

# OPERATION MANUAL



**BMS Bulut Makina Sanayi ve Ticaret Ltd. Şti.**

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# 1 Cautions & Safety Note

Following instruction shall be followed to prevent from fire hazard, electric shock and injury:

1. Read carefully all the operation instructions.
2. Keep in mind the elementary knowledge of electrical appliances.
3. Abide by all the warnings and instructions either marked on the product or mentioned in the documents delivered with the machine.
4. Should any discrepancy be found between the instructions and safety note, the safety note shall prevail.  
For more details, please refer to the sales agency or after market service.
5. Pull out the power plug prior to clean the surface. Clean with damp cloth instead of detergent or kerosene.
6. Nothing is allowed to put on the machine.
7. Don't overload the power socket in case of fire hazard or electric shock.
8. Don't try to disassemble the cutting machine to prevent from electric shock. Only qualified maintenance technicians are allowed to repair the machine .You will be exposed to dangerous voltage or other danger once the cover is opened or removed. Improper reassembling may result in future electric shock.
9. Remove the plug and call qualified technician in following cases:
  - 1) The cable or plug is damaged or worn out.
  - 2) The machine can't run in normal operation.
  - 3) Sudden and obvious change on the capability of the machine.
10. Only the parts mentioned in this operation manual are allowed to adjust.
11. Keep the manual well.

# 1 General Description

BULUCUT-7 is a kind of large automatic metallographic specimen cutting machine. It adopts SIMENS programmable controller and has high reliability and powerful controlling ability. It also adopts touch type screen for human-machine interaction and high precision step motor for controlling system. It is suitable to cut various metal and non-metal materials so as to observe the metallographic and lithofacies structures. This cutting machine features automatic cutting process, low noise, convenient operation, high safety and reliability. It is the ideal equipment to be used to prepare various specimens in modern laboratories, factories, colleges and researching institutes etc.

## 1.1 Features & Technical Specifications

Three cutting modes: Chop cutting, Pulse cutting, Sweep cutting (choose cutting modes according to different materials, diameters and hardness)

3-axis simultaneous motion. Moving capacity of X-axis: 300mm, Moving capacity of Y-axis: 200mm, moving capacity of Z-axis: 240mm

120L circulating and cooling system, equipped with magnetic filter and cleaning water gun

Automatic on/off protective shield

Stainless working table

Water-jet type cleaning system

Isolated lighting system

Equipped with quick clumper

HMI (Human-Machine Interaction) controlling system.

Cutting disc size:  $450 \times 3 \times 32\text{mm}$

Max. Cutting diameter: 160mm

Frequency control speed adjusting range: 0-2300 rpm

Large working chamber 840mm x 980mm

Motor power: 7.5KW

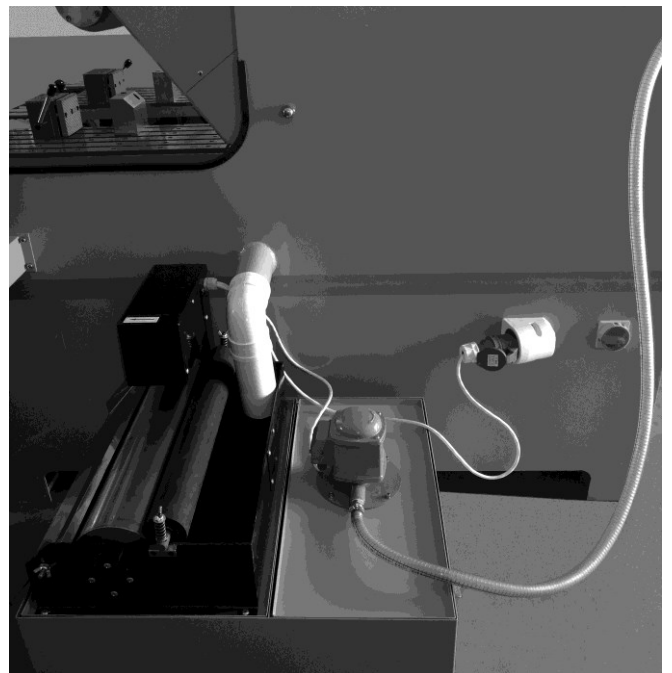
Power supply: 380V, 50Hz, three phases

Dimensions: 1800×1350×1870mm

Net Weight: 910 KG

## 2 Installation

1. Open the packing box of main machine. Remove the foundation bolts on the bottom of machine, and place the machine on solid, flat and vibration-free ground.
2. This machine is equipped with 120L cooling water tank. Open the packing box of water tank. Put the water tank to the right of main machine. Direct the outlet pipe of main machine at the water collecting box of magnetic filter. Connect the outlet pipe from water pump with the water inlet on the right of main machine and tighten the pipe clumper as well. Fill 6L special cutting lubricant liquid into the water tank and then mix it with water (mixing rate 1:20), at the same time observe the liquid level position. It will be ok while it reaches at position of maximum water level.
3. Connect power plug of water tank into the socket on right side of main machine. Connect the power wires of main machine with power supply in proper way. Caution:



The power supply of this machine is 380V, 50Hz, three phases. The three power wires of Yellow, Green and Red should be connected with live wires and the Blue wire should be connected with Ground wire.

4. Check all the power cables, connecting plugs and sockets, and make sure everything is fine. Then turn power on and check whether the motor rotating direction is same as the label marked direction on the machine. Adjust the power line wires in case the rotating direction is wrong. Press **Manual** button and **Pump** button, the rotating direction of water pump and magnetic filter should be same as the rotating direction mark.

### 3 Cutting Parameters Setting

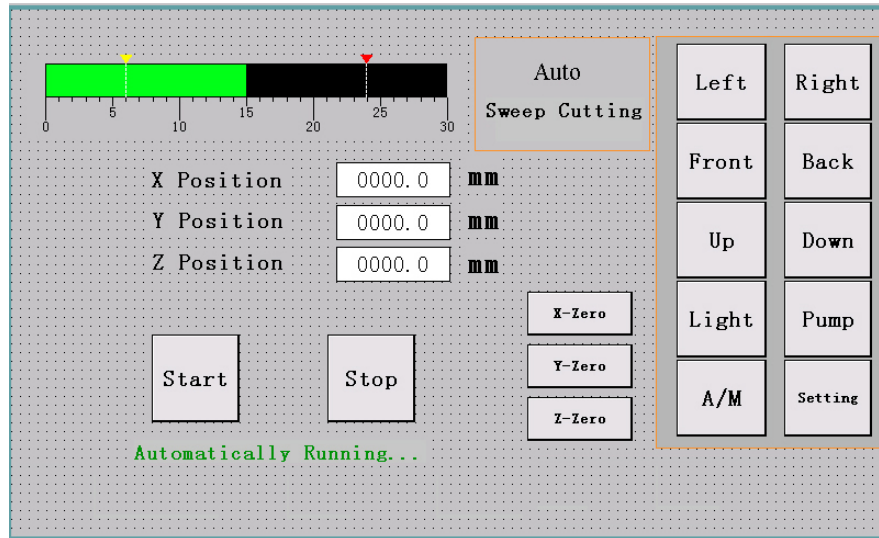


Fig.1 Main interface

Start up the machine and click on **Enter System**. Main interface will be displayed as Fig.1.

#### 3.1 Description of main interface display area

**Cutting disc electric current bar**: It indicates the effective working electric current value of present main motor. The unit is A (Amp).

**X Position**: The X-axis moving distance from the preset Zero position.

**Y Position**: The distance between the Y-axis moving position and the position of front limit switch.

**Z Position**: The distance between the Z-axis moving position and the position of upper limit switch.

**X-Zero**: When machine is under manual state, move work table to the left-most position and click on the button of **X-Zero**. Thus this place will be set as X-axis Zero position.

**Y-Zero**: When machine is under manual state, move cutting arm to the back-most position and click on the button of **Y-Zero**. Thus this place will be set as Y-axis Zero position. The Y-axis Zero position can be set at any places.

**Z-Zero**: When machine is under manual state, move cutting arm to the up-most position and click on the button of **Z-Zero**. Thus this place will be set as Z-axis Zero position. The Z-axis Zero position can be set at any places.

#### 3.2 Description of main interface operating buttons

**A/M**: When machine is under manual or stop state, press this button and it will change to green color, now machine enters into manual working status, press this button again to enter into automatic working status. The Automatic / Manual working status will be displayed in status bar of main interface.

**Pump**: When machine is under manual or stop state, press this button, it will change green and the water pump starts to work.

**Up**: When machine is under manual state, press this button and the cutting arm will move upwards.

**Down**: When machine is under manual state, press this button and the cutting arm will move downwards.

**Left**: When machine is under manual state, press this button and the movable work table will move

leftwards.

**Right:** When machine is under manual state, press this button and the movable work table will move rightwards.

**Front:** When machine is under manual state, press this button and the cutting arm will move forwards.

**Back:** When machine is under manual state, press this button and the cutting arm will move backwards.

**Light:** When machine is under manual or automatic state, press this button and it will change green. Now the lighting lamp is turned on. Press this button again to turn off light.

**Setting:** When it is necessary to change cutting mode and parameters of each axis, press this button and it will enter into parameter setting interface.

### 3.3 Description of system parameter setting buttons

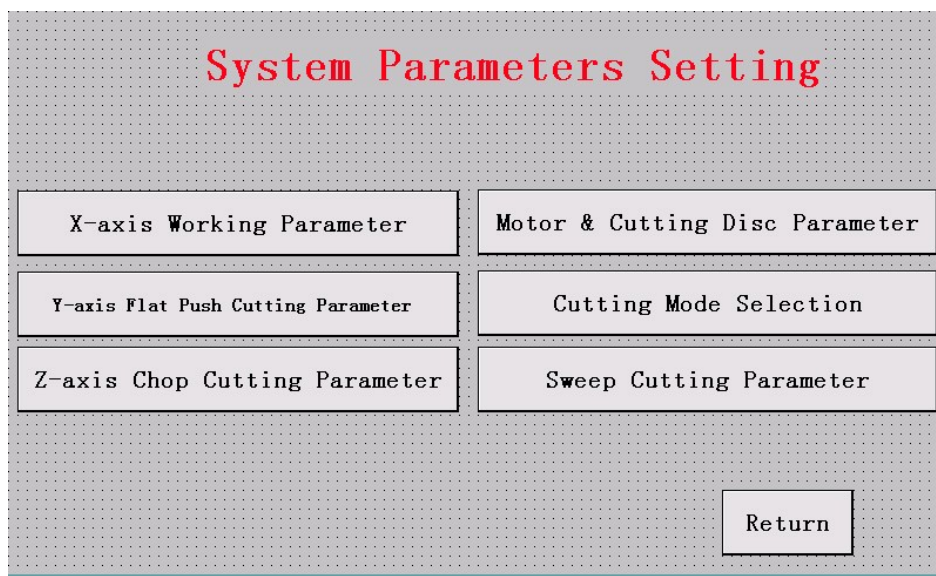


Fig. 2 System Parameters Setting Interface

Press **X-axis Working Parameter** button to adjust the parameters of X-axis.

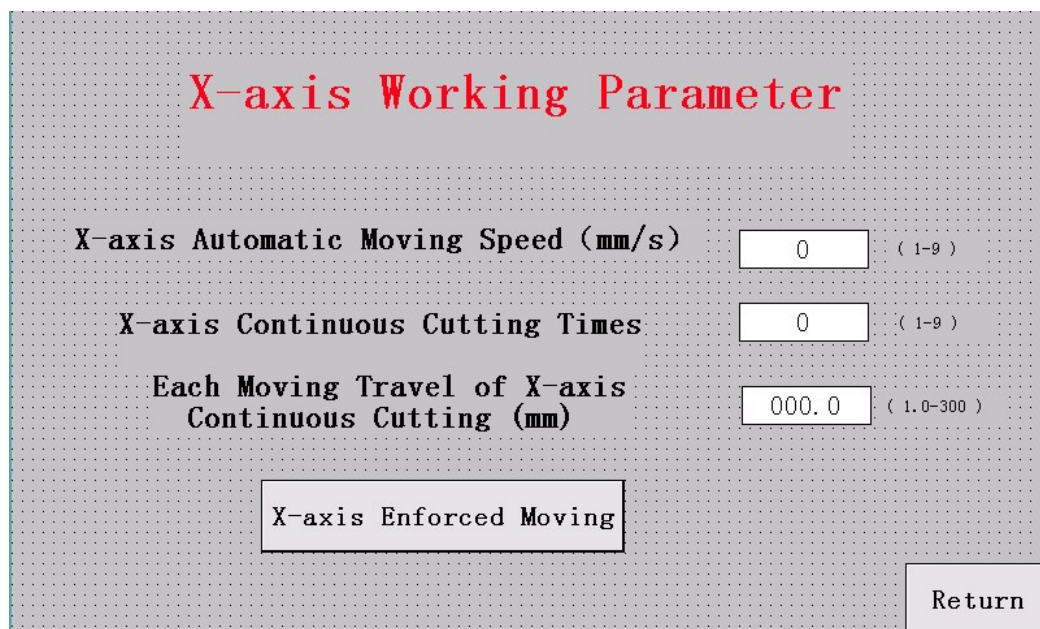


Fig.3 X-axis Working Parameter

**X-axis Automatic Moving Speed (mm/s):** This function is only valid while it is under X-axis automatic moving state.

**X-axis Continuous Cutting Times:** Before automatic running, input the required sample numbers, then the machine will make continuous cutting until the required work is finished. To use this function, it is necessary



to measure the size of specimen in advance and clamp the specimen reliably.

**Each Moving Travel of X-axis Continuous Cutting (mm):** Input the required sample thickness here, pay attention that this thickness also includes the thickness of cutting disc.

**X-axis Enforced Moving:** Click this button to enter into X-axis Enforced Moving interface

Please note that this situation happens only in case of power failure and missing of stored data.

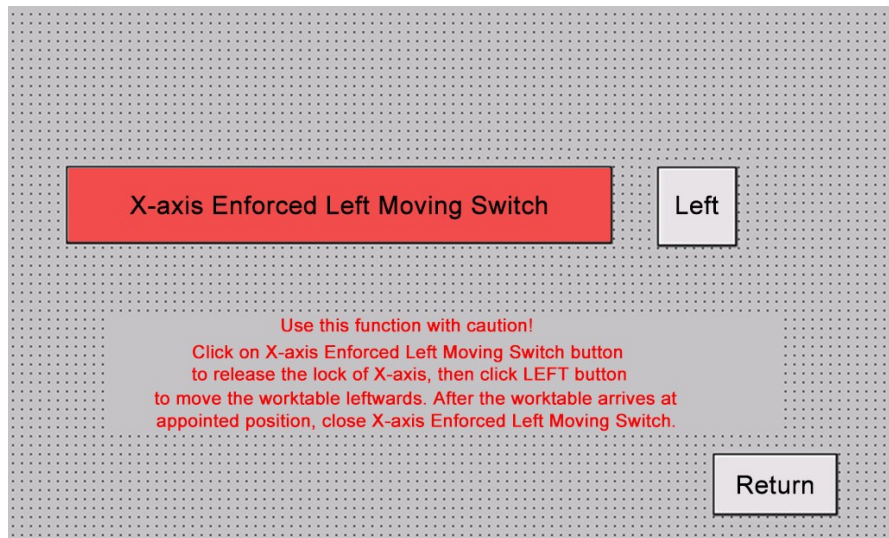


Fig.4 X-axis Enforced Left Moving Switch

Use this function with caution! Click on **X-axis Enforced Left Moving Switch** button to release the lock of X-axis, then click **LEFT** button to move the worktable leftwards. After the worktable arrives at appointed position, close **X-axis Enforced Left Moving Switch**.

Press **Y-axis Push Cutting Parameter** button to adjust the parameters of Y-axis and flat-push type cutting.

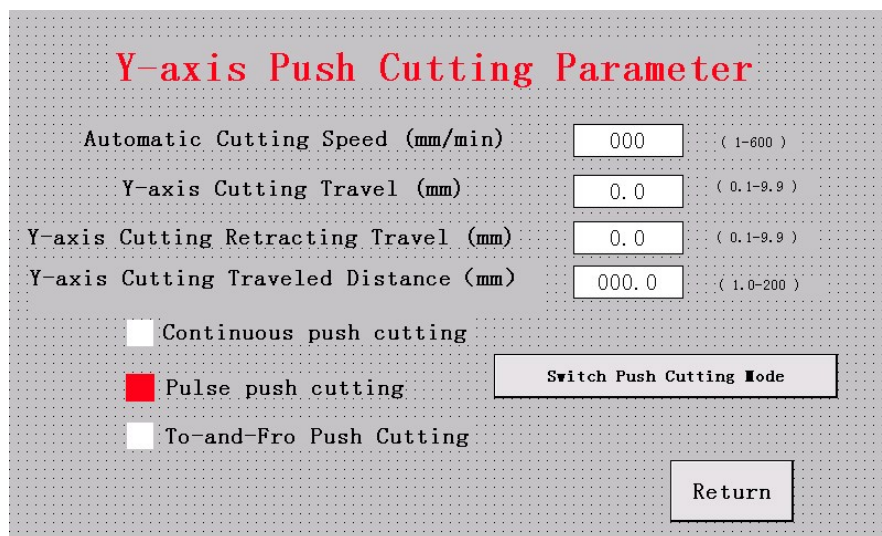


Fig.5 Y-axis Flat Push Cutting Parameter

**Automatic Cutting Speed (mm/min.):** Adjust this value to change the feeding speed of Y-axis from minimum 1 to maximum 600 under automatic state.

**Y-axis Cutting Travel (mm):** Adjust this value to change the unit cutting travel (which will be only valid in pulse push cutting mode and To-and-Fro push cutting mode).

**Y-axis Cutting Retracting Travel (mm):** Adjust this value to change the unit retracting cutting travel (which will be only valid in To-and-Fro cutting mode).

**Y-axis Cutting Traveled Distance (mm):** The total travel of Y-axis.

Press **Z-axis Chop Cutting Parameter** button to adjust the parameters of Z-axis motor and chop type cutting.

## Z-axis Chop Cutting Parameter

Automatic Cutting Speed(mm/min)	000	( 1-600 )
Z-axis Cutting Travel(mm)	0.0	( 0.1-9.9 )
Z-axis Cutting Retracting Travel(mm)	0.0	( 0.1-9.9 )
Z-axis Cutting Traveled Distance (mm)	000.0	( 1.0-240 )

☐ Continuous Chop Cutting

☒ Pulse Chop Cutting

☐ To-and-Fro Chop Cutting

Switch Chop Cutting Mode

Return

Fig.6 Z-axis Chop Cutting Parameter

**Automatic Cutting Speed (mm/min.):** Adjust this value to change the feeding speed of Z-axis from minimum 1 to maximum 600 under automatic state.

**Z-axis Cutting Travel (mm):** Adjust this value to change the unit cutting travel (which will be only valid in Pulse chop cutting mode and To-and-Fro chop cutting mode).

**Z-axis Cutting Retracting Travel (mm):** Adjust this value to change the unit retracting cutting travel (which will be only valid in To-and-Fro chop cutting mode).

**Z-axis Cutting Traveled Distance (mm):** The total travel of Z-axis.

**Switch Chop Cutting Mode:** This button is used to switch between three kinds of chop cutting modes at will.

Press Motor & Cutting Disc Parameter button to enter into the interface of motor and cutting disc parameter setting.

## Motor & Cutting Disc Parameter

Normal Rotating Speed (Output)

0000

(0-2300)

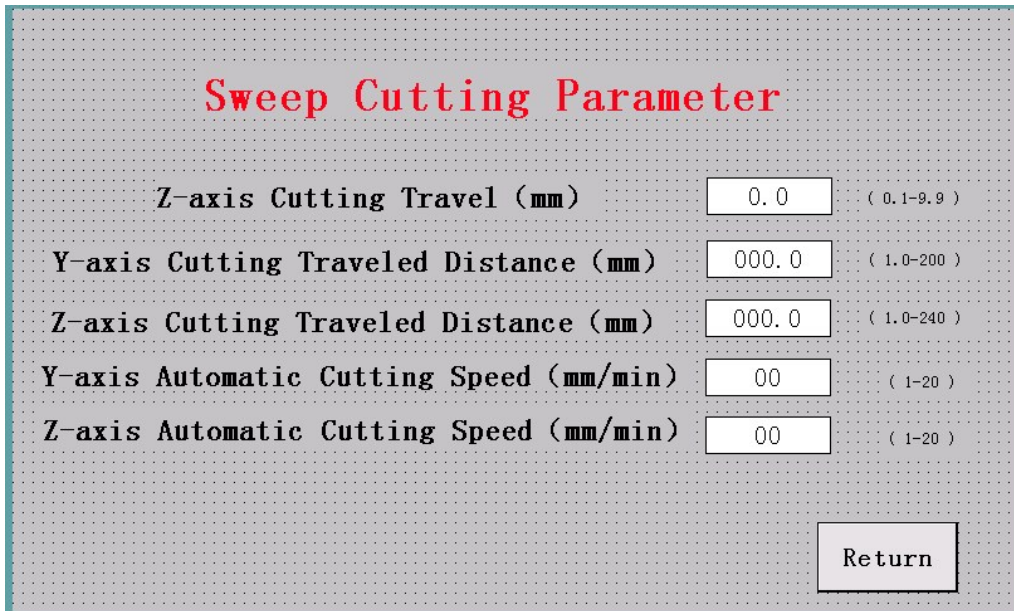
Recommended rotating speed 1600-2300 rpm

Return

Fig. 7 Motor & Cutting Disc Parameter Interface

- Normal Rotating Speed (Output): Adjust this value to change the rotating speed of main shaft motor. The maximum speed is 2300 rpm. It is recommended to set the rotating speed at 1600~2300 rpm. Long time low speed running of motor will lead to damage of motor easily.
- Press Sweep Cutting Parameter button to enter into the interface of Sweep cutting parameter setting. Sweep cutting is a kind of linkage work of Y-axis and Z-axis. Thus this setting has much resemblance to Y-axis and Z-axis parameter settings.





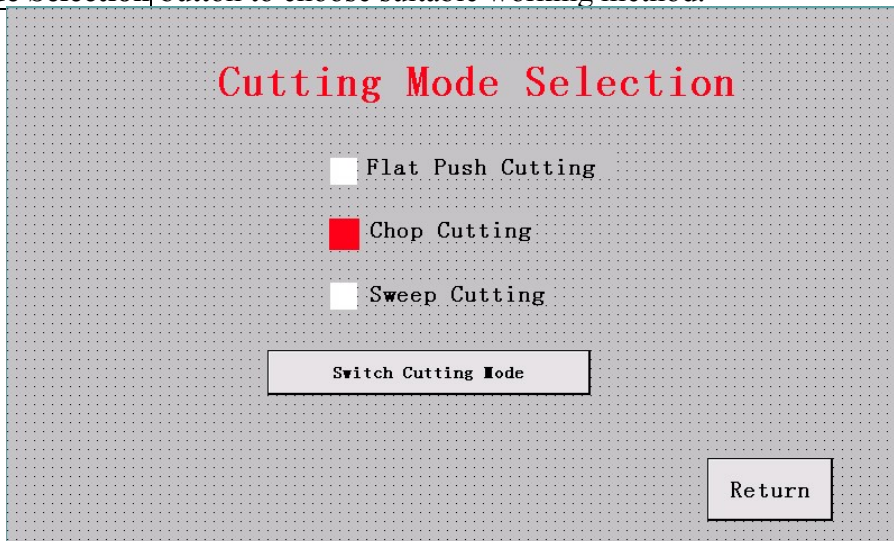
**Sweep Cutting Parameter**

Z-axis Cutting Travel (mm)	<input type="text" value="0.0"/>	( 0.1-9.9 )
Y-axis Cutting Traveled Distance (mm)	<input type="text" value="000.0"/>	( 1.0-200 )
Z-axis Cutting Traveled Distance (mm)	<input type="text" value="000.0"/>	( 1.0-240 )
Y-axis Automatic Cutting Speed (mm/min)	<input type="text" value="00"/>	( 1-20 )
Z-axis Automatic Cutting Speed (mm/min)	<input type="text" value="00"/>	( 1-20 )

Fig. 8 Sweep Cutting Parameter Interface

- **Z-axis Cutting Travel (mm):** Adjust this value to change the unit cutting travel in Z-axis direction.
- **Y-axis Cutting Traveled Distance (mm):** The total travel of Y-axis.
- **Z-axis Cutting Traveled Distance (mm):** The total travel of Z-axis.
- **Y-axis Automatic Cutting Speed (mm/min.):** This value is linked and related to the feeding speed of Y-axis parameters.
- **Z-axis Automatic Cutting Speed (mm/min.):** This value is linked and related to the feeding speed of Z-axis parameters.

Press  button to choose suitable working method.



**Cutting Mode Selection**

☐ Flat Push Cutting  
☒ Chop Cutting  
☐ Sweep Cutting

Fig. 9 Cutting Mode Selection Interface

## 4 Installing and Dismantling of Cutting Disc

1. Open the machine cover as per the marked direction on it, remove the left-hand fixing nut on the end of main shaft with the spanner delivered with machine. Then the clamping plate and cutting disc can be taken down.
2. Put cutting disc and clamping plate on to the main shaft and tighten the fixing nut with spanner. Rotate the main shaft for several cycles to check whether the cutting disc swings on both sides. The swing of cutting disc can not be more than 2mm. If it is more than 2mm, check the reason and remount the cutting disc properly.

## 5 Clamping of Specimen

It is important guarantee of reliable and safe work to clamp the specimen in proper way. When clamping, put the specimen on clamping vice and then tighten it by locking the handle. Push or rotate the specimen with hand to check whether the specimen is fixed tightly. If not, it will be necessary to re-clamp the specimen. The front and back position of clamping vices can also be adjusted as per the size of specimen.

## 6 Specimen Cutting

- Place specimen on the surface of worktable, press **Left** or **Right** button to adjust it leftwards or rightwards until it reaches at the appropriate place.
- Select proper cutting mode from parameter setting interface.
- Press **Start** button from system working interface and then it will enter into automatic working process.
- The cutting speed is different according to different specimen materials. Generally for steel material, it is recommended to set the cutting speed at 1-9mm/min., and the larger the size of specimen is, the lower the speed should be. The most frequently used cutting speed for steel material is 3-6mm/min.
- Use special cutting disc to cut aluminum alloy material, generally the speed should be 1-20mm/min. The larger the size of specimen is, the lower the speed should be.
- Use special cutting disc to cut wood material, generally the speed should be 50-600mm/min. The larger the size of specimen is, the lower the speed should be.

## 7 Maintenance and safety notice

- Connect the power wires of machine in proper way and make sure the machine is grounded reliably.
- Check the level of cooling liquid in the water tank regularly. Fill in cooling liquid in time in case of shortage.
- Inlet and outlet pipes should be smooth for water flowing without leakage.
- It is not allowed to use cracked or torn cutting disc for specimen cutting work.
- It is not allowed to use the cutting disc with linear speed less than 35m/s for specimen cutting work.
- Clean the filter of water tank often (at least once a week). According to actual using situation, it is necessary to clean the water tank once a month and change the cooling liquid as well.
- Clean the machine in time at the end of cutting work of everyday. Apply antirust oil or grease on the places like clamping vices and worktable etc.
- Should any abnormal noise be heard, stop the machine immediately and carry out full inspection.

## 8 Wearing Parts List

No.	Description	Specification
1	Deep Groove Ball Bearing	36207
2	Deep Groove Ball Bearing	36203
3	Cutting disc inner ring	
4	Protective sleeve	
5	Ribbed belt	10PL1700

# 9 Structure Diagram

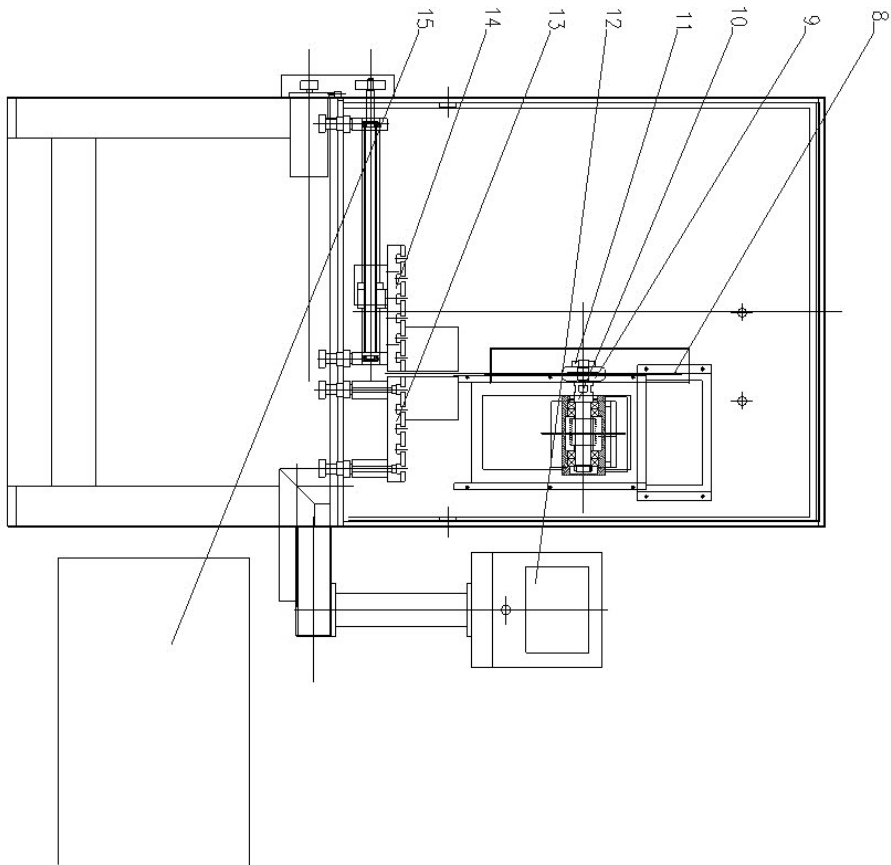
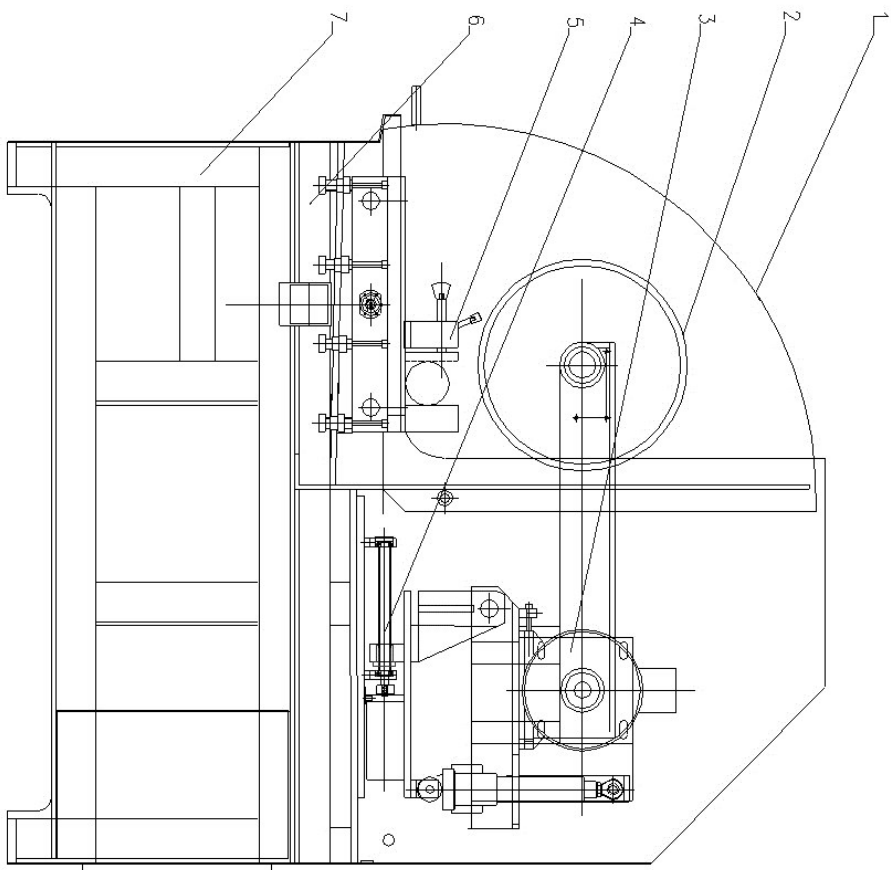


Fig.10 Structure Diagram

- 1. Machine shield 2. Cutting disc guard 3. Power components 4. Moving components 5. Clamping vices
- 6. Machine body head 7. Machine body 8. Cutting disc 9. Clamping plate 10. Main shaft 11. Fixing nut
- 12. Control panel 13. Fixed worktable 14. Movable worktable 15. Dust cleaning component

# 10 Electrical Diagram

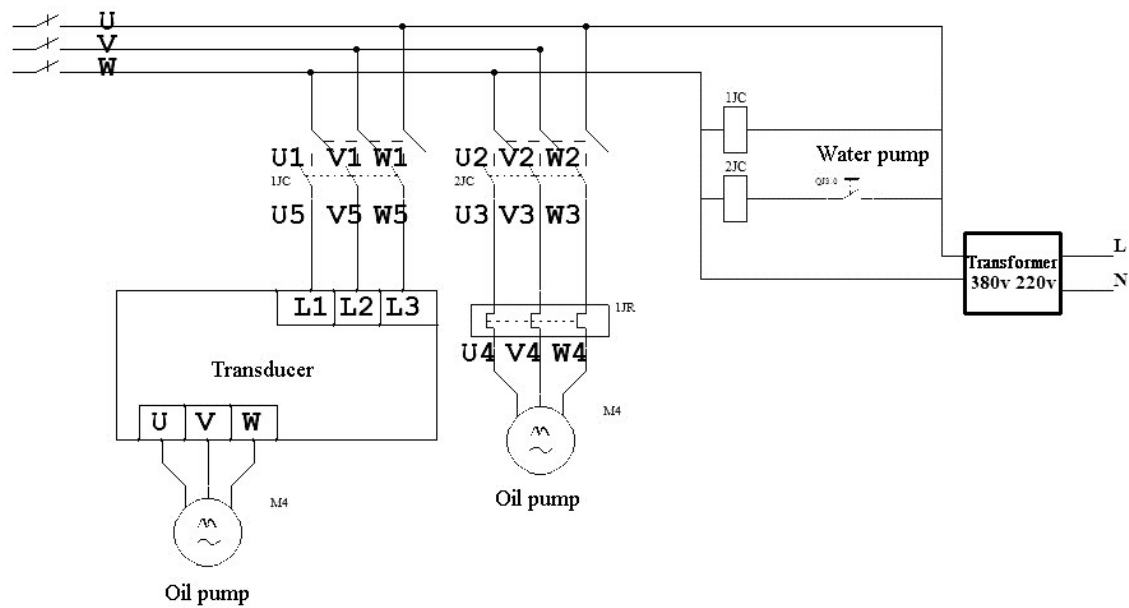
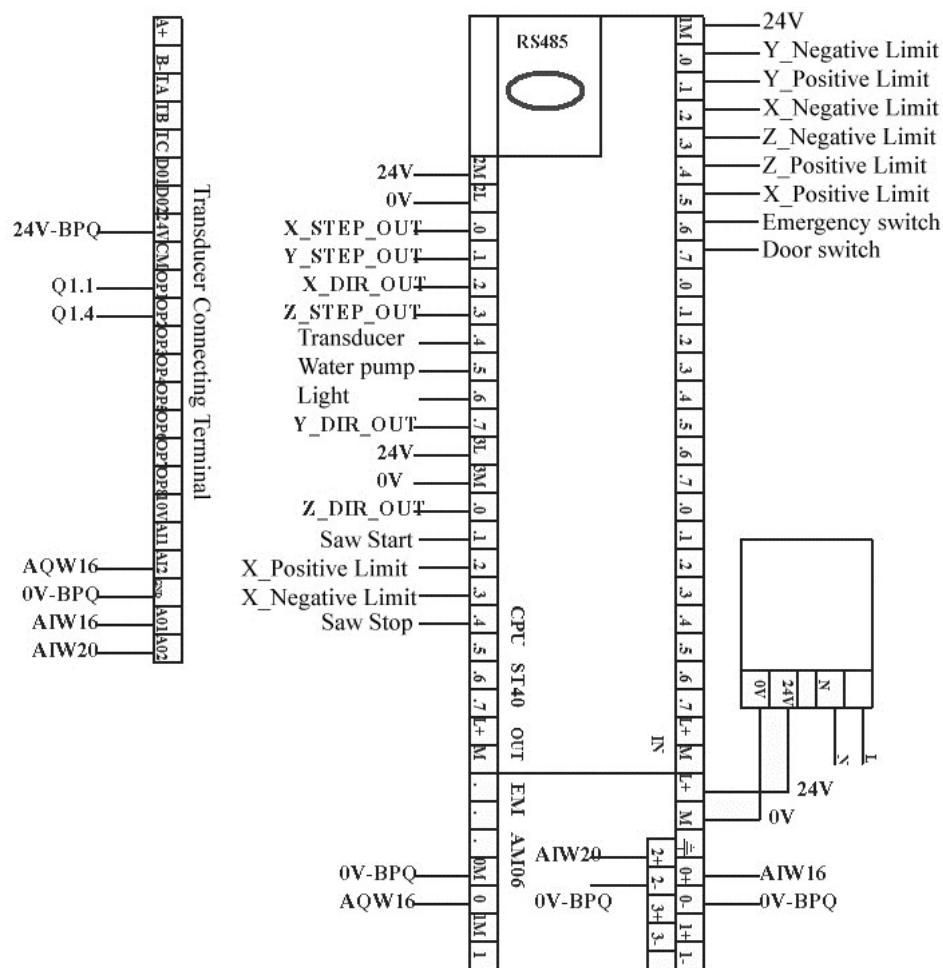


Fig.11 Electric Diagram (1)



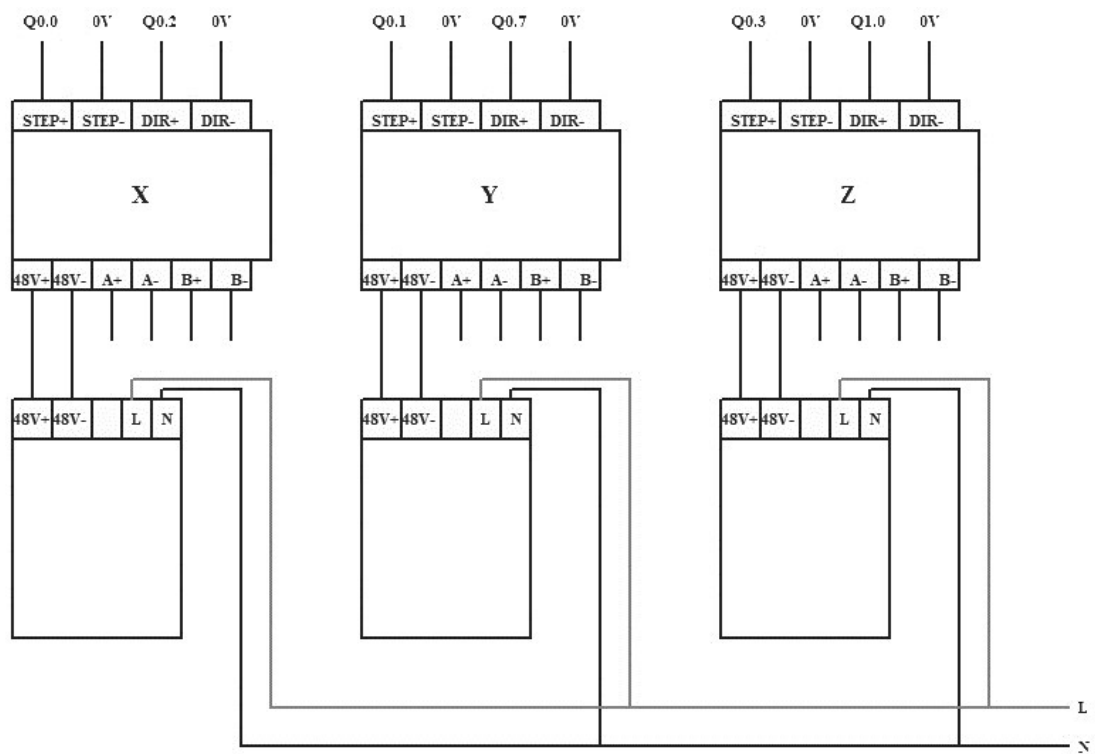


Fig. 13 Electric Diagram (3)

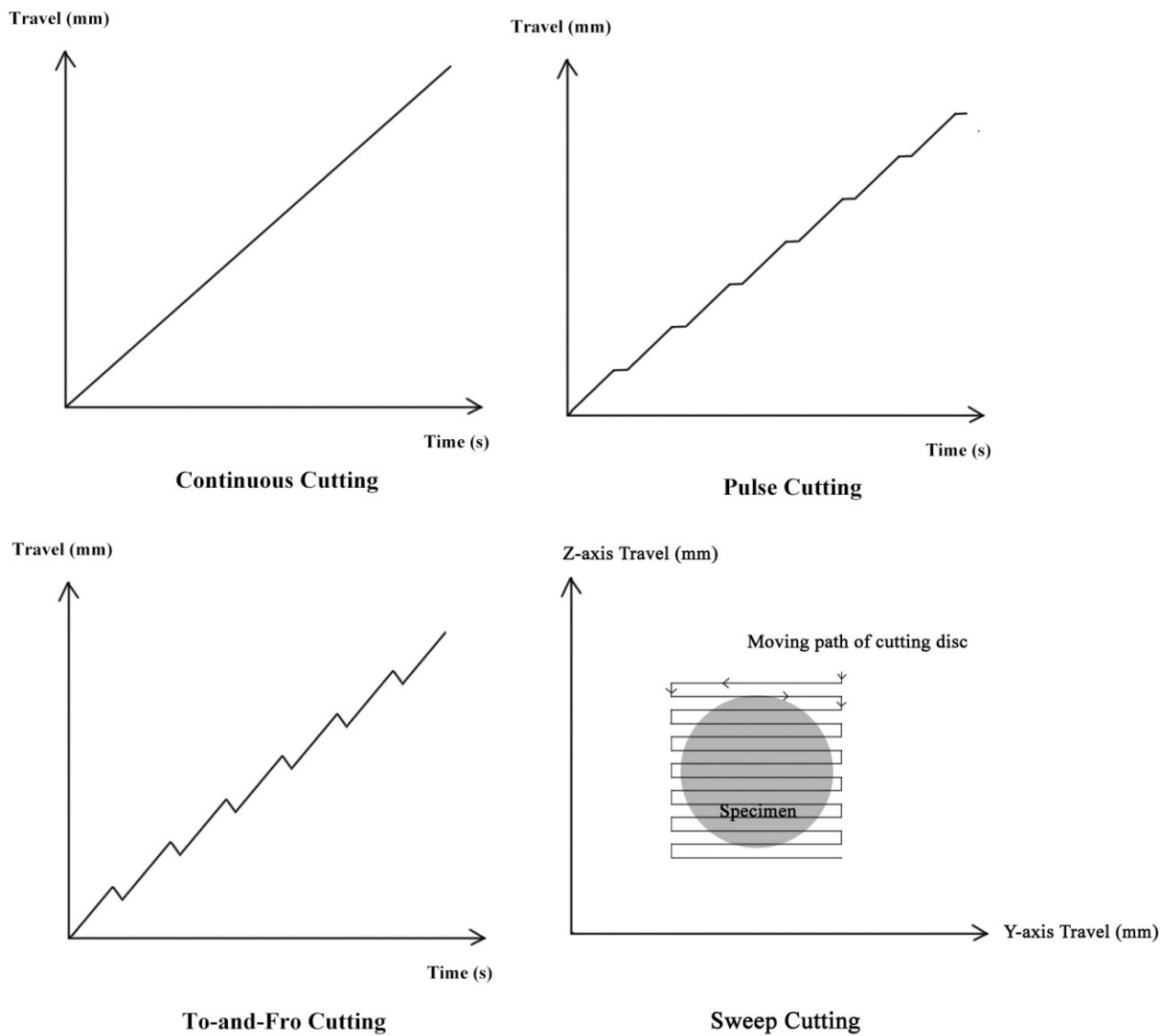


Fig. 14 Cutting Mode Diagram