



Read this manual before operation

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

# RDC5121

## Control System Manual

<https://www.ruidacontroller.com>



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# CERTIFICATION DECLARATION

 **CE**

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.

# SAFETY INFORMATION

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.n 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.

### **Important:**



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.

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# Section 1    Installation Size

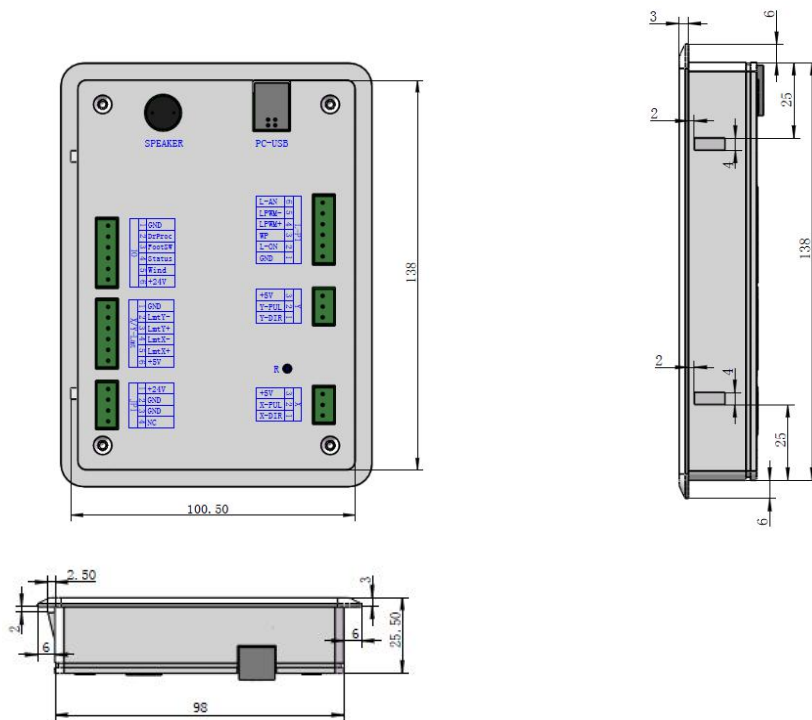
## CONTENTS:

■ Installation Size of  
MainBoard's back

■ Installation Size of  
MainBoard' s front

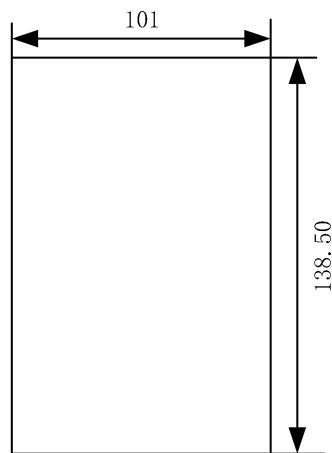
## 1.1 Installation Size of MainBoard's back

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



Figure

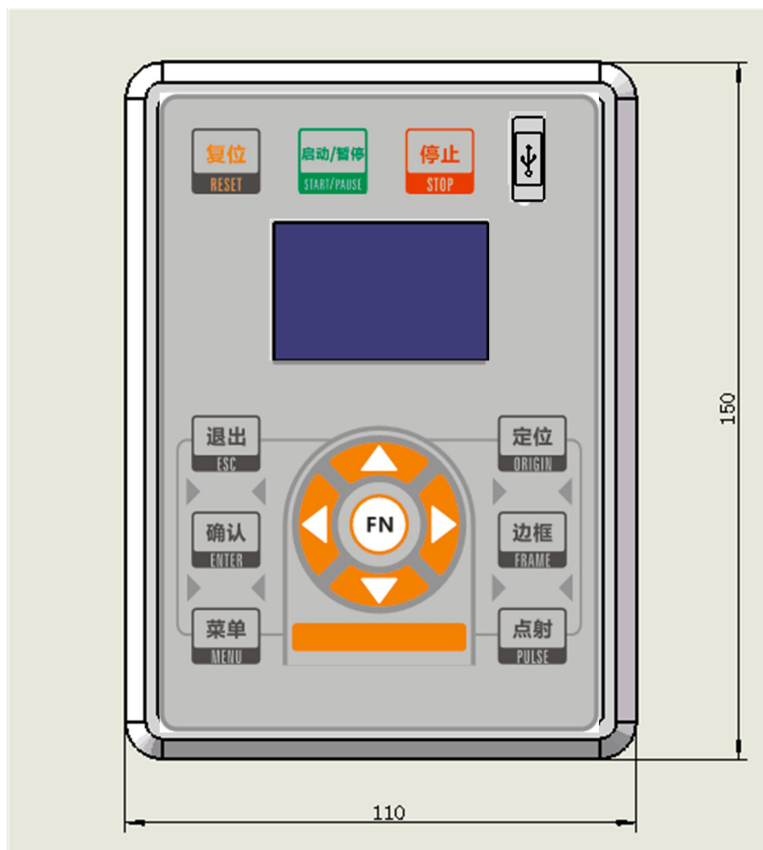
**Recommended opening size:**



**Recommended size**

## 1.2 Installation Size of MainBoard's front

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



Figure

# Section 2    Electric connection

## CONTENTS:

 Electric connection

## 2.1 Electric connection

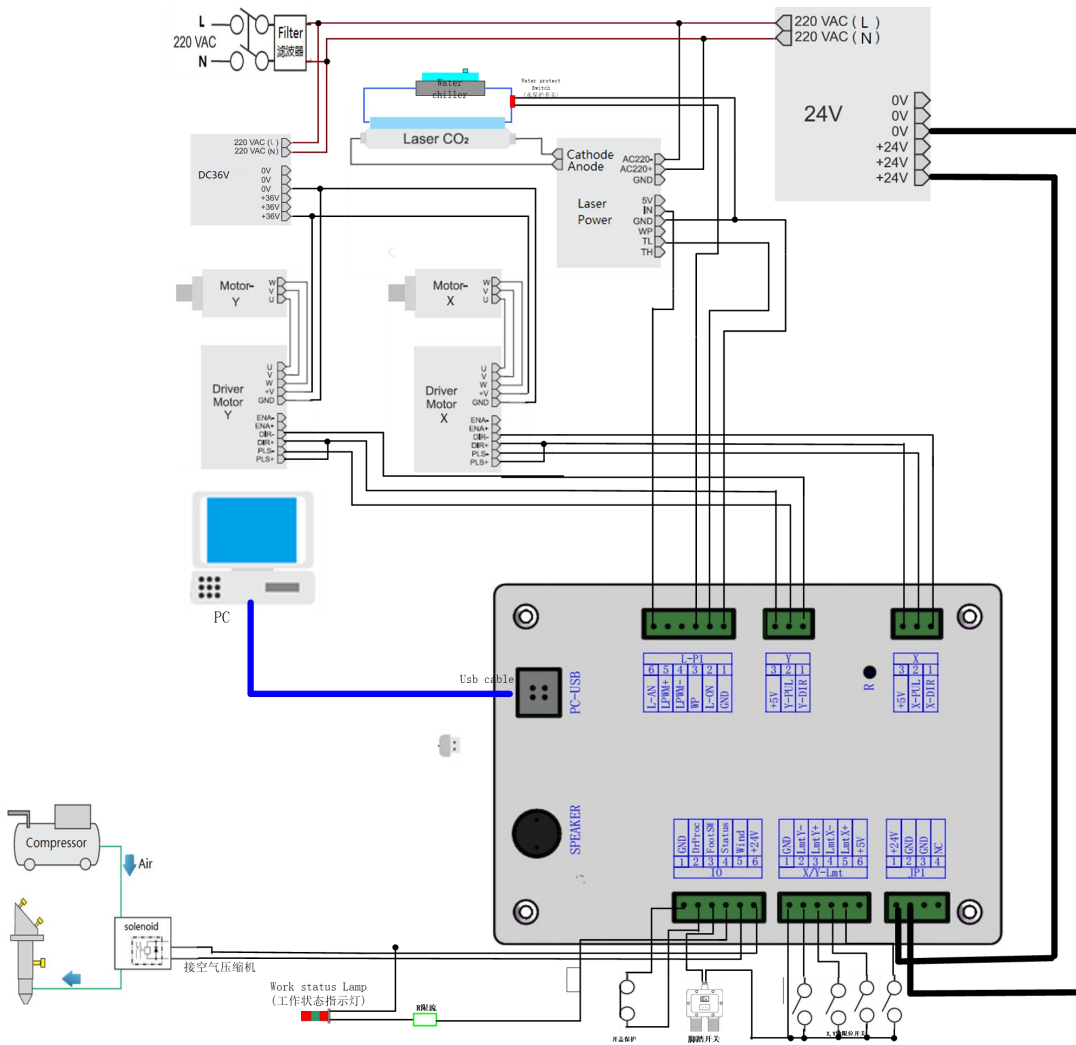


Figure 2.1 electric connection

# Section3 Description of Interface Signal for MainBoard

## CONTENTS:

### ■ Interface of Main Power

Source JP1

### ■ Udisk Interface

### ■ PC-USB Interface

### ■ Special IO port

### ■ Spacing Input Interface

X/Y-Lim

### ■ X/Y axle Motor Driver

Interface X \Y

### ■ Laser Power Control

Interface L-P1

### 3.1 Interface of Main Power Source JP1

| Pin | Symbols | Definitions                |
|-----|---------|----------------------------|
| 1   | +24V    | 24V power positive (input) |
| 2   | GND     | 24V power ground (input)   |
| 3   | GND     | 24V power ground (input)   |
| 4   | NC      |                            |

|                                                                                                     |                                                                                                                   |
|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| <br><b>Caution</b> | This control system employs single 24 power supply. For a certain margin, it is suggested to select 24V/2A power. |
|-----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|

### 3.2 Udisk Interface

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

### 3.3 PC-USB Interface

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

### 3.4 Special IO port

The Special IO port is defined as follows:

| Pin | Symbols | Definitions                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | GND     | Power ground (output)                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 2   | DrProc  | Input from protective port. If the machine needs to be protected in the special state (such as door open protection), the protective signal can be inputted from this pin. This pin can be enabled and prohibited. This signal is not inquired by the mainboard if this pin is prohibited; if this pin is enabled, when the input is high-leveled or this input port is suspended, the machine will be protected, the work suspended and the laser closed. |
| 3   | FootSW  | Input port of foot switch. The connection method is: when the pedal is stepped down, the low-level signal will be inputted to this port; when the pedal is released, the port will be disconnected or the high-level signal can be inputted to this port; when the stepped-down pedal is held for not less than 100 ms, if the                                                                                                                             |

|   |        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|---|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   |        | machine lies idle, it can be started for work; if the machine is in the working state, the work will be suspended; of the machine is in the suspension, the work will be restarted, that is to say, the function of the pedal switch is the same as that of the “Start/Pause” key. If the interval time to the first stepping-down of the pedal should be less than 100ms when the pedal is stepped down once again, the second stepping-down of the pedal will be considered invalid by the mainboard. |
| 4 | Status | General output for the signal port of running status. If this port is externally connected with the relay, the relay coil is broken over when it works; no influence is produced when it suspends working. When its work ends or is stopped manually, the relay coil will be cut off.                                                                                                                                                                                                                   |
| 5 | Wind   | General output for blower control. When the blower control is enabled, this port will output the control signal of the blower, otherwise it will output other special control signals. When the blower is connected and its control enabled, the blower switch can be set separately on each layer. If the relay is connected externally, the relay coil will be broken over when the blower is on; the relay coil will be cut off when the blower is off.                                              |
| 6 | +24V   | 24V Power positive output (If the interface of main power source is powered with 24V power supply, this pin should be 24V; if it is powered with 36 V power supply, this pin should be 36V.)                                                                                                                                                                                                                                                                                                            |

### 3.5 Spacing Input Interface X/Y-Lim

X/Y axle spacing input CN4

| P<br>in | Symbols | Definitions                                       |
|---------|---------|---------------------------------------------------|
| 1       | GND     | Power ground (output)                             |
| 2       | LmtY-   | The spacing from axle Y- and Y to 0 coordinate    |
| 3       | LmtY+   | The spacing from axle Y+ and Y to max. coordinate |
| 4       | LmtX-   | The spacing from axle X- and X to 0 coordinate    |
| 5       | LmtX+   | The spacing from axle X+ and X to max. coordinate |
| 6       | Puxy    | 5V Power positive (output)                        |

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

***spacing inputs are compatible to 5V/12V/24V logic level inputs.***

### 3.6 X/Y axle Motor Driver Interface X \Y

The interfaces of the above four motion axes are the same. The AXIS-X interface is exemplified.

| Pin | Symbols | Definitions                    |
|-----|---------|--------------------------------|
| 1   | DIR     | Directional signal (OC output) |
| 2   | PUL     | Pulse signal (OC output)       |
| 3   | +5V     | 5V Power positive (output)     |

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

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

### 3.7 Laser Power Control Interface L-P1

| Pin | Symbols | Definitions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | GND     | Power ground (output)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2   | L-ON    | Laser-enabled control interface<br>1. When the laser is the RF laser, this pin will not be used;<br>2. When the laser is a glass tube, if the used laser is outputted in the low-level form, this pin will be connected with the laser power enable end and used to control the ON/Off of laser.                                                                                                                                                                                                                                                                                      |
| 3   | WP      | The input port of water protector for the first laser power source.<br>When the water protector is enabled, the mainboard will detect the input port of water protector. If this port is of low level, it will be deemed normal; if this port is of high level, the mainboard will forcibly close the laser to suspend the work in progress and the system will warn. If the water protector is not enabled, the mainboard will not detect the input port of water protector and so the water protector can be unconnected.<br><b>Water protection input must be 24V logic level.</b> |
| 4   | LPWM+   | Power control interface of laser/laser tube<br>1. When the laser is the RF laser, this pin will not be used;                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

|   |       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5 | LPWM- | <p>2. When the laser is a glass tube the laser power PWM terminal is low level effective, this pin will be connected with the laser power PWM end and used to control the power of the laser.</p> <p>Power control interface of laser/laser tube</p> <p>1. When the laser is the RF laser, this pin will be connected with the laser RF-PWM end;2. When the laser is a glass tube the laser power PWM terminal is high level effective, this pin will be connected with the laser power PWM end and used to control the power of the laser.</p> |
| 6 | L-AN1 | <p>An analog signals. this pin connected with the power control end of the laser power.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

|                                                                                                    |                                                                          |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| <br><b>Prompt</b> | <p>Please correctly select the laser type in the factory parameters.</p> |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|

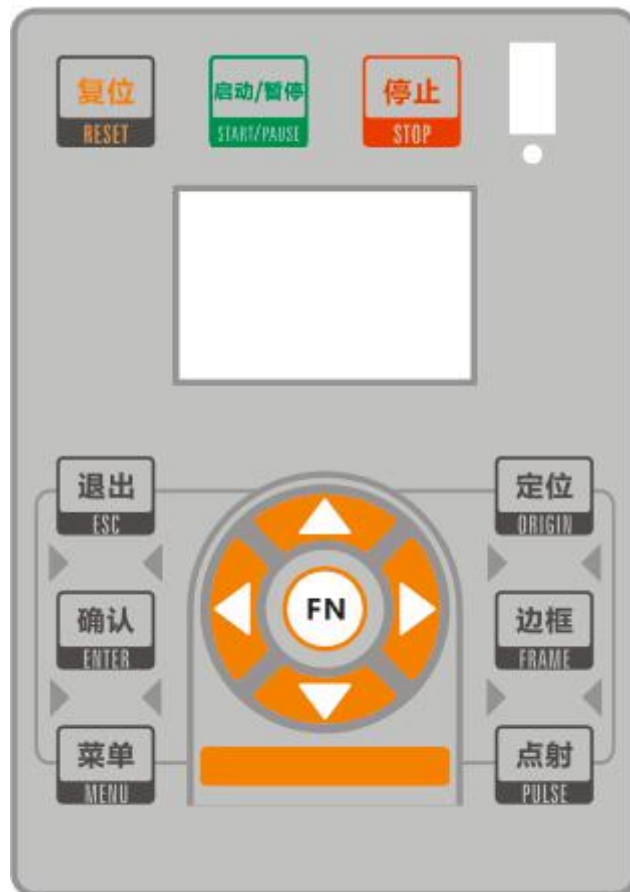
# Section 4    Operating Instruction of Panel

## CONTENTS:

- Introduction to the Panel  
and Keys
- Introduction to the Main  
Interface
- FN key

## 4.1 Introduction to the Panel and Keys

### 4.1.1 The whole panel



### 4.1.2 Introduction to the Keys

-  :Reset the whole system;
-  :To stop work;
-  :To start or pause the work;

-  :Set the relative origin;
-  :To track by the current file's frame;
-  :Let the Laser to splash;
-  :To stop work, or to exit to some menu;
-  :Validate the change;
-  :The Z/U key can be pressed when the system is idle or the work is finished. On pressing this key, it will show some entries in the interface, each entry includes some functions, Z axes move. each axes to go home etc.;
-  :To move the X axes or the left/right cursor ;
-  :To move the Y axes or the up/down cursor ;

## 4.2 Introduction to the Main Interface

### 4.2.1 The main interface

When the system is powered on, the screen will show as below:

|            |         |
|------------|---------|
| File: 04   | Num: 3  |
| MaxPower:  | 50.0%   |
| Speed :    | 100mm/s |
| Idle . . . |         |

Figure 4.1

- File: To display the running file's file number

- Num: To accumulate the work number of the current file
- MaxPower: To display the max power
- Spend: To display the speed of work
- Idle: To display the current status of the machine, such as Idle, Run, Pause, Finish, etc.;

When work is Idle or finished, all keys can be pushed, users can select a file to run, set some parameters, preview to a select file etc. But, when work is running or paused, some keys don't respond when they are pushed.

## 4.2.2 Menu Key

The Fn key can be pressed when the system is idle or the work is finished. On pressing this key, it will show some entries in the following interface:



Figure 4.2

Push "Y+/-" keys to move the green block to the anticipated item, and then push the "Enter" key to display the sub menu.

## 4.2.3 Speed Setting

When selecting the "speed" entry under the menu interface, the following dialog box is displayed:

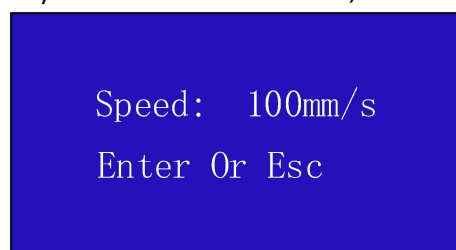


Figure 4.3

Push the "X+/-" Keys to move the cursor in the numeral area, and push the "Y+/-" keys to change the

value, then push the "Enter" key to save the change, push the "Esc" key to invalidate the change.

## 4.2.4 Max/Min power Setting

When selecting the "Max power" or "Min power" entry under the menu interface, the following dialog box is displayed:

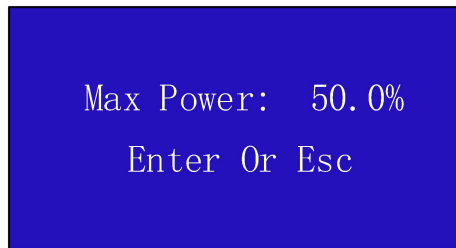


Figure 4.4

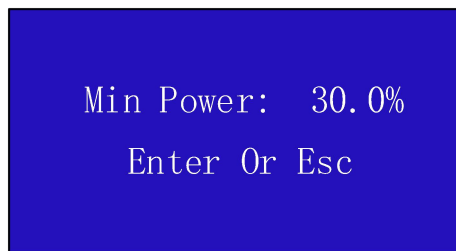


Figure 4.5

At this time, the parameters can be modified by the "Y+/-" key and the "X+/-" key. Setting the parameter method can refer to the speed setting.

## 4.2.5 File Setting

When selecting the "file" entry under the menu interface, the following dialog box is displayed:

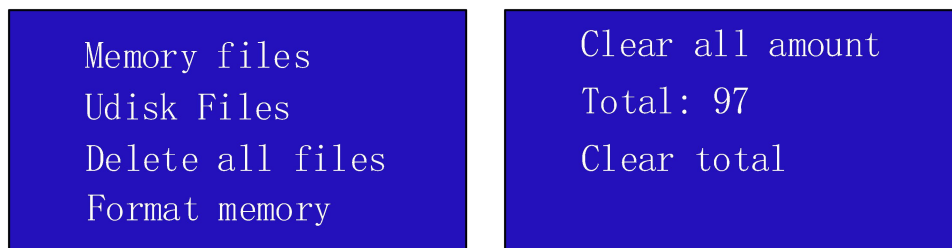


Figure 4.6

When the light blue cursor is on the entry item, you can press the "Y+/-" key to select the entry and

press the "ENTER" key to activate the entry. The "ESC" key returns to the main interface.

All the item show as below:

- **Memory files:** read the memory file list;
- **Udisk Files:** Show U disk file menu;
- **Delele all files:**To delete all memory files;
- **Format memory:**Show Format memory meun,includes Format speedily and

Format drastically;

- **Clear all amount:**To clear the running times of the select file;
- **Total :**the total running times of all the files;
- **Clear total :**To clear the running times of every file in the memory;

## 4.2.6 Memory files

After selecting the “memory file” option, the following left image is displayed, showing the list of memory files.Then select a file and click OK to display the following right image.

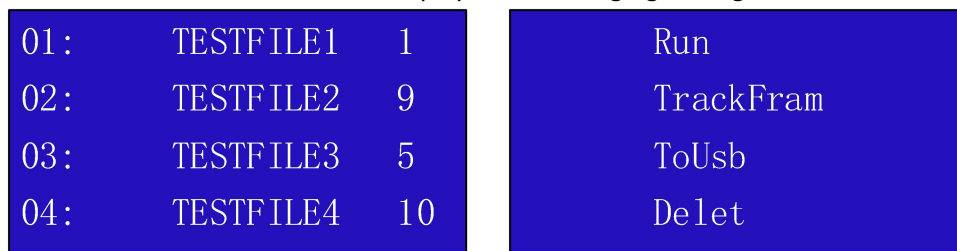


Figure 4.7

All the item show as below:

- **Run:** To run the selected file;
- **TrackFram:** To track the selected file;
- **ToUsb:** To copy the selected file to Udisk;
- **Delete:** To delete the selected file in the memory;

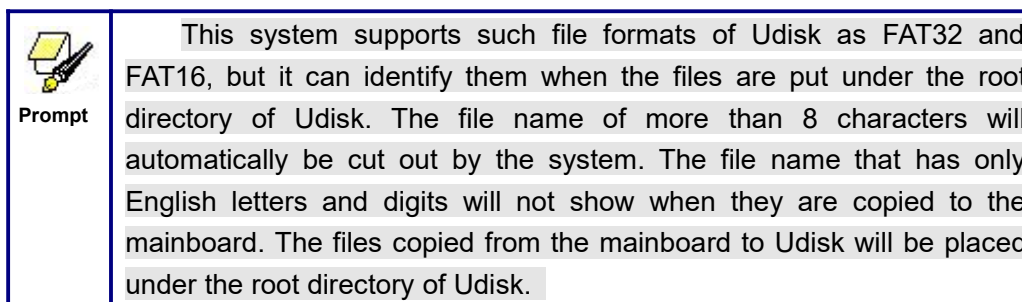
## 4.2.7 Udisk Files

If the “Udisk” entry in figure 4.6 is pressed, the system will show as figure 4.8, and the operation method is all the same as figure 4.6.



Figure 4.8

- **Copy to memory**: copy the target Udisk file to the memory;
- **Delete**: delete the selected Udisk file;



## 4.3 FN key

Press the "FN" key in the main interface to enter the function menu, as shown below:

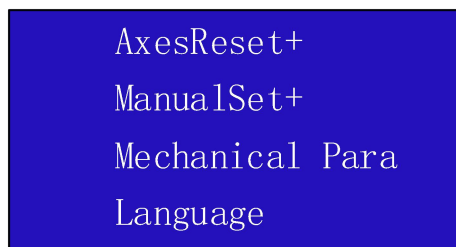


Figure 4.9

Press the "Y+/-" key to move the light blue cursor to the corresponding item and press the "ENTER" key to enter the corresponding submenu.

### 4.3.1 AxisReset+

When the green block is on this item, push the "Enter" key to show as below:



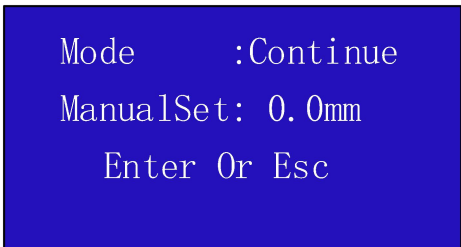
XYAxesReset  
XAxesReset  
YAxesReset

Figure 4.10

Push the “Y+/-” Keys to move the cursor to one of the entry, then push “Enter” key to restart the selected axis, the screen will show some information when resetting.

### 4.3.2 ManualSet+

When the cursor is on this item, push the “Enter” key to show as below:



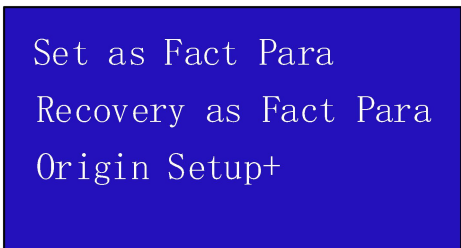
Mode :Continue  
ManualSet: 0.0mm  
Enter Or Esc

Figure 4.11

Push “Y+/-” key to move the cursor, and when the green block is on the “Mode” item, push “Y+/-”keys to select the anticipant value, “Continue” or “Manual”. When “Continue” item is selected, then the “Manual” item is not valid, on that time, push the direction keys to move the corresponding axes, and when the pushed key is loosed, then the corresponding axes will finish moving. When the Mode item is “manual”, then pushing the direction key one time, the corresponding axes will move a fixed length, unless the scope is overstepped.

### 4.3.3 Mechanical Para

When the item is selected, it is displayed as follows:



Set as Fact Para  
Recovery as Fact Para  
Origin Setup+

Figure 4.12

### 4.3.4 Set Fact Para

After the “Set Fact Para” is selected and the Enter key pressed, the interface will show the specific password to be entered when set as default parameter.



Figure 4.13

Push “X+/-” keys and “Y+/-” keys to select the characters, and push the “Enter” key to valid the characters, when finishing enter the password ,that is to say, the six characters, if the password is error, it prompts there is some error, or, all parameters are stored.

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

### 4.3.5 Recovery as Fact Para

After the “Recovery as Fact Para” is selected and the Enter key pressed, the “Successful Recovery” dialog box will pop up to prompt that all manufacturer parameters and user parameters are recovered successfully. You can return to the previous menu by press the Enter key.

### 4.3.6 Origin Setup+

When the cursor is on this item, push the “Enter” key to show as below:

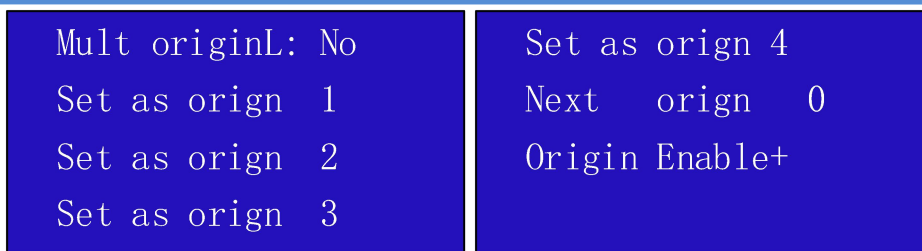


Figure 4.14

Push “Y+/-” key to move the green block to the anticipant item, and when the green block is on “enable” items, push “Enter” key to enable or disable the item, when enabled, the small diamonds is green, and when disabled, the small diamonds is grey. When the green block is on the “Set origin” item or the “Next origin” item, push the “X+/-” keys to select the value.

Pay attention to if when the green block is on the “Set origin” item, push the “X+/-” keys to select a value, then, “Enter” key must be pushed to valid the change, or, the change is invalid.

Each item introduced as below:

- Multiple Origins Enable: “Yes” or “No” can be selected. If you select “No”, the system will use the single-origin logic. You can press the “Origin” key and set the origin, and only this origin can become valid. If you select “Yes”, the system will use the multiple- origin logic and the “Origin” key on the keyboard become invalid. In such a case, the parameter of each origin must be set in the menu as follows.
- Origin Enable1/2/3/4: after the multiple-origin logic is enabled, the four origins can independently be prohibited and enabled.
- Set Origin 1/2/3/4: after the multiple- origin logic is enabled, you can stop the cursor at “Set as Origin 1/2/3/4”. Press the “Enter” key on the keyboard and the system will take the coordinate figures of current X/Y axes as the corresponding ones to the origin 1/2/3/4.
- Next Origin: there are such five digits as 0~4 for option, which are the origins to be used for the next figure. Origin 0 means the origin set by the “Origin” key on the panel in the single- origin logic. 1~4 means the serial number of the origins in the multiple- origin logic. Next origin can be modified to any one of origin 1~4, so as to control the start location of next work (the premise is that the origin is enabled), but it can't be modified to origin 0.

|                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br><b>Prompt</b> | <p>Once the multiple- origin logic is selected and if the serial number of the next origin is 1 and four origins are enabled, when the memory file function is started or the processing file is uploaded into the PC and this file selects “Take the Original Origin as current Origin”, the work started for each time will use different origins. The rotation order</p> |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

of origin is 1->2->3->4->1->2.....

### 4.3.7 Language

When the cursor is on this item, push the “Enter” key to show as below:

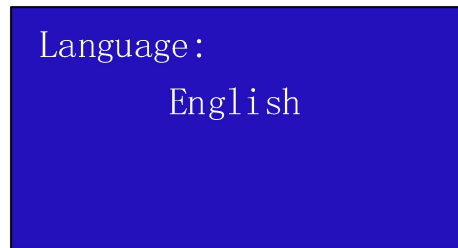


Figure 4.15

Press up and down to select the language type.

When you select one of the languages, press “ENTER” to return to the main interface.

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