EDM Punching Machine MB-2000C
Operation Manual

Honesty Deserves Sincerity

Behavior Before Work

Luoyang Xincheng Precision Machinery Co., Ltd

ADD: No.256, Tanggong East Road, Luoyang, China

ZIP CODE: 471002

TEL:+86-0379-63512276

FAX: +86-0379-69960770

EMAIL: tapremover@lyxc.com

Website: www.brokentapremover.com

Introduction

The MB-2000C EDM punching machine utilizes the principle of electric erosion to melt and corrode the metal section by generating electric sparks to achieve the purpose of perforating on the metal workpiece.The device using brass electrode tube as a tool electrode,using high-pressure water to cool and slag the processing point and it can process a deep hole between Φ0.5 and Φ3.0 mm on a metal workpiece of any size and shape.It can also be used to remove the broken drills, taps, etc., without damaging the original hole threads.

The device adopts a mobile chassis design, which is convenient for mobile use; a modular integrated circuit system is integrated in the chassis, thereby greatly reducing the volume of the original large-scale equipment; the touch screen control is simpler, convenient to use, stable and reliable;The portable magnetic base can be conveniently placed and fixed at any position of the workpiece for a variety of working conditions. It can be directly inserted into the hole from the inclined surface, curved surface and tapered surface, so that the perforating machine of this model can be applied more widely.

Product Information

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Packing List

No.	Item Name	Specification	Unit	Qty	Remark
1	Power Box	MB-2000C	Set	1	
2	Work Head	JT-300	Set	1	
3	High Pressure Water Pump System	QTZ-310	Set	1	
4	Magnetic Base	400kg	Set	1	
5	Servo Wire	14 pins，2.5m long	Pcs	1	
6	High Frequency Wire	2×4 mm²×2.5m	Pcs	1	
7	Allen Wrench	4&6mm	Pcs	1	
8	Open-end Wrench	14-17mm	Pcs	1	
9	Drill Chuck Key		Pcs	1	
10	Seal Ring	UN20×10×5mm	Pcs	2	
11	Waterstop	Φ8	Pcs	20	
12	Hand Wheel	Φ8×50	Pcs	1	
13	Guiding Device	With upper and lower plate	Set	1	With screws
14	Guider	Φ1mm	Pcs	1	Ruby
15	Guider	Φ2mm & Φ3mm	Pcs	1	Brass
16	Electrode	Φ1×500mm	Pcs	10	
17	Electrode	Φ2×500mm	Pcs	10	
18	Electrode	Φ3×500mm	Pcs	10	
19	Test piece	Φ18×60mm	Pcs	1	With test report

Customer Service

With company spirit High Quality, Excellent Service, Striving for Development and company concept "Quality Product, Competitive Price, Considerate Service" , we promise you responsibly and publicly:

1.Warranty Terms

1. The warranty period is one year and within this time frame, if there are any technical problems, we would repair them for free including the new parts that needed for repair;

2. The warranty period for wearing parts like water pump are not under warranty;

3. The purchasing date is the invoice date (If the customer didn't have invoice, refers to the purchasing date).

4. If the machine models is no longer produced, we only do functional repairing. Please kindly read the operation manual before using.

2.Warranty Void Cases

1. The faults caused by improper use;

2. The damage caused by improper storage or natural disasters;

3. Without the consent of our company, the customers disassemble, repair and modify the product.

3. After-sales Service Promise

Service Purpose: Serve customer, satisfy customer, perfect technology.

Service Goal: Win customers' satisfaction by service and quality.

Note: The company reserves the right to final explanation on customer service.

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Catalog

Ⅰ. Device Parameters

1. Technical Parameters

Power Box Input Voltage (V)	AC220V　50Hz
Input Power (W)	1500
Water Pump Input Voltage (V)	AC220V　50Hz
Maximum Processing Depth (mm)	300（Φ1）
Electrode Diameter(mm)	0.3-3
Max Travel of Working Head(mm)	300
Manual Travel (mm)	300
Machine Size(mm)	L540×W275×H500（22kg）
Work Head Size(mm)	L375×W155×H690（23kg）
Water Pump Size(mm)	L600×W300×H460（20kg）
Rough Weight (kg)	75

2. Machining Parameters

Machining diameter	Voltage	Electricity	Mpa	Working Speed
Φ0.5mm	12V	5A	8-9Mpa	10.64 mm/min
Φ1mm	25V	20A	7-8Mpa	20.66 mm/min
Φ2mm	25V	26A	5-7Mpa	21.74 mm/min
Φ3mm	25V	20A	3-5Mpa	3.14 mm/min

This is a recommended table for common material processing parameters. In actual use, due to different processing materials, the feed and current knobs on the operation panel can be adjusted to keep the ammeter and voltmeter at the maximum stable value of the current machining, so that the equipment enters the optimal working state.

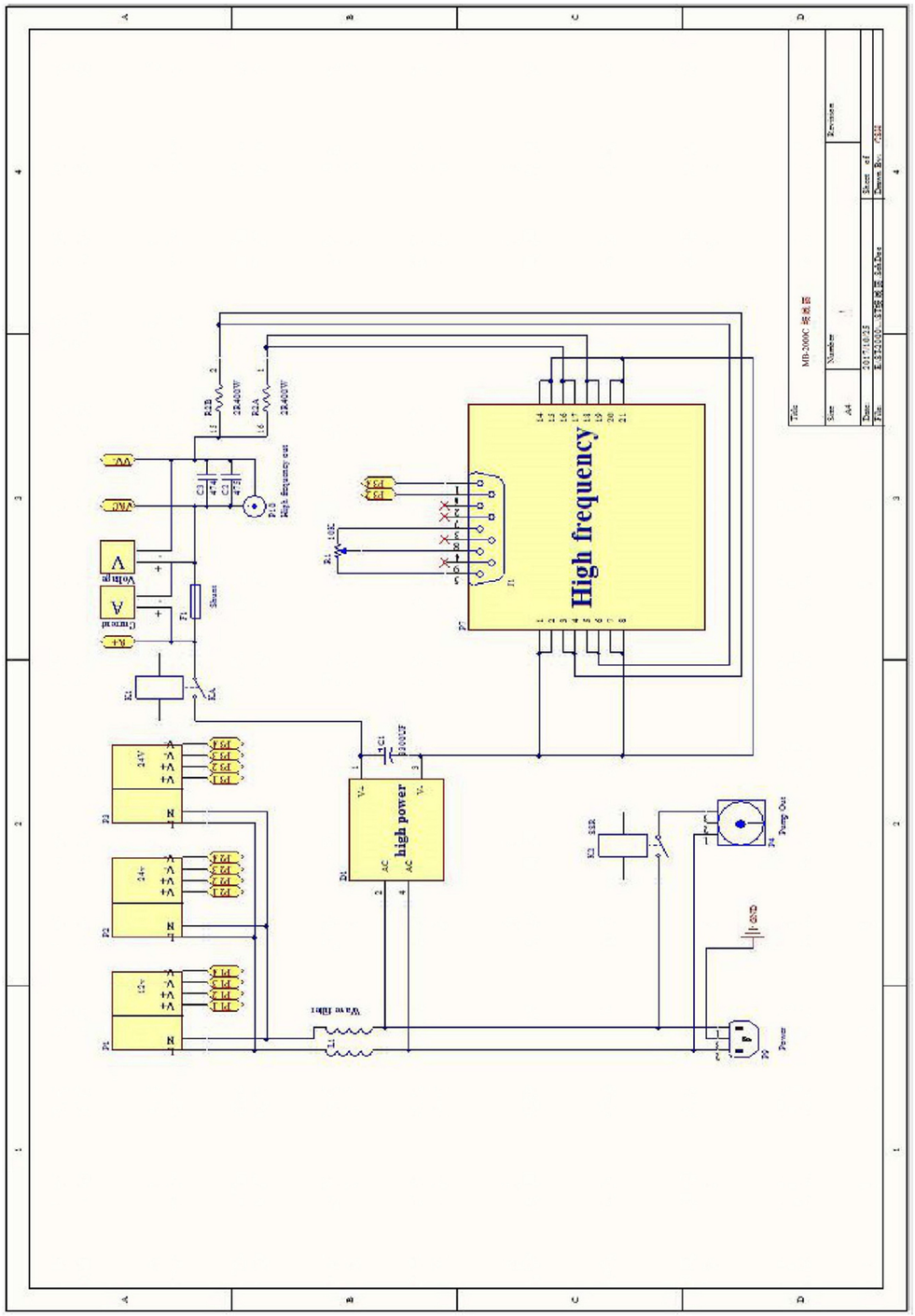

Figure 6　Equipment Electrical Schematic

(6)Normal working state: The discharged working fluid is black, evenly spread, and at the same time emits a "beep" sound. The pulse width is adjusted according to the parameter table so that the current meter indicates a predetermined parameter, and the feed is adjusted so that the voltmeter is indicated at about 25V, and is stable. The working fluid system pressure is stable and the spindle does not have a large distance back.

(7)When the spark is flashed at the lower end of the workpiece or the working fluid is sprayed out, it indicates that the workpiece has been pierced. At this time, the electrode can be further processed for 1-2 minutes to completely penetrate the electrode. If the processing is unstable, the rotation can be turned off. After processing, close "one-button start", the work head will automatically roll back. When the electrode leaves the workpiece, press the "Pause" button to remove the workpiece.

(8)If the machining depth is too deep and the electrode is consumed, and a new electrode needs to be replaced, first turn off the "one-button start", and the spindle will automatically retract (presse the "quick" button to make the spindle rise quickly). After raising, press the "pause" button and replace the new electrode. After the replacement, you can continue the processing according to the previous steps.

(9)If the machining current is unstable when the deep hole is machined and the speed is obviously slowed down, the power switch can be temporarily turned off to retract the spindle for a certain distance, and the residue in the hole is removed before processing continues.

Ⅶ. Electrical Schematic

The main power box includes pulse power supply, servo control, electrical and other parts. According to the assembly layout, there are five main parts: highfrequency power supply, control power supply, control board, power resistor nd touch screen switch. The electrical principle of the device is shown in Figure 6.

3.Consumable Models

Name	Specifications, Models
Brass electrode	Ø1.0×500mm
	Ø2.0×500mm
	Ø3.0×500mm
Sealing Ring	20×10×5mm
Waterstop	Mounting Diameter Ø8mm
Synchronous Belt	B132MXL

Ⅱ. Structure of the Equipment

1. General Layout

This equipment consists of the power box, work head and the high pressure water system (as shown in fig. 1).

(1) Power box: It is conveniently supported by 4 casters, equipped with pulse power supply, spindle servo system and other electrical equipment.

(2) Work Head： Mounted on the magnetic base, it is the main component of the up and down movement of the electrode during processing.

(3) High pressure water system: It consists of high pressure water pump, high pressure water pipe and water tank. The water pump and the water tank are installed in one body for easy movement.

Figure 1　Overall Layout

1. Power Box　　2. Work Head　　3. High Pressure Water System

2.Power Box Structure

Figure 2　　Power Box Structure

Ⅵ. Processing Example Operation Introduction

1. Preparation Work

(1) Assemble the equipment according to the operating instruction.

(2) Select the corresponding electrode and guide, then install the sealing ring into the rotary head drill chuck, connecting handle into the rotating spindle. Install the electrode through the seal ring to a length of about 30mm (moderate force, do not loosen the electrode), adjust spindle to the lower limit, after the pause, adjusting the electrode coaxial with the guide and tightening the guide. Finally, fix the position of the workpiece and the magnetic base so that the workpiece approaches the guide by a distance of about 2 mm.

(3) Release all buttons to return the device to its default state and re-install the electrodes to a suitable length.

(4) Select the processing parameters according to the table.

2. Processing

(1) The sample block is a square thickness of 10 mm, the material is 45# hardened steel, and the electrode diameter is Φ1 mm.

(2) Open the air switch on the back panel of the device, all the fans in the chassis will rotate. At this time, the rotary head will automatically retract to the uppermost initial position, operate the touch screen to enter the manual interface.

(3) Start the pump and check if there is water passing through the electrode.

(4) Press the “tool setting” button on the board and then spidle is going down. When the electrode touches the workpiece and the work head up and down, the tool setting is finished, close the “tool setting” button and open the “pause” button. The operation of the power box is finished

(5) Operate the work head and press the “one-button start”, Close the pause button, the work head is lowered, and the workpiece is processed. (Note: During the machining process, the electrode rotary bustton can be started and stopped on the manual interface as needed, and the start-stop process will cause short-term instability in processing).

Ⅴ. Failures and Solutions

Failures	Failure Reasons and Solutions
The work head does not work	1. The servo line of the work head is not connected. Check for rewiring. 2. The work head is overheated. Continue processing after cooling. 3. The magnetic base pause switch is turned on. Turn off the pause switch. 4. The servo controller is faulty. Contact our company for repair.
When the electrode touch the work piece. There is no electirc spark	The high frequency power cable connection is faulty. Check for rewiring. 1.The workpiece or electrode has an insulating layer. After the insulation layer is removed, it is processed. 2.The electrode is short-circuited by sintering. Rework after retracting the machine head.
Unstable processing Ammeter swings back and forth	1.Processing parameters are not suitable. Readjust the machining parameters. 2.2The workpiece or electrode is not clamped. Re-clamp after fixing. 3.The workpiece is too far from the guide and the electrode is off center. Reposition the workpiece to avoid the electrode being off center. 4.4The electrode is not straight, and the circumference is swung a large amount when rotating. Adjust and replace the new electrode to maintain the straightness of the electrode during processing. 5. The rotating head carbon brush is excessively worn and has poor contact. Continue processing after replacing the new carbon brush.
Electrode does not produce water	1. Excessive machining current causes the electrode to sinter. Reduce the current, rework after retracting the machine head. 2. The center hole of the electrode is blocked. Remove the cleaning or replace the new one. 3. The pump is faulty. Check that the maintenance pump is working properly.
Rotating head does not turn	1. Control line failure. Check for rewiring. 2. The drive motor is faulty. Check and repair the drive motor. 3. The belt is excessively worn. Replace the new conveyor belt. 4. The inside of the rotating head is stuck by debris. Maintenance and cleaning up.

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1.Voltmeter: Indicates the voltage value between the electrode and the workpiece.
2.Ammeter: Indicates the current value between the electrode and the workpiece.
3.Power indication: Total power supply indication.
4.Work instructions: Lights up when the high frequency power is turned on and off when turned off.
5.Touch screen: The device control is divided into four interfaces.
(1)Initial interface: Simple explanation and use instructions details interface.
(2)Automatic interface: display high temperature alarm, one-button start, pause. When press the “one-button start”, the pump starts, the rotary motor runs, and the 1S high-frequency power supply delays the spindle to lower the contact with the workpiece to start machining.
(3)Manual interface: high temperature alarm, water pump, tool setting, pause, high frequency power supply, rotation. One-button operation, each button presses the corresponding device to run. Tool setting with the high frequency power supply, when both buttons are turned on at the same time, they will be turned off at the same time.
6.Fast button: press the button, the speed of work head is increased.
7.Pulse width adjustment: adjust the pulse width of high-frequency discharge, adjust the current.
8.Feed adjustment: used to adjust the servo machining gap.
9.Tool setting: Indicates the working condition of the tool setting. When the electrode is not in contact with the workpiece, the sound and light alarm is gentle, and the alarm is urgent when contacting the workpiece.
10.Main power switch: Main power switch with short circuit protection.
11.Pump output: The power output interface of the high pressure water pump.
12.Main power input: Main power supply with ground input, AC 220V 16A.
13.Servo output: The spindle control output is connected to the work head by the servo wire.
14.High frequency power supply positive: the red end (+) of the high frequency power supply line is connected to this pole
15.High-frequency power supply negative: the blue end (-) of the high-frequency power line is connected to this pole.

3.Work Head Structure

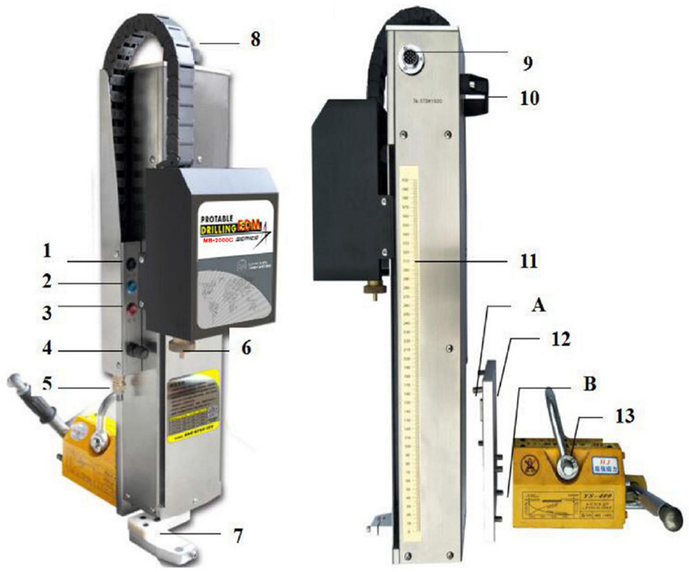

Figure 3　Work Head Structure

1.Fast button: Parallel with the power box fast button, the same function can be used interactively.

2.One-button start: same as "One-button start" on the touch screen, can be used interactively

3.Pause button: same as "Pause" on the touch screen, can be used interactively.

4.High-frequency power supply negative: Connected to the negative pole of the chassis high-frequency power supply.

5.High-pressure inlet pipe: The quick-connect interface is connected to the pump outlet

6.Drill chuck connection handle and nut: The connection drill chuck and rotary spindle are connected at the factory.

7.Guiding device: Install the Guide apparatus to ensure the machining accuracy of the electrode.

8.Handwheel: The height of the spindle can be adjusted manually without powering up.

9.Servo input: servo control input, connected to the power box servo output

10.Handle: easy to carry the work head

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2. Maintenance

(1) Precise electronic components are installed in the machine, please avoid bumps during handling. After the work is finished, the main power supply should be cut off, and the equipment should be cleaned up and properly stored.

(2) The screw and slide parts in the work head should be lubricated regularly to ensure that the work head works normally.

(3) If the working fluid system enters the air, it will affect the normal processing. The working fluid must be guaranteed to be sufficient and uninterrupted. After use, drain the working fluid in the pump and pipeline to avoid blockage of impurities. After using the filter for a period of time, clean or replace the filter element to avoid corrosive media.

(4) If a motor occurs, the line is faulty, and should be repaired by a professional.

3. Use tips

(1) The inside of the work head is a screw guide rail structure, which can accurately ensure the smooth running of the line slider. A travel switch is arranged at the upper and lower positions of the work head. When the work head automatically rises to the upper limit position and the default state is started, it automatically stops. When the work head moves to the lower limit position during tool setting or machining, it will automatically stop or retract.

(2) The electrical conductivity of the workpiece and the clamping of the electrode have a great influence on the processing efficiency. Therefore, the rust oxide layer on the surface of the workpiece is cleaned before processing to maintain the electrical conductivity of the workpiece. At the same time, the position of the alligator clip is based on the principle of proximity, reducing the line power loss.

(3) When installing the electrode, be careful not to bend the electrode, and do not have excessive circumferential oscillation when rotating. When machining, the coaxiality of the guide and the drill chuck should be adjusted to ensure the coaxiality of the electrode during deep hole processing, so as to reduce the side discharge of the electrode and improve the processing efficiency.

(4) Select appropriate machining current according to the processing material and processing depth during processing to maintain the normal consumption of the electrode. And adjust the pump pressure to about 7-9Mpa, in special circumstances to adjust the water pressure according to the actual processing, to maintain normal discharge.

(4) Turn on the rotary, water pump, high frequency power supply and then close the pause to start processing. You can also click the touch screen to enter the “automatic interface”, open “one button start”, close “pause” when the electrode contacts the workpiece to start processing, adjust according to the size of the electrode. The feed and pulse widths allow the voltage and current to reach the optimum parameters for proper processing.

(5) Quick button use: The fast lifting process can be used for the lifting process that is not in the process state.

(6) At the same time, you can also operate a key on the work head to start, pause, and quickly press the button. Same function as the chassis buttons.

(7) After the processing is completed, turn off the “one button start”, the work head runs to the appropriate position and press the pause. Do not lift the work head to the upper and lower limit positions to avoid the mechanical fatigue of the limit switch, and then turn off the main power.

Ⅳ.Matters need attention

1. Use environment

(1) The ambient temperature of the place of use should be between 10℃and 30℃. Try to avoid the temperature being too high or too low.

(2) Pay attention to waterproof to avoid corrosive substances damage to the circuit board and operation panel.

(3) Avoid using the machine in places with excessive dust. After use, it should be properly stored to avoid the intrusion of debris and affect the use.

(4) Due to the hollow electrode used in the machine, the internal hollow diameter is too small. When using the working fluid, the filter should be installed to avoid the inclusion of impurities in the working fluid to block the electrode.

(5) Take anti-seismic measures when using. It is forbidden to move the main box, main head and high-pressure water pump in the processing state.

(6) Use distilled water or tap water for the working fluid. Do not use kerosene, cutting fluid or anti-rust liquid.

(7) It is normal for the water leakage of the rotating head to leak slightly. When the water leakage is serious, the upper high pressure sealing ring of the rotating head needs to be replaced.

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11. Ruler: reference for spindle lifting position and machining depth.

12. Connecting plate: As shown in Figure 3, the four screws on the B side are connected to the magnetic base, and the four screws on the A side are connected to the body to complete the head assembly.

13. Magnetic base: It has switch control and can be attached to any flat iron workpiece.

4.High Pressure Water System

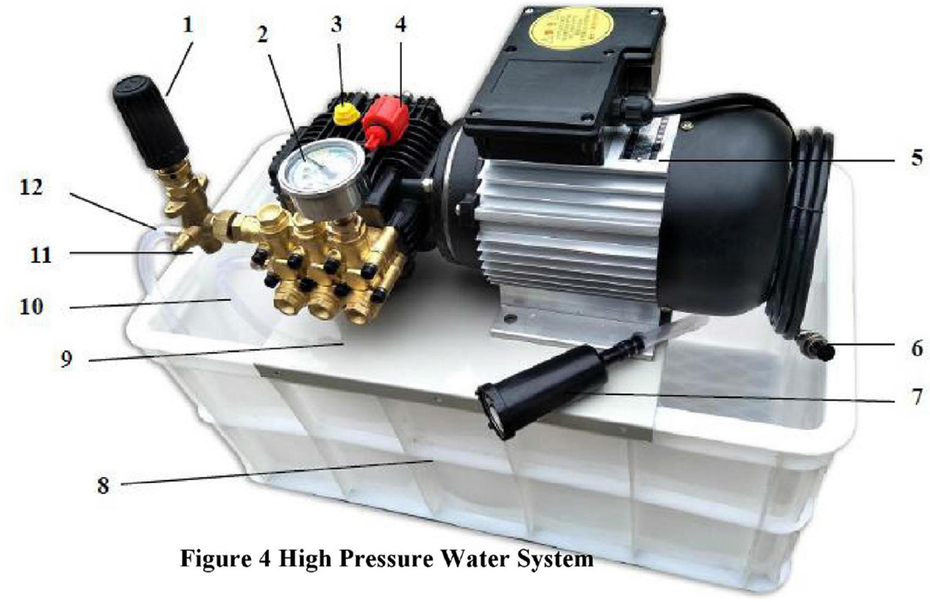

Figure 4 High Pressure Water System

1. Pressure regulating valve: adjust the output pressure of the water pump, and increase the clockwise pressure and vice versa.

2. Pressure gauge: shows the output water pressure.

3. Oil hole: When running, replace the yellow plug with red 4 and check if the high pressure pump oil is sufficient.

4.The lubricating oil is oil No. 10 or No. 20.

5. Pump body: pump motor, pay attention to waterproof.

6. Pump power cord: Connect to the power box pump output.

7. Filter: Connect to the water inlet (10) through a water pipe.

8. Water tank: Only tap water and distilled water can be used.
9. Pump bottom plate: Connect the water pump and water tank, and fix it firmly when using.
11. High pressure water outlet: The output is connected to the high pressure water pipe to the machine head.
12. Overflow: Connect a water pipe without a strainer.

Ⅲ.Equipment operation instructions

1. Installation steps

(1) Assemble the work head parts: Install the magnetic base, adjust the position of the base and the body as needed, and lock; install high-pressure water pipes, guide parts, guides matched with the electrodes.
(2) Assemble the high-pressure water system: the high-pressure water pump head air outlet, pressure regulating valve, high-pressure water pipe, inlet pipe (installation filter), overflow pipe, pressure gauge are installed. Add an appropriate amount of clean water to the water tank and put the inlet and overflow pipes into the water.
(3) Place the power box components, head parts, and high-pressure water system in a suitable position as needed to ensure smooth and safe insulation.
(4) Connect the high-frequency line, servo line and pump power supply line to the corresponding interface of the power box and the work head, and lock them. The red clip is clamped to the workpiece to ensure good electrical conductivity.
(5) Verify the input voltage and power and connect to the power supply.

2. Replacement electrode, timing belt operation

(1) As shown in Figure 5, first place the waterstop(2) into the rotating spindle, install the drill chuck connecting handle (by the combination of 3, 4, 5), and loosen the drill chuck with the special key of the drill chuck (5), insert the new electrode from the middle of the drill chuck through the seal ring and finally tighten the drill chuck. (Note: When the electrode diameter is small, it is necessary to prevent the electrode from being in the center of the drill chuck and deflecting into the groove, so that the electrode will be flattened and eccentric when clamped!) After the work is completed, the drill chuck should be oiled and rustproof. If you want to change the electrodes of different diameters and the difference in electrode diameter is large, you need to replace the waterstop plug at the same time. When replacing the waterstop , first remove the electrode, drill chuck, nut and connecting handle, then briefly open the pump to use the high pressure water flow to flush the seal.
After replacing the sealing ring (2) of the corresponding specification, install the mounting electrode as described above.

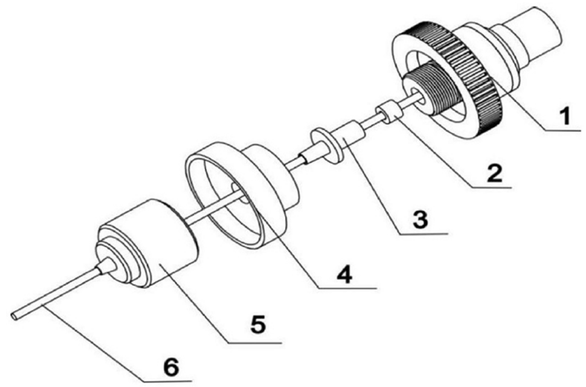

Figure 5 Electrode installation structure
1. rotating spindle 2.waterstop 3.drill chuck connecting handle
4.Nut 5.drill chuck 6.drill chuck

(2) The rotation of the spindle is driven by the motor through the synchronous toothed belt to drive the timing pulley on the main shaft. After the belt is used for a long time, it may be worn or even broken. In this case, a new timing belt needs to be replaced. When replacing, first remove the cover, loosen the fixing screws at the bottom of the synchronous motor base, and move the synchronous motor to remove the old belt. In the same way, after installing the new belt, move the synchronous motor to the position where the timing belt has a certain tension, then tighten the screw and finally install the cover.

3. Processing operations

(1) Turn on the main power switch of the main unit, the power indicator of the operation panel is on, and the touch screen is activated.
(2) Click the “Operation Interface” on the touch screen interface to enter the “Manual Interface”, press the pump button to test the water output of the water pump and the electrode. The first time after using the air in the pump, it takes a few seconds to open the electrode. Only the working fluid is sprayed out. After the test is normal, it is closed first. The water stop plug is installed on the rotating main shaft to install the drill chuck, and the electrode is clamped to make the electrode pass through the water stop plug and the locking chuck.
(3) Open the tool setting switch, and make the electrode through the guide to be contacted with the workpiece spindle to lift and shake the tool to complete the knife. Close the knife electrode and leave the workpiece 1-3mm and then open the “pause” switch.