting operation. Press the [Esc] key. The interface exit and returns to the previous interface.

### 8.6.1.5 Machine configuration

Press [Machine Config] in the parameter setting interface, and the machine configuration interface pops up as follows:



```
Figure8.6.1-5
```

Refer to Section 8.10 for parameter setting operation. Press the [Esc] key. The interface exit and returns to the previous interface.

### 8.6.1.6 Rotate function settings

Press [Rotate Function Setting] in the parameter setting interface, and the rotation function setting interface pops up as follows:

Enable rotary Func:	YES	
PPR:	50	]
Diameter:	10.0	mm
	Read Wr	ite

Figure 8.6.1-6

Refer to Section 8.10 for parameter setting operation. Press the [Esc] key. The interface exit and returns to the previous interface.

### 8.6.1.7 IP Set

KT332G do not support Ethernet. Only KT332N can support Ethernet and USB.

IP addr	ess:	6 17 17 st
192	. 168 .	1. 100
		Write

Figure8.6.1-7

When the IP is changed, user should <Write > make the parameter valid.

### 8.6.1.7 Jog settings

When the red selection box is stopped on the item and press [OK] key, the following interface pops up:

Move mode:	Manual	
Manual:	100	mm
	Read	d e
Modify to pres <write> to set</write>	ss <ent>,Sel parameters</ent>	lect



Refer to Section 8.10 for parameter setting operation. Press the [Esc] key. The interface exit and returns to the previous interface.

When the jog mode is in "continuous", the jog parameters have no effect. When returning to the main interface, when the direction key is pressed, the axis moves, and when the direction key is popped up, the axis stops moving. When the jog mode is "Jog", each time the direction key is pressed, the corresponding motion axis runs one time and runs .The distance is equal to the jog distance value set by the user (without exceeding the machine format).

### 8.6.9 Laser pulse setting

Laser mode: Continue
Laser time: 100 ms
Read Write
Modify to press <ent>, Select <write> to set parameters</write></ent>

When the red selection box is stopped on the item and presses the [OK] key, the following interface pops up:



If the continuous shooting mode is selected, the laser will always on when press the continuous button. When loose this button, the laser stops. If the laser pulse mode is selected, when the key is pressed, the laser is switched on for some time and then switched off automatically. The laser pulse time is determined by the parameter <laser time>

### 8.6.10 Axis reset

When the red selection box is stopped on the item and presses the [OK] key, the following interface pops up:





Press the arrow keys to select an item and press the [OK] key. The system resets the axis and

prompts "Resetting ...".

Press the [Esc] key to return to the previous menu.

### 8.6.11 Multiple origin points setting

In the menu, select the item "Origin point setting" and press the [OK] key to pop up the following interface:



Figure 8.6.5-1

Move the red selection box to the "Multi-origin enable" item . Press [OK] to enable or disable the multi-origin functions (the small square on the right side is displayed in red when it is enabled), same as others setting. There is a [Setting] button for each item. Press the button and go to the page shown as below. On this page the coordinates are displayed. And user can move the axes manually to the origin position and press <Origin> to set each origin point.

Origin	1:			
Forme	r postion:			
X:	20.0	Y:	20.0	mm
Current	t Position:			
X:	0.9	Y:	1.2	mm
Press Press <esc< td=""><td>the arrow k <origin> to &gt; to exit</origin></td><td>eys to m o set orig</td><td>ove the a in,Pres</td><td>xis, s</td></esc<>	the arrow k <origin> to &gt; to exit</origin>	eys to m o set orig	ove the a in,Pres	xis, s

#### Figure 8.6.5-2

Press the up, down, left and right keys to move the X or Y axis to the target position, press the [Origin] key to set the origin point, and press Esc to cancel.

There are 4 origin points that can be set. The steps are that same as above when set other 3 origin points.

User can select one of the 4 origin points as the start origin point. When the "selection box" stops at the "start origin", press the [OK] key to confirm the modification, press the "Up / Down" key to change the number of the origin point, and press the [OK] to confirm the modification. After that, the parameter will automatically take effect. Press [Esc] can return to the previous menu.

Here is the description in detail of the items of the multi-origin setting:

The sub-items are described as follows:

- <Multi-origin setting>: "Yes" enables the multi-origin function. "No" disable the multi-origin function. When disable the multi-origin function, one origin mode is enabled in default. The key<Origin> on the panel can set the origin position. When "Yes" is selected and enable the multi-origin function, the origin position that has ever been set with the <origin> will be invalid because now is the multi-origin mode. All the origin point s is set in the multi-origin page.
- > <Origin enable>: enable or set the coordinate of the origin point from 1~4.
- Start origin> select the start origin point from the 4 origin points.

Once the multiple origin logic is enabled, if the start origin is the first origin point and all four are enabled, the cutting job will be done according to different origin points. The cutting order will be from origin 1 to origin 4.



Only the software select the <Anchor point> option, the multi-origin function is valid.

Position:	Anchor point	-
Position:	raterior pointe	

If user has selected the graphic position to be <Current position>, <machine zero> or <absolute coordinate>, the multi-origin function does not work.

Position: Current position	•
----------------------------	---

And if user has enabled the multi-origin function, the <origin > function will does not work.

### 8.6.12 Screen reference coordinate setting

When the "red selection box" is stopped on the item and presses the [OK] key, the following interface pops up:

Screen origin: Up-left	
Up-left Up-right	
Low-left Low-right	

Figure 8.6.6

Set the reference position of the screen here. Select different reference positions of the screen to correctly display the patterns.

Select a reference position and press the [OK] key. The setting takes effect and the system returns to the main interface automatically.

When the entity displayed on the screen reverse, mirror to the pattern in the computer, user can modify the reference point to set them the same.

### 8.6.13 Panel lock Settings

In order to ensure the safety of the machine working, the panel can be locked while machine is working.

When the "red selection box" stops on this item and press [OK]. the following interface will pop up:



Figure 8.6.7

Password setting
 This item is used to set the password for keyboard lock. When set successfully, use the

password to lock the keys.

Keyboard lock

This item can lock the keys. After entering the correct password, the keys are automatically locked and returned to the main interface. When any key is pressed, the interface prompts for the password to unlock the keys.

Please refer to section 8.8 for password input and setting method.

Press the [Esc] key to return to the previous menu.

### 8.6.14 Language settings

When the "red selection box" is stopped on the item and press [OK], it will pop up as follows:



Figure 8.6.8

Press the arrow keys to select a language and press the [OK] key. The setting takes effect and the system returns to the main interface automatically.

### 8.6.15 Diagnosis tools

When the "red selection box" is stopped on the item and press the [OK] key, the following interface pops up:



Figure 8.6.9

This interface displays the system's hardware IO port information: trigger normal INPUT:

Read the system hardware information. When the hardware signal is triggered, the small box to the left of the corresponding entry will be displayed in red, otherwise it will be displayed in gray. OUTPUT:

Select an output port with the cursor and press [OK] to switch the output state.

Press the [Exit] key to return to the previous menu.

### 8.6.16 System Information

When the "red selection box" is stopped on the item and press the [OK] key, the following interface pops up:



#### Figure 8.6.10

Press the [OK] key to read the controller information, and press the [Esc] key to return to the previous menu.

### 8.6.17 Backup factory parameters

Select the "Backup factory parameters" item in the menu interface, and press the [OK] key to pop up the password interface. For password input operations, refer to section 8.8. If the password is entered correctly, the system will back up all current factory parameters and user parameters to factory parameters, the interface prompts "set parameters successfully".



When the machine delivery from the factory, use the "Backup Factory Parameters" function to back up all debugged factory parameters and user parameters, and then at any time, you can use "Restore Factory Parameters" to restore all factory and user parameters.

### 8.6.18 Restore factory parameters

In the menu interface, select the "Restore Factory Parameters", and press the [OK] key to pop up the password input interface. For the password input operation, refer to section 8.8. If the password is entered correctly, the system will restore all current user parameters and vendor parameters with the factory parameters that were set before. The interface prompts "Successfully restored parameters."

### 8.6.19 Controller management

When the "red selection box" is stopped on the item and press [OK] , the following interface pops up:



Figure 8.6.13

Press the [OK] key on the corresponding entry to execute the corresponding function, and press the [Esc] key to return to the previous menu.

<backup to U disk> "press this button, controller will backup the user and vendor parameters to

the Udisk.

<restore para from U disk>: restore the vendor and user parameters from the Udisk. <upgrade from U disk>: upgrade the controller firmware from the U disk.

### 8.6.20 Time setting

When the "red selection box" is stopped on the item and press [OK] , the following interface pops up:

2019  /  1  /  12    12  :  1
Write
Modify to press <ent>,Select <write> to set parameters</write></ent>

This interface is only displayed when the system is not encrypted. For parameter setting operations, please refer to Section 8.10.

### 8.6.21 Authorization Management

When user buy the first product from us, the product should be authorized.

If the current product is not authorized, when the "red selection box" on this item, press [OK] and the following interface pops up:

Permission not activated !
00000 - 00000 - 00000 - 00000
Change permission code

Figure 8.6.14-1

Press [OK] , the red selection box selects the first parameter box, and press the [OK] key again to display the soft keyboard, as shown in the figure:

Permi	ssi	on	no	t ac	ctiv	vate	ed!				
0000	0	- [	00	000	)	-	000	00	] -	0	0000
	(	Cha	ng	e p	err	nis	sio	n c	od	e	
	1	2	3	4	5	6	7	8	9	0	
	А	В	С	D	Е	F	G	Н	Ι	J	
	K	L	М	Ν	0	Р	Q	R	S	Т	
			U	V	W	Χ	Y	Ζ			
Set suc	cce	ssf	ul,	un	loc	ke	d				

#### Figure 8.6.14-2

Use the "Up, Down, Left, Right" to select the corresponding character. If the operation is incorrect and the input is wrong, just press [Esc] and select [OK] to enter the setting again. The red selection box selects the currently modified parameter box, and presses the arrow keys to select other parameter boxes. The parameter setting operation is the same as above. After all the parameters are set, move the red selection box to change the authorization code and press the [OK] key to set successfully. Press Esc to return to the upper-level operation interface.

### 8.7 File management

### 8.7.1 Memory file

In the main interface, press [File] to pop up the following interface:

File:	Copies:	Data Check
01:DEF1 02:DEF2	65535 65535	File paras
03:DEF3	65535	Work time check
04:DEF4 05:DEF5	65535 65535	Clear copies
06:DEF6	65535	Copy to Udisk
07:DEF7 08:DEF8	65535 65535	Delete
Udisk file	Memery oper	r Read file

#### Figure 8.7.1

After entering this interface, the controller will automatically read the system memory file. the first column is the file name. The second column is the copies that have been processed. When a file is selected and confirmed, the file will be displayed in the preview area. When there are multiple

files, press the up and down keys to select a file, the file will be previewed, and the graphic will be displayed in the upper right of the interface. After pressing [OK], the file will be previewed on the main interface, and the current file dialog box will be closed. If you want to cancel the preview, press [Esc].

Press the left and right keys to switch the activated area with a blue square between the file list on the left and the item on the right, indicating that the list or item is activated. When the "red selection box" stops on the item, press the up and down keys to select the item and press [OK] to select the item.

Press [Esc] to return to the main interface.

The entries on the right and bottom are as follows:

- Data check: Perform data check on the selected file. Ensure the data safety.
- File parameters: goes to the child menu.
- Work time check: The total processing time
- Clear processed copies: Clear the number of the processed files
- Copy to U disk: Copy selected files to U disk.
- Delete file: delete the selected file.
- U disk file: U disk operating menu.
- Memory operation: go to the child menu of the flash memory operation
- Read memory file: read the list of memory files

### 8.7.2 File parameters

Select the "File Parameter" in the interface above and press [OK], then the pop-up menu is as shown below:



Figure 8.7.2

User can modify the file property. User can define the array attribute such as line number and column number and the interval distance. Feeding para are included of the parameters for feeding and cutting.

Press [Esc] to return to the previous menu.

### 8.7.3 Array parameters modification

Select the "Array Information" item in the interface above, and press [OK]. The pop-up menu is as shown below:

Array:	
00:DEFAUL1	
01:DEFAUL2	
02:DEFAUL3	
03:DEFAUL4	
04:DEFAUL5	
05:DEFAUL6	
06:DEFAUL7	
07:DEFAUL8	
Press <ent> key.</ent>	

Figure 8.7.2.1-1

Then select any items in the interface above, and press [OK], and then the pop-up menu is as shown below:



Figure 8.7.2.1-2

Refer to Section 8.10 for parameter setting operation. Press the [Esc] key to cancel parameter modification and return to the previous interface.

### 8.7.4 Auto feeding parameters

Select the "Feeding Parameters" item in the interface above, and then the pop-up menu is as shown below:





Refer to Section 8.10 for parameter setting operation.

### 8.7.5 Memory operation

Select the "Memory Operation" item in the interface above, and the pop-up menu is as shown below:



Figure 8.7.3

- Current work time: Preview the processing time of the currently selected file.
- Clear all files: Clear the number of processed files in flash memory.
- Del all memory files: delete all memory files.
- Format memory: Format the flash memory.
- Memory space: displays the available space of flash memory.
- Total Pieces: Shows the total number of processed pieces for each file, which can be cleared through the "Clear" entry on the right

### 8.7.4 Format memory

Select the "Format Memory" item in the interface above. The pop-up menu is as shown below:



Figure 8.7.4

After formatting the memory, all memory files will be erased.

### 8.7.6 U disk file

Select the "U disk file" entry on the "File" interface and press [OK] to pop up the U disk file list, as shown in the figure:



- Read U-disk file: read U-disk file list.
- Copy to memory: Copy selected files to memory on board.
- Delete file: delete the selected file of U disk.



This system supports the FAT32 and FAT16 file formats of the U disk. The file must be placed in the root directory of the U disk to be recognized by the system. File names longer than 8 characters will be automatically cut off by the system. Except for English and numbers named files. Others will not be displayed on the controller. Files copied from the controller to the U disk are placed in the root directory of the U disk.

### 8.8 Password and setting

### 8.8.1 Password

You need to enter a password when operations. The pop-up interface is as follows:

Password error											
			1	a55	vv C	'nu	UII	UI			
	1	2	3	4	5	6	7	8	9	0	
	Α	В	С	D	Е	F	G	Н	Ι	J	
	K	L	Μ	N	0	Р	Q	R	S	Т	
			U	V	W	Х	Y	Z			
Pr pa	Press direction keys to select passwords,then press <ent>.</ent>									> <b>.</b>	



User can directly press the number keys to enter the password, press left and right arrow can select letters and press ok to confirm it. When user enter a full six-digit password, press [OK], if the password is correct, then go to next step. Otherwise "Password Error" is displayed. Please input the password again.

### 8.8.2 Password setting

The password setting interface is shown below:

Old password:						123456				
New password:						987654				
Confirm password:			9	987654						
	0	1	2	3	4	5	6	7	8	9
	Α	В	C	D	E	F	G	Н	Ι	J
	K	L	M	Ν	0	Р	Q	R	S	Т
			U	V	W	Χ	Y	Ζ		
UVWXYZPress direction keys to select passwords,then press <ent>.</ent>										



User can directly press the number keys to enter the password, or you can press a left and right arrow on the panel to select a number or letter, and then confirm it. When you have entered six

passwords, press the [OK] key to perform the operation, otherwise "Password Error" is displayed, and input the password again.

### 8.9 Alarms information

During the system is working, some alarm or messages will pop up, such as resetting, water protection fault, hard limit protection, border crossing, etc when executing some actions.

Information display

When enable the axis reset or system reset, the reset page will pop up. Interface is as follows:



Figure 8.9-1

Follow the information on the interface to operate the next step

Alarm information

The system displays water protection information when there is water cooling system fault, and the interface is as follows:



Figure 8.9-2

At this time, press [OK] or [Esc], and the system will perform related operations.

### 8.10 Parameter setting operation

This chapter introduces some parameter modification operation methods when using the product.

Auxi.air mode:	Blow when laser	
Open auxi.air delay:	10.0	ms
Close auxi.air delay:	10.0	ms
	Read W	/rite

Figure 8.10.1

### 8.10.1 Option Box operating

When users modify the parameter of the selection parameter box, first select the parameter, and then press the OK key. The up and down arrows appear on the right side of the selection parameter box. As shown in the figure Blow when laser, you only need to press the "Up and Down" key to select other options, and press [ [OK] key confirms the currently selected parameter. When the cursor moves to "write parameter", press [OK] key to complete the parameter modification and the parameter takes effect.

### 8.10.2 Number modification operating

When user modify the numerical parameters, select the parameter box and press the [OK] key, the cursor appears below the first digit (10.0),At this time, press the "up and down" key to modify the number at the cursor position (20.0), For other digits, press the left and right keys

to move the cursor to the digit to be modified and repeat the operation described above 21.0.

If the number of digits required for the parameter setting is greater than the current display digits, the highest display here is up to ten digits. When you need to set hundreds or more parameters, just move the cursor to the leftmost side and continue to press the "left direction" key or the rightmost to press the "right direction" key on the side, other operations are the same as above. At the same time, if the current number of display digits is greater than the number of digits required for the parameter, if the highest digit of the current display is thousands 1000, and

the parameter only needs to set the highest digit as the hundredth, and then set the number of

digits before the hundredth to  $0^{0900}$ 

When user need to set other digits, use the "up and down arrow keys" to select the parameter to be modified and perform.

Note: The parameter box has a limit on the number of digits. When the parameter digit was limited, pressing the left and right arrow keys will not increase the number.

# Chapter 9 Vendor and user parameters introduction

### MAIN CONTENTS OF THIS CHAPTER:



### 9.1 Vendor parameters

All the vendor parameters can be modified by the software!

(1) Motor parameters

#### X, Y, Z, U axis parameters

- Direction polarity: Modifying the direction polarity can make the motor move in the opposite direction. It is usually used for the axis reset and makes the reset movement to the limit- direction. If the axis moves away from the origin when resetting, it means that the polarity of the axis is set incorrectly and should be modified.
- Limit polarity: Used to set the high and low voltage mode of the limit signal. If the motion axis reaches the limit position, input a low voltage signal to the controller, the limit polarity at this time should be set to negative. So NPN or PNP can be compatible.
- Breadth: The longest distance that the motion axis can move, depends on the actual situation of the machine. It is also a soft limitation protection for the machine.
- Origin offset: If the hard limit protection is enabled for this axis, usually this value should be set to a value of 2 ~ 5mm. If it is set to 0, when the motion axis runs to the minimum coordinate 0, the limit may be enabled, which will trigger by mistake hard limit protection function enables the machine to stop immediately. If the hard limit protection is not enabled, the value can be set to 0 ~ 5mm.
- Pulse mode: Double pulse and pulse + direction mode are optional. It depends on the type of motor driver actually configured on the machine. Generally, it is pulse + direction mode.
- Step length: That is, the pulse equivalent of the motor. When sending a pulse to the motor, the absolute distance value corresponding to the movement axis. Before the value is set correctly, the machine can cut a large rectangle (larger graphics, which can make the error smaller), and automatically calculate the step size of the motor based on the graphic length and measured length.
- Hard limit protection: Using for whether to enable the hard limit protection function of this axis or not.
- Pulse valid edge: It is used to set whether the pulse signal of the motor driver is valid on the rising edge or the falling edge. When this item is not enabled, the controller uses the falling edge to be effective; when this item is enabled, the controller uses the rising edge to be effective.
- Enable reset: If the machine is configured with this axis, the "Reset Enable" option of this axis should be turned on. If the axis is not configured, the "Reset Enable" option of this axis should be disabled. The meaning of this parameter lies in controlling the "power-on reset" option in the user parameters and the "reset all axes" function in the function key to prevent the user from resetting a non-existent motion axis by mistake.
- Start speed: The speed at which the motion axis starts directly from a static state. If the value is too large, it will cause the motor to lose steps, jitter or even howling. If it is set too small, the running speed of the entire graph will be reduced. If the inertia of the moving shaft is large (heavier shaft), a smaller jump-off speed can be set. If the inertia of the moving shaft is small (lighter shaft), the jump-off speed can be appropriately

increased. Typical values are 5 ~ 30mm / s.

- Maximum speed : The maximum limit of speed that the shaft can withstand. This parameter is related to the driving ability of the motor, the inertia of the moving shaft, and the transmission ratio. Typical values are 200 ~ 500mm / s.
- Maximum acceleration: The maximum acceleration value of the motion axis during acceleration and deceleration movements. If the acceleration is set too large, the motor will lose steps, jitter and even howling. If it is set too small, it will cause slow acceleration and reduce the running speed of the entire graphic. For axes with large inertia, such as the Y axis corresponding to a beam, a typical setting range is 8000 to 3000 mm / s2. For axes with low inertia, such as the X axis corresponding to a car, a typical setting range is 8000 to 20000mm / s2.
- Emergency stop acceleration: If hard limit protection is enabled for the axis, when the axis moves to the limit position, the axis will perform an emergency deceleration stop operation at emergency stop acceleration. This value can be 2 to 3 times the maximum acceleration of the axis.

#### Key parameters

- Key start speed: Press the key on the keyboard to move the starting speed of the axis, which cannot be higher than the jump-off speed of the axis.
- Key acceleration: The acceleration value of the axis when the key is moved cannot be higher than the maximum acceleration of the axis.
- motion reverse: It is used to control the movement direction of the manual key when moving the movement axis. When the direction polarity parameter is set correctly, if the direction key is pressed on the operation panel, the axis moves in the opposite direction, then the key can be reversed.

(2) Laser parameters

- Laser tube configuration: Single / double tube optional, set according to the actual number of laser tubes configured by the manufacturer.
- Laser type : Glass tube, RF laser (no pre-burning pulse required) and RF laser (requires pre-burning pulse) are available
- > Laser attenuation coefficient
- Laser tube enable: When the laser tube is configured as a double tube, the lasers
  1 and 2 can be enabled respectively.
- > Minimum energy
- > Maximum energy
- > Laser frequency
- > Tickle pulse frequency
- Tickle pulse width: When it is a radio frequency laser and a pre-burning pulse is required, the characteristics of the pre-burning pulse can be configured by the pre-burning frequency and the pre-burning pulse width.
- Water protection enable: When the water protection is enabled, the controller must be connected to the water protection circuit, otherwise the machine will not fire. If the water protection is not enabled, the water protection circuit may not be connected and

#### the controller will not detect

The laser frequency is used to set the pulse frequency of the control signal used by the laser. The glass tube is generally set to about 20KHZ and the RF tube is generally set to about 5KHZ. The maximum / minimum power (%) is used to set the limit power value of the laser. That is, during operation, the maximum power set by the user cannot be higher than the maximum power set, and the minimum power set by the user cannot be lower than the minimum power set. If the power has decayed after using the laser for a period of time, the laser power can be fine-tuned by setting the laser attenuation coefficient. In the case of no attenuation, the attenuation coefficient is 0.

If only a single laser tube is configured, only one laser parameter is prompt displayed.

(3) Other vendor parameters

Machine configuration

- Machine Type: In most cases, a general engraving machine should be selected, and other models are specific models.
- Transmission mode: In general, the "belt stepping type" should be selected. When other types are selected, the control algorithm will change slightly.
- Feeding mode : Unidirectional / bidirectional optional. When feeding in a single direction, the coordinates can be checked in one direction without checking the coordinates. When selecting two-way feeding, the system will check the maximum and minimum coordinates. The initial direction of a time can be changed by setting the direction polarity or modifying the positive and negative values of the feeding length. This parameter takes effect only after "Z axis function" is configured as "feed axis".
- Power-off delay: 0 ~ 3000ms can be set. After the power shut down, the system power supply will not immediately drop to 0V. There is a delay during this period. The delay value set here should be basically the same as the actual power off delay value. If the set value has a large deviation, when the power is turned on and off, the graphics processed for the second time and the graphics before power off are either not closed or overlapped.



After the configuration parameters in the vendor parameters, such as directional polarity, control method, laser type and laser frequency are modified. The modification takes effect after the reset.

Enable parameter

- Enable cover protection: If this option is enabled, the controller must be connected to the cover protection circuit, otherwise the machine will not work.
- Enable the auxiliary air control: If you want to use the Wind signal of the output port to control the fan switch in layers, you must enable this parameter. Otherwise, the Wind signal outputs other signals.

### 9.2 User parameters

All the user parameters can be modified by the software!

- (1) Cutting parameters (Only affects for cutting works)
- Fast feed speed: This parameter determines the maximum speed of all straight lines that do not fire during the movement of the machine.
- Fast feed acceleration: Maximum acceleration of no fire for straight lines. Large idling speed and idling acceleration settings can shorten the working time of the entire graph, but the setting is too large, which may cause jitter in the trajectory, which needs to be considered comprehensively when setting.
- Corner speed: The speed at sharp corners during cutting also is the lowest speed during the entire cutting.
- Corner acceleration: Acceleration at sharp corners when cutting. Setting the turning speed and turning acceleration too large will make the corner jitter, and setting it too small will affect the cutting speed.
- Cutting acceleration: The highest acceleration value of the firing segment during the entire cutting process.
- Cutting mode: There are two types: fast cutting and precision cutting. For fast cutting, the cutting speed is given priority, and for precision cutting, the cutting effect is given priority.
- Acceleration method: Divided into T-type acceleration and S-type acceleration. T-type acceleration will make the whole cutting process faster, but the cutting effect caused by too fast T-type acceleration mode will be inferior to that of S-type acceleration.
- Delay after fast feed : If this parameter is 0, no delay is performed after idling, otherwise the speed is reduced and delayed after idling.

(2) Engraving parameters (Only affects for engraving works)

- > X axis starting speed
- > Y-axis starting speed
- > X-axis acceleration
- Y-axis acceleration

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

- Scan step feed speed: This parameter is used to control the maximum speed of the vertical movement of the previous line to the next line in the scanning mode. If the space between lines is large during scanning, or when the distance between each block is large when scanning block graphics, and precise positioning of each line or each block is required, you can set scan wrap Speed is a lower value.
- Scan mode: General mode and special mode are selectable. If the special mode is enabled, the laser power should be increased. The lower the spot percentage, the more the laser power is attenuated. To achieve the same scanning depth, the laser power should be set higher. The purpose of selecting the special mode is to make the laser emit light at high power for a short period of time. During deep scanning, the effect is flat at the bottom. However, it should be noted that if the adjustment of the spot is not appropriate, this purpose may not be achieved. The mode has a certain effect on

the life of the laser. The system selects the general mode by default.

Aperture size : When the general mode is selected for the scanning mode, this parameter is invalid. When the special mode is selected, this parameter becomes effective. The controller controls the parameter between 50% and 99%.



The cutting and scanning process parameters cannot exceed the limit parameter values in the axis parameters. If the axis parameters are exceeded, the setting is illegal, and the system will automatically cover the process parameters with the axis parameters.

(3) 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 will start to move. It is convenient for users to feed and pick materials on the feeding device during the delay time.
- Delay after feeding: The time can be set from 0 to 9.9s, which is convenient to delay after the feeding device moves in place, and wait for the feeding shaft to completely stop before performing the second work.
- Feed line by line: If the progressive feed function is enabled, the virtual array graphics in the Y direction will be processed at the same position, and the feed axis will move once each time.
- Line-by-line feed compensation : Due to the inaccuracy of the feeding shaft movement, the feeding length can be compensated by setting this item.
- (4) Reset parameters
- **Reset speed:** Speed of X / Y-axis linkage return to origin
- > X-axis power-on reset
- Y-axis power-on reset
- > Z -axis power-on reset
- U-axis power-on reset

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

(5) Frame parameters

Frame mode: "Fire off and go to the border" means idle, to realize the border preview function. "Fire on to cut the border" can realize the manual cutting of the processed graphics. "Dots in the four corners" means that on fire at the four corner points of the frame, and one point is shot, and other place fire off. The size and position of the figure can be visually viewed through the four points. The speed of frame moving is the speed value set on the keyboard when the system is idle. If the fire on, the minimum / maximum power of the fire is the corresponding value set on the keyboard when the system is idle).



If the frame is out of bounds, the interface will prompt out of bounds information. At this time, if you press the OK key, the system will cut the frame with the maximum / minimum coordinates, and then perform the frame moving operation. You can also cancel this operation.

- (6) Other user parameters
- Array processing method: Two-way array and one-way array can be selected, which only works for virtual array. Bidirectional walking array: the array is cut back and forth in sequence; unidirectional walking array: the array is always cut from one direction to the other. When a unidirectional array is selected, the motion mode of each array unit is exactly the same, and the smoothness of the motion is completely the same, but it takes slightly more time than a bidirectional array. The bidirectional array is selected by default.
- Return position : Choice of anchor point and machine origin. This parameter determines the docking position of the laser head after 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 autofocus function, this parameter is invalid.
- Backlash X: X-axis backlash. Set this value according to whether the machine actually has a backlash, it is accurate to 1um, if the value is not zero, the control system will compensate the backlash.
- Backlash Y: Y-axis backlash. Set this value according to whether the machine actually has a backlash, it is accurate to 1um. If the value is not zero, the control system will compensate for the backlash.
- Blowing method: The way of the air is blown during processing. Can be configured to output fire, process gas, and manual gas.
- **Blow on delay**: Delay time after turning on air blowing
- **Blow off delay**: Delay time before turning off the blow
- Origin set when over range: If the processing graphics are over the machine size, this function can automatically set the origin point and make the job work normally.
- U axis function configuration : The U axis can be configured as a platform, a feed axis, or a rotation axis.
- > Manual fast speed: Speed when moving fast.
- > Manual slow speed: The speed at which the keys move slowly.

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