Operating Instruction

Beta 300 Series Cutter

Suzhou Trojan Industry Material Co., Ltd

http://www.trojanchina.com

Building A,No.53#, Xinze Road,Singapore Industry Park,Suzhou,Jiangsu Province, China.
Tel: 0512-67580617 Fax: 0512-67508229

Basic Infomation

Introduction

Suzhou Trojan Industry Material Co., Ltd is a professional supplier and service provider of metallographic equipment and consumables and developed and manufactured a series of metallographic cutting machines. Beta-300 series cutting machine applied a new cutting technology, with a variety of cutting modes. Beta-300 series cutting machine applied the newest cutting technology. Various cutting modes can satisfy different cutting requirements from the customers.

Beta-300 can be loaded with the cutting discs maximum diameter 300mm and equipped with XYZ three-axis rocker and 7-inch touch screen. It can achieve table-feed cutting (Y axis), chop cutting (Z axis), and segment cutting (YZ axis). The flexible cutting method avoids the damage of the sample in cutting process.

Beta-300 offers the following 3 optional models:
Beta-300 Pro Automatic Cutting Machine: LCD Touch Screen, Three-Axis Rocker Control, X-Axis, Y-Axis, Z-Axis automatic cutting system. Adjustable speed of cutting disc: 1000-3500rpm, the maximum cutting diameter 110 mm. The maximum cutting section: 80x200mm. Laser Positioning. Various cutting modes can realize automatic adjustment of cutting speed in Y and Z directions, pulse cutting and step cutting.
Beta-300 MY manual/automatic integrated semi-automatic cutting machine: LCD Touch Screen. Single-axis Y-Axis rocker, only Y Axis can realize automatic feed and pulse cutting. Z-Axis manual hand-wheel control can realize Z-Axis manual cutting. Cutting disc speed is not adjustable: 2800rpm.

Beta-300M manual cutting machine: No LCD touch screen, operate by control panel and button. Y-axis movement controlled by hand-wheel, it can realize Y-Axis manual feed cutting. Z-axis cutting disc is also controlled by manual. Cutting disc speed is not adjustable: 2800rpm.
Beta-300 is equipped with a caster-movable circulating cooling water tank. Capacity 80L. There are 2 optional filtering type:

- 100μm filter basket (standard)
- Magnetic filter (optional);

Building A,No.53#, Xinze Road,Singapore2Industry Park,Suzhou,Jiangsu Province, China.
Tel: 0512-67580617 Fax: 0512-67508229

Beta-300 offers the following fixtures:

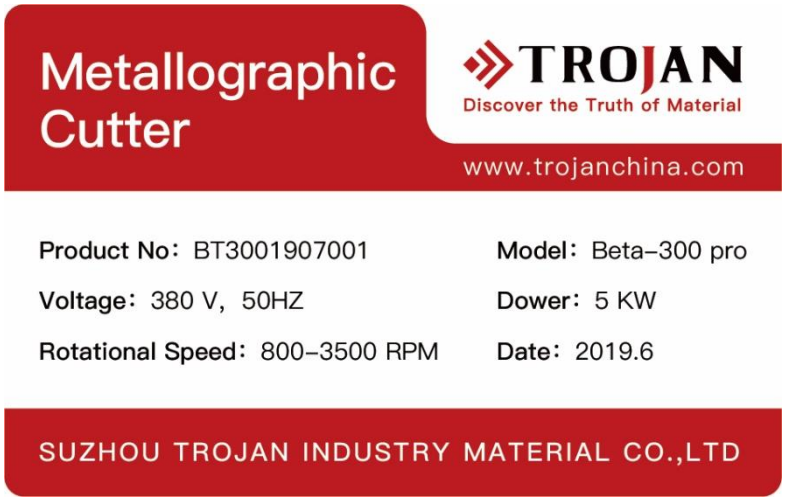
- Quick fixture for both right and left side (standard matching);
- Vertical fixture;
- Vertical fixture with chain;
- Customized fixture;

Cautions

Please read this instruction carefully before operating this equipment. Please strictly follow the instructions to operate. Equipment Damaged caused by failure to operate in accordance with the instructions shall not be included in the company's warranty regulations. This instruction is only for users who own this equipment.

Device Identification

The nameplate of the device can be found behind of the device in the following form:



Use Restrictions

Beta-300Pro is a fully parameterized metallographic cutting machine which provide a variety of customized operations.
Personnel who are not trained or in the metallographic industry are forbidden to operate the equipment.
Beta-300Pro is only suitable for resin-type or diamond-type cutting discs with a maximum diameter of 305mm. If you want to install other types of cutting discs or accessories, please contact the manufacturer.
The equipment can be cleaned with a water gun. Operators need to wear goggles to prevent splashing water or debris into the eyes.
It is strictly forbidden to cut the materials that are flammable, explosive and harmful for the human body. Cutting fluid is needed to avoid sample burns during cutting process.
The debris generated during the cutting process which may accumulate in the water tank or cooling pipeline, requiring regular manual cleaning and maintenance by users.

Technical parameter

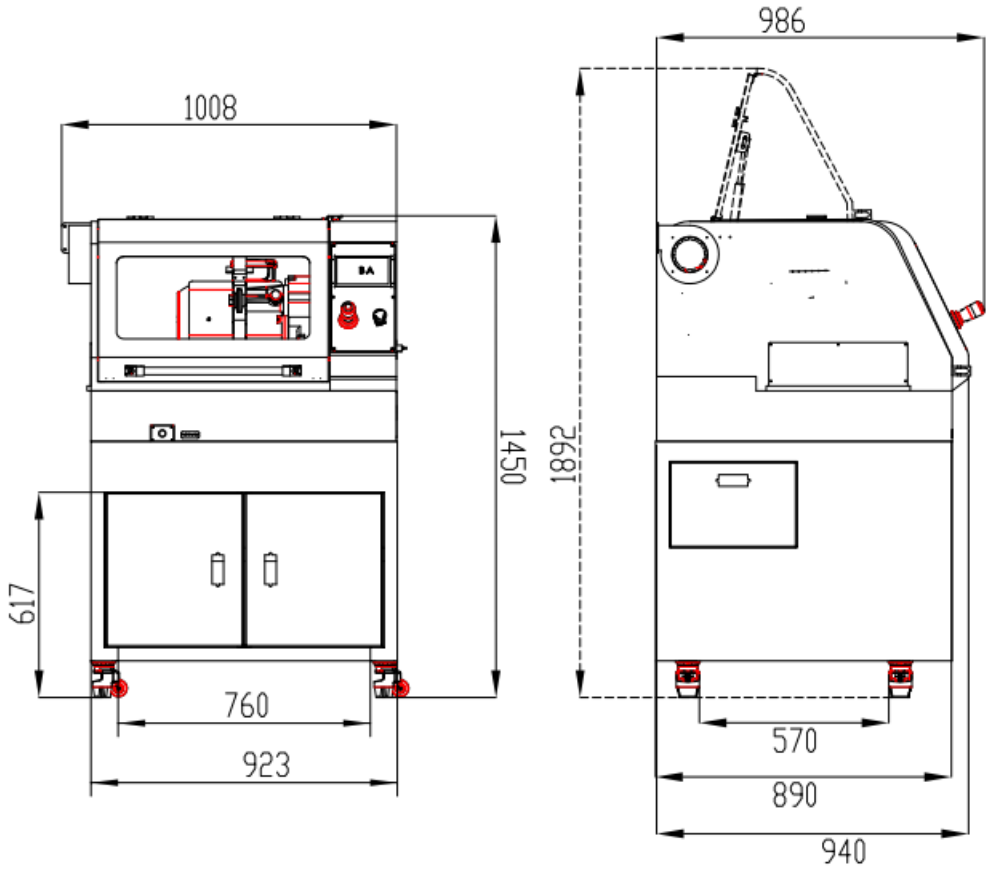
		Beta-300 Pro	Beta-300 AY	Beta-300 MY	Beta-300 M
Max. Wheel Diameter		Φ300mm	Φ300mm	Φ300mm	Φ300mm
Min. Wheel Diameter		Φ200mm	Φ200mm	Φ200mm	Φ200mm
Max. Cutting capacity. Φ		Φ110mm	Φ110mm	Φ110mm	Φ110mm
Max. Cutting Capacity. HxD		80x200mm	80x200	80x200	80x200
mm Z-Axis Travel		150	150	150	150
mm Y-Axis Travel		200	200	200	200
mm X-Axis Travel		80	-	-	-
T-table Dimensions，mm		280x536 (636)	280x636	280x636	280x636
mm T-Slot Dimension		12	12	12	12
Kw Cutting motor power		4	4	4	4
RPM Wheel Speed		800-3500	800-3500	2800	2800
Control Panel		7 inch Touch Screen	7 inch Touch Screen	7 inch Touch Screen	Buttons
Cutting Method	Smart Cutting	Auto	Auto	Auto	Manual
	Chop Cutting，Z-Axis	Auto	Auto	Manual	Manual
	Table Feed Cutting，Y-Axis	Auto	Auto	Auto	Manual
	Pulse Cutting	Y-Axis Z-Axis	Y-Axis Z-Axis	Y-Axis	-
	Segment Cutting	Yes	Yes	-	-
Cutting Feed rate，mm/s		0.01-5.0	0.01-5.0	0.01-5.0	-

Building A,No.53#, Xinze Road,Singapore Industry Park,Suzhou,Jiangsu Province, China.
Tel: 0512-67580617 Fax: 0512-67508229

Laser Alignment	Yes	Option	Option	Option
Weight，Kg	370	370	370	370
lt Recirculation coolant	80	80	80	80

Installation

Beta-300Pro requires an area of at least 1000X1000mm and a height of at least 1900mm.



Pre-installation preparation:

1.Power socket: 3x380V and 1 ground wire, power: 5Kw;

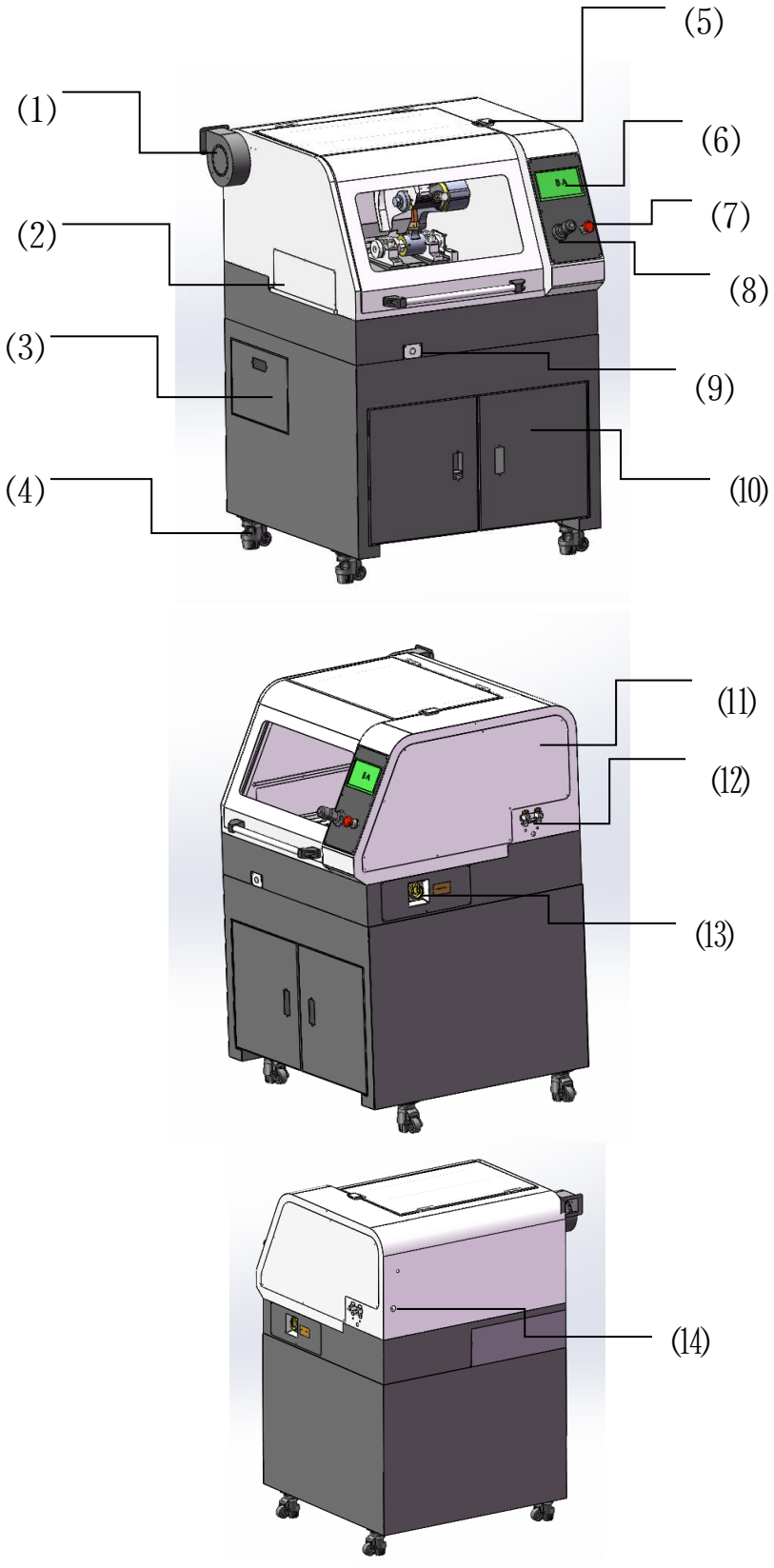
2.High-pressure water intake pipe connecting pump: inner diameter 19 mm;

3.Wire pipe connecting drainage: inner diameter 38 mm;

Beta-300Pro Introduction

Beta-300Pro uses vertical cabinet installation, cast aluminium base, 304 stainless steel housing. The operation panel is simple in configuration. The cutting parameters are set on the 7-inch touch screen. The three-axis rocker controls the movement of XYZ in three directions.

Building A,No.53#, Xinze Road,Singapore8Industry Park,Suzhou,Jiangsu Province, China.
Tel: 0512-67580617 Fax: 0512-67508229



Building A,No.53#, Xinze Road,Singapore Industry Park,Suzhou,Jiangsu Province, China.
Tel: 0512-67580617 Fax: 0512-67508229

1. Exhaust fan. 3x380V，85W..

2. Side opening: When the length of the sample exceeds 420 mm, the side opening can be removed.

3. Left opening on the vertical cabinet. Open the door to connecting the intake pipe and drainage pipe.

4. Load-bearing casters with moving wheels. When the equipment need to move on the flat ground. Rotate the adjusting nut and the moving wheel touches the ground while the supporting part of the load-bearing wheel is retracted. When the supporting parts of the four load-bearing casters are retracted, the equipment can be propelled.

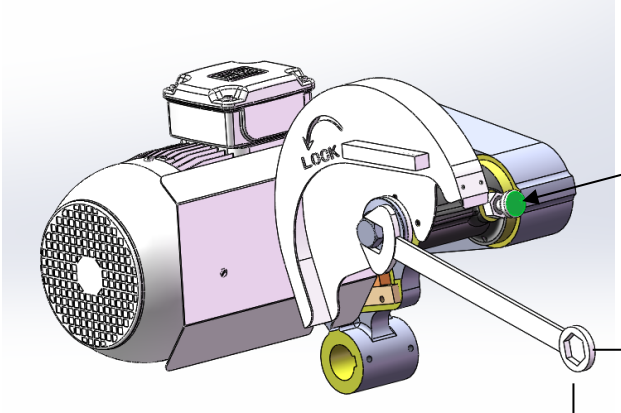
5. Safety Door Switch
6. 7 Inch Touch screen.
7. Emergency stop button.
8. XYZ three-axis Joystick
9. Three-axis joystick activated button. The joystick can only be usable by pressing down this button.
10. Front opening of the vertical cabinet. Place or remove the water tank.
11. Side plate of electronic control box. Maintenance or inspection of electronic control problems.

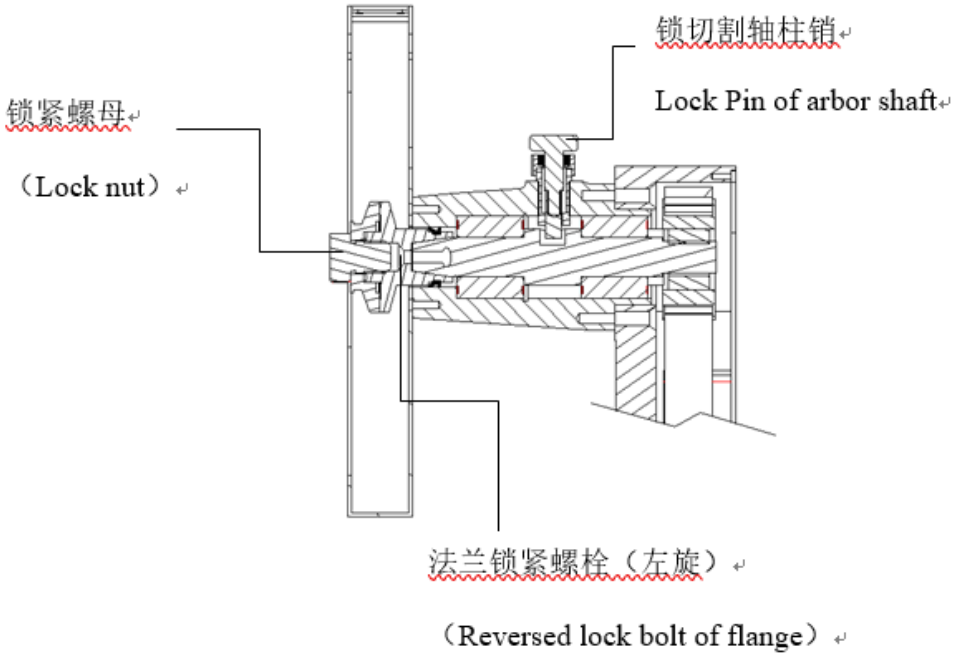
12. Z-axis limit switch

13. Main power switch.
14. Main power cable, 3x380V, and 1 grounding wire

Changes Of Cutting wheel

Replace the cutting wheel with an open end Wrenches (32mm). Press down the pin of the lock cutting shaft and tighten/loosen the lock nut with the wrench. (See chart below)





1.

Cooling Water Tank

The circulating water tank consisting of the following four parts:

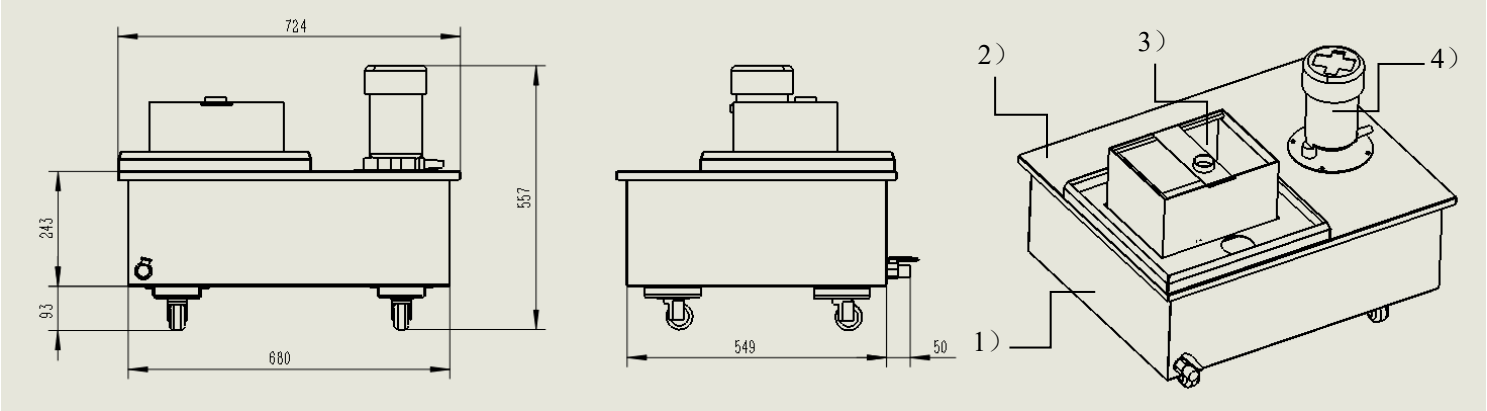
1. Movable water tank with 4 2.5-inch casters. Water tank volume: 80L.

2. Water tank cover. Fixed pump and filter basket.

3. The filter basket is equipped with a filter bag to filter out particles larger than 100um. When the filter bag needs to be cleaned/replaced, the two small long axes of the fixed filter bag are lifted directly and the small long axes are drawn out.

4. Water pump. Pagoda Joint with 19 mm Outer Diameter. Pump voltage: 3x380V, 250W. Flow speed : 100L/min.

Note: The water level in the water tank should be checked regularly. Pumps are strictly prohibited from working for long periods of time without water.



Equipment Operation

Design Concept

1. Beta-300Pro is a fully automatic cutting machine which can automatically adjust the feed rate, determine whether the cutting process has completed and the cutting wheel will be cut repeatedly in pulse mode. The above judgment of equipment operation mode is based on the current-changes of motor. If the feed rate is too fast, the current will rise obviously, and if the feed rate is too slow, the current will remain at a low level. More details as follow:

Automatically adjust feed rate: Set up a low current value (IL) and a high current value (IH), if the current is less than IL, the feed rate will increase. if the current higher than IL, the feed rate will be decreased.The increase or decrease of feed rate can be set in the "parameters" page.

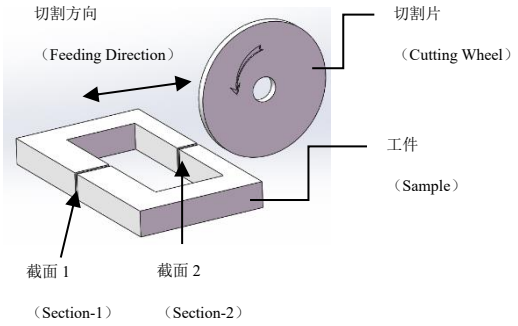
Auto-detect whether cut-off: Set a no-load current (In), during the cutting process, if the current continues to be lower than In, then it is determined that the sample has been cut

off. The following situations are not available for the use of "Auto Detect whether cut-off".

2.1) As shown in the right pic, there are more than one discontinuous sections on the cutting route.

2.2) Feed rate is slow and current value fluctuates little.

Note: The current setting should satisfy In < IL < IH. Otherwise, the setting will unsuccessful.



3. Pulse- cutting: setting forward cutting time (Tf) and cutting backward speed (Vb). When the current is more than IH, Tf starts to count and when time ends, the sample move backward at speed Vb until the current value falls back to less than IH. If the setting value of IH is high then it will takes less time to complete the sectioning. But the frequency of the reciprocating cutting will decrease. If the setting value of IH is low then it will take a long time to complete the sectioning, therefore the frequency of the reciprocating cutting will increase. Different with the traditional pulse cutting algorithm. The pulse cutting mode of Beta-300Pro only returns the tool under the condition of current overload, which greatly reduces the number of reciprocating and improves the cutting efficiency.

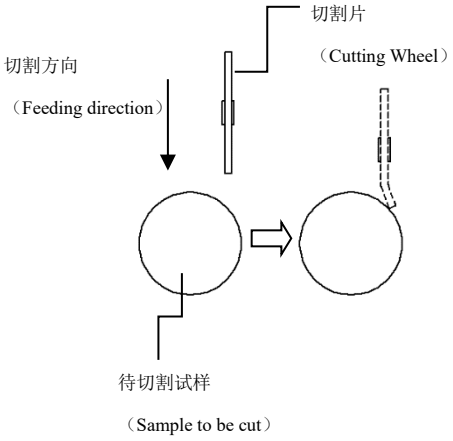
Overload Protection:

4.1) Current overload: In any case, if the current exceeds the maximum setting value, it will be returned back or reduce the feed rate.

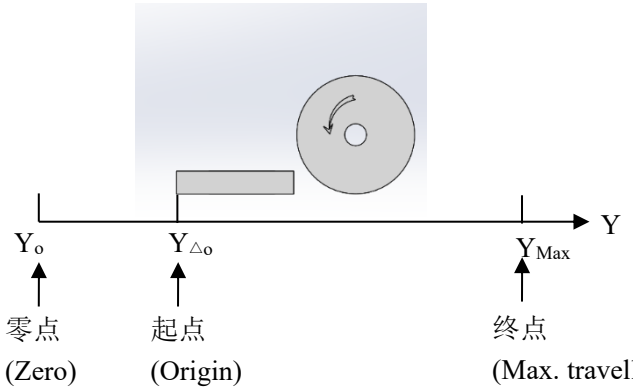
4.2) Pressure Overload: Y-axis and Z-axis collide due to incorrect setting. When abnormal pressure will detected by the system, the movement of Y-axis and Z-axis will stop moving and the message will prompted on the interface.

5. Automatic find origin: Before cutting process, the cutting wheel does not rotate and the feed process begins. When the cutting wheel touches the sample, it feeds in the opposite direction, there is a small distance between the cutting wheel and the sample. The system records the position at this time as the origin position of cutting process and then the cutting process is executed according to the set parameters.

Note: The sample with arc or inclined surface in the cutting route, it is not recommended to use "Auto Find Origin" function. See the right picture.



6）Zero, Origin: Take Y axis as an example, X axis, Z axis is similar to Y axis.



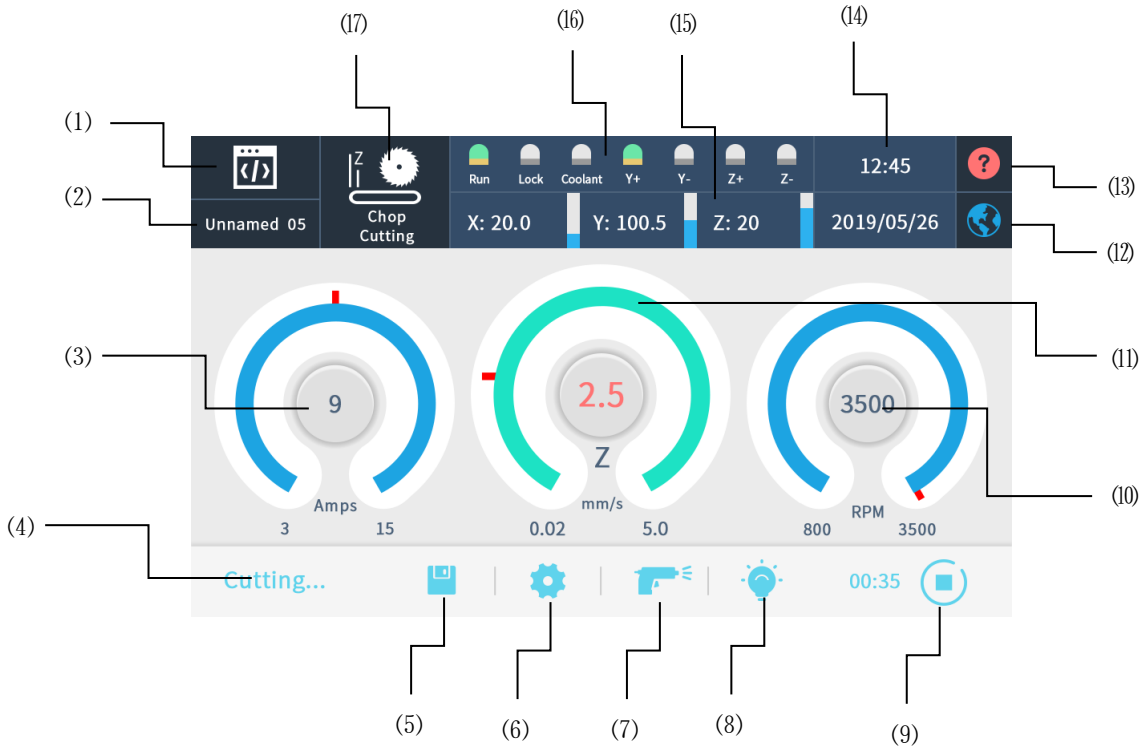
Zero position: The position of the table away from the direction of the cutting wheel and touches Y- limit switch is defined as Zero. Zero is the origin of the coordinate and an absolute position point returned when the "return to zero" operation is performed.

Origin position: before cutting process, the position of the table defined as " Origin". Because of the shape of the sample or the clamping position is different, the Origin position is usually determined by manipulating the joystick. Make the sample as close as possible to the cutting wheel when finding the Origin, so that the cutting timing will be reduced. The origin also can be found by "Auto Find Origin" function.

Endpoint: the maximum travel distance of the table (or the table touches Y+ limit switch) is defined as the end point. If the "Auto detect whether cut-off" function is not enabled, the end point of each (or every step) cut is the end point.

Operating Interface

The main interface and the function of each part are described below.



Select procedures. The pop-up page is shown below. Click the name of the procedure you want to modify or run, and the name of the selected will be highlighted.

（1）

Displays the name of the currently procedure .

（2）

Setting current value IH

（3）

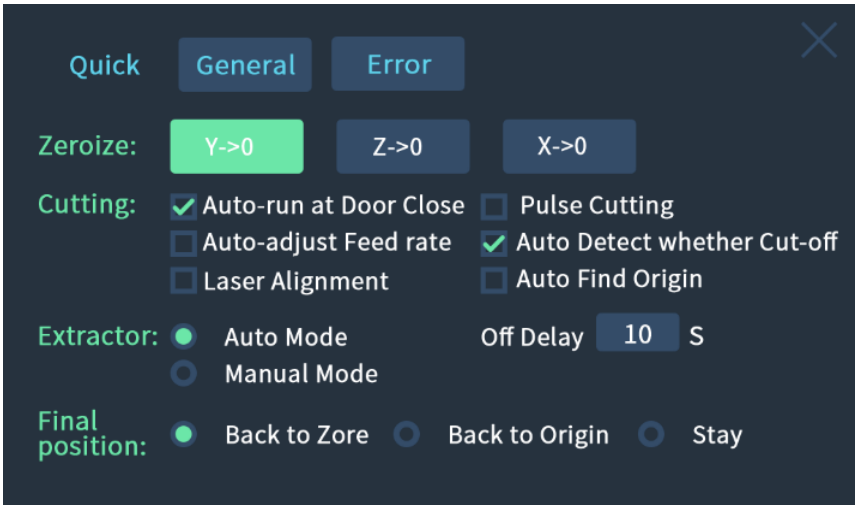
Information bar, showing error codes or current ongoing operations

（4）

Saving button. Click on the page where the pop-up prompt is saved.

（5）

Click on the pop-up "Parameter Settings" page, as shown below:



On the Parametric Settings page, there are three tabs:
In the Quick , you can operate the following steps:

6.1.1）

XYZ Axis returns to Zero position.

6.1.2）

Aut-run at Door Close: No need to click the start button, the cutting process will automatically running once the door closed. Suitable for repetitive cutting with uniform specimen shape. This option will not be saved and will not be checked automatically when it is shutdown.

6.1.3）

Pulse Cutting: Select whether to enable pulse cutting mode

6.1.4）

Auto Adjust Feed Rate: Select whether to enable automatic cutting speed adjustment function

6.1.5）

Auto Detect whether Cut-off: Select whether to enable automatic detect cut-off function 6.1.6）

Laser Alignment: Select whether to turn on the laser positioning function 6.1.7）

Auto Find Origin：Select whether to enable automatic find the origin position. (Only two modes of Y-direction feeding and cutting are supported) 6.1.8）

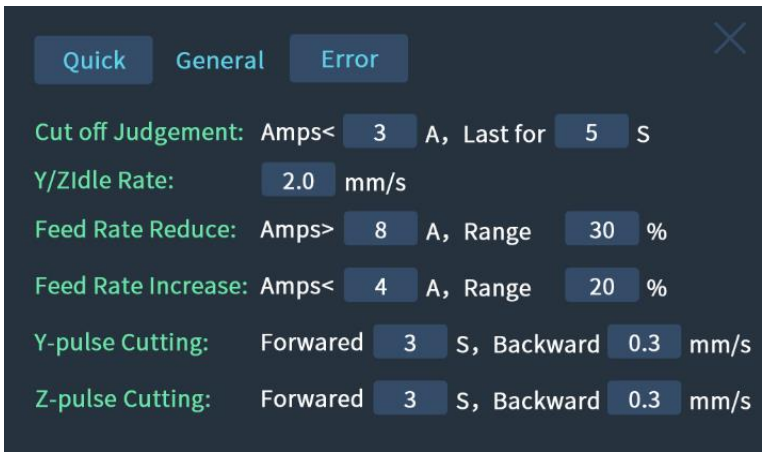
Extractor Auto Mode：Select whether to let the exhaust fan start or stop with the spindle motor and delay the shutdown. 6.1.9）

Extractor Manual Mode：Select whether to keep the exhaust fan on. 6.1.10）

Back to Zero：Automatically return to zero after cutting process. 6.1.11）

Back to Origin：Automatic return to starting point after cutting process (Z-axis cutting mode does not support this function) 6.1.12）

Stay：After cutting stay at the endpoint.



In the General tab, the following settings can be set

6.2.1）

Set the current In and duration

6.2.2）

Set the Speed of Y/Z empty trip

6.2.3）

Increasing current IH and increasing amplitude

6.2.4）

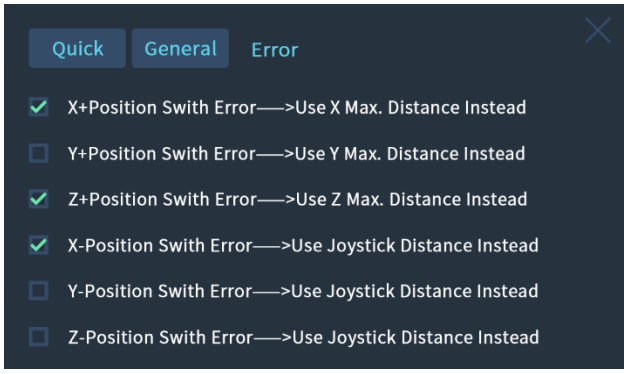
Deceleration current IL and reduction range;

6.2.5）

Forward and Backward Speed of Y-axis Pulse Cutting

6.2.6）

Forward and Backward Speed of Z-axis Pulse Cutting



Error tab:

6.3.1）

If the X + limit switch is damaged, X end point position can be determine by the maximum travel in the X direction

6.3.2）

If the Y + limit switch is damaged, Y end point position can be determine by the maximum travel in the Y direction

6.3.3）

If the Z + limit switch is damaged, Z end point position can be determine by the maximum travel in the Z direction

6.3.4）

If the X- limit switch is damaged, the action of rocker button can be replace the X-limit switch.

6.3.5）

If the Y- limit switch is damaged, the action of rocker button can be replace the Y-limit switch.

6.3.6）

If the Z- limit switch is damaged, the action of rocker button can be replace the Z-limit switch.

（6）

Flushing Spray Gun Button: Click to open the flushing spray gun. The water pump will automatically shut down if the flushing spray gun works continuously for more than 2 minutes or click the “Flushing Spray Gun Button” again to close it in manually.

（7）

Click to turn on/off the lights. Lighting lamp voltage: DC24V, 20W.

（8）

Click, start/stop the cutting and displays the cutting time.

（9）

Digital Keyboard: click it to set up the speed of the cutting disc, speed range: 800～3500rpm.

（10）

Digital Keyboard: Click it to set up the feed speed of Y/Z axis. Speed range: 0.01～5mm/min.

（11）

Timing and Date: Click it to set up the date and time.

Language setting: Click it to set up the user language.

（12）

About The Equipment: Click to get the device information.

（13）

Display the date and time

（14）

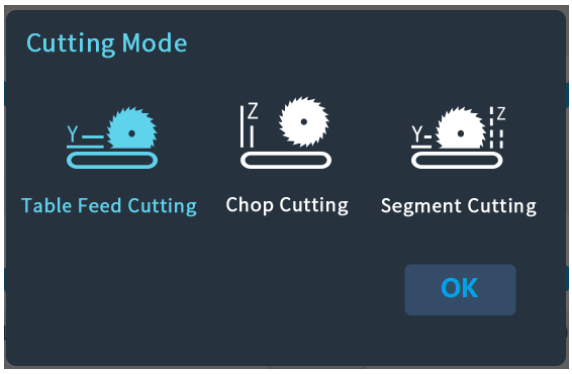
Display the current position of the XYZ axis. This value is the distance between the sample and zero point. Z-axis is only the reference value.

（15）

Display the status of operation, door lock and YZ limit switch. When the light is on, it means that it is in progress and when the light is off , it means that it is invalid.

（16）

Select the cutting mode



Click to select the mode to use.

设备的提示信息:

Device Reminder Message

Number	*Message*	*Description*
1	Door open	The door was not closed
2	Moving to X zero…	X-axis is going back to zero
3	Moving to Y zero…	Y-axis is going back to zero
4	Moving to Z zero…	X-axis is going back to zero
5	Cuting…	Cutting in progress
6	Completed	Cutting completed
7	Door is locked	The door is locked.
8	Error: SC	Output short circuit. Check whether the motor is short-circuited and whether the wiring and cable are short-circuited
9	Error: OC	Motor over-current. Check the cutting parameters and adjust the feed speed.
10	Error: OV	Bus voltage is too high.
11	Error: OH	Inverter overheating. Check the heat dissipation system.
12	Error: GF	Frequency converter leakage to the ground. Check whether the wiring is loose or not, check whether the motor cable is leakage.
13	Error: ADC	Current sensor failure. Contact the manufacturer.

14	Error: NTC LOSS	The inner temperature sensor of the frequency converter is broken, Contact the manufacturer.
15	Error : PARA ERROR	Motor parameter fault. Check whether the parameters of the converter motor are set in accordance with the nameplate.
16	Error: MOTOR OH	The motor is overheated. Check cutting parameters to reduce cutting speed.
17	Error : SUPPLY LOSS	The power supply is abnormal or out of phase and the three-phase input is unbalanced. Check the input power supply.
18	Error : OUTPUT LOSS	The output current is abnormal or the output phase is absent. Check whether the motor is out of phase or contact the manufacturer.
19	Error : MODBUS FAULT	Communication failure. Check the communication settings of the converter.
20	Error : UNDER VOLTAGE	The power supply is under-voltage. Check whether the power supply is normal
21	Error : SPEED FEEDBACK	Speed feedback fault. Speed feedback disconnection. Contact manufacturers
22	Error : OVER SPEED	Over-speed fault. The motor over-speed. Contact manufacturers
23	Error : MOTOR STALL	The motor is blocked. Check if the cutting disc is stuck

Note: When the information from 8 to 23 appears, try to turn off the power of the device for 5 minutes then try restarting. If the error message still appears, please contact the manufacturer.