



## Portable EDM Broken Tap Remover

**EDM-2000B** Operation Manual

HONESTY DESERVES SINCERE  
BEHAVIOR BEFORE WORK

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## Profile

The newly innovated machine EDM-2000B can fast remove broken taps, drill, drift, screw, plug gauge etc., without damaging to the work piece, easily process on work pieces at any size, especially effective for large machine tools. The integral construction of the machine left a space for storage at the bottom of the power box which is convenient for managing the attachments. With a high efficiency in processing, it could remove broken tap, screw and is especially good at processing mark.

## Portable EDM Operating Instruction

Luoyang Xincheng Precision Machinery Co., Ltd

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## PORTABLE EDM MACHINE

### EDM-2000B Parameter

Input Voltage (V)	AC220V/110V 50/60Hz
Input Power (W)	300-2000
Output Voltage (V)	DC65-70V
Working Liquid	Tap water (Pure water / distilled water is better. Well water should be used with caution )
Electrode Chuck Diameter(mm)	0.8-10
Max Travel of Working Head (mm)	70
Short Hole Processing Speed Processing Material: Hardened Steel	≈1.5      ≈1 ElectrodeØ4    ElectrodeØ10
Machine Size (L*W*H mm)	420*220*370
Work Head Size (L*W*H mm)	DK8    315×50×50
Pump Size (L*W*H mm)	60×45×55
Packing Size (mm)	528×323×470
Net Weight (kg)	19

## I. Overall Appearance



Figure 1: Overall Appearance

- 1、 Power Box: Electrical components, control panel, housing etc.
- 2、 Work Head Part: Spindle, Magnetic Base etc.

## II. Functions and Features

1. EDM-2000B abide by the principle of spark erosion to remove broken tools, no direct contact, thus, no external force and damage to the work pieces.
2. Excellent Structure: it is convenient to carry due to small size and light weight, and shows its special superiority for large work pieces. Working head is separated from the machine and could rotate in any direction, which is helpful for complex machining.
3. Convenient operation: one-button start-stop operation is simple; current stepless adjustment is convenient for control, and the magnetic base

can be adsorbed to the work piece for processing, which is convenient for clamping and operation.

4. Accurate Positioning: Alligator clamp can be installed on desktop workbench or aluminum workbench, which is convenient for fast clamping and precise positioning, and is suitable for batch processing.

5. Easy Maintenance: MCU Controller and Function Modularization are utilized to guarantee stable performance and easy maintenance.

6. Economical and Convenient: The working liquid is ordinary tap water; power consumption is moderate; the inlet pipe is detachable.

7. Wide Processing Range: broken taps and drills (conductive material) above  $\varnothing 2\text{mm}$  ( $\varnothing 2\text{mm}$  is included).

8. Long Working Hours: a cooling fan installed ensures the ventilation, which keeps the machine working continuously.

## III. Components of EDM

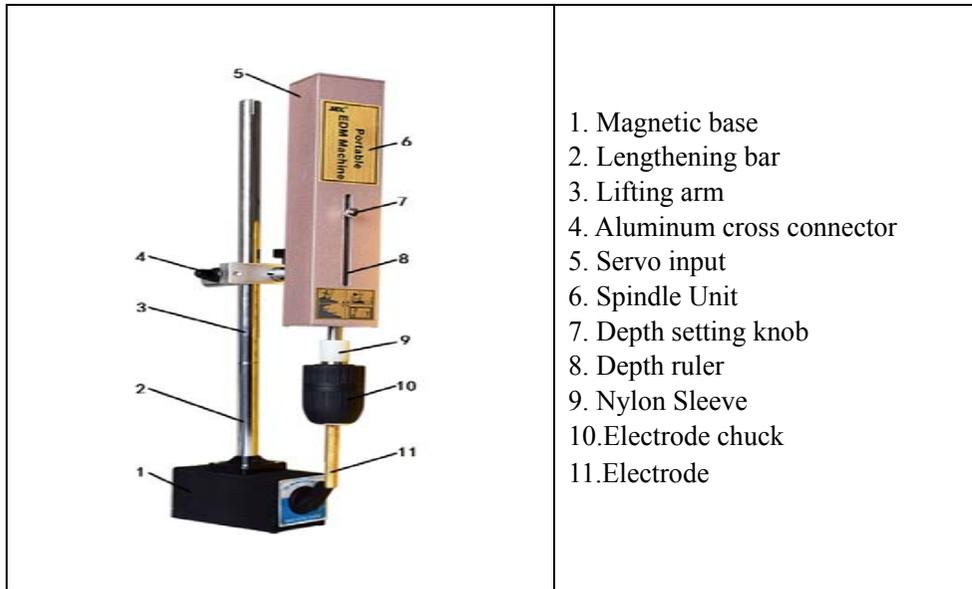
Working part: power box, operation panel, work head, water pump, magnetic base.

Power box: The power box of EDM-2000B is portable designing unit. The carrying handle on the top of power box is good for carrying.

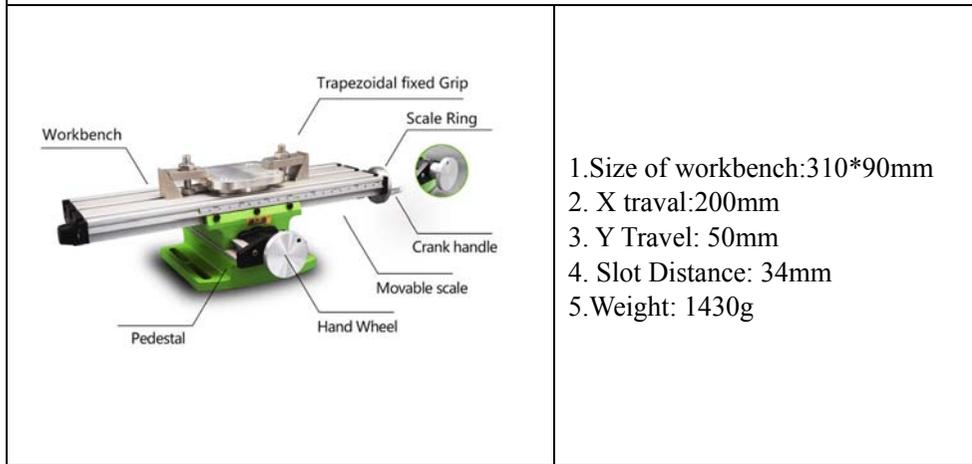
Assist devices: power cable, high-frequency cable, servo cable, water pipe, magnetic external water supply pipe, electrode chuck, adapter sleeve, etc.

Consumptive materials: brass rod, brass bar, hexagon electrode, brass sheet.

## 1. Work Head:



**Work Head (Chart 1)**



**Optional: Aluminum Jig and Fixture (Chart 2)**

## 2. Power Box



**Figure 2**

1. Start/Stop
2. Vibration
3. Pump
4. Manual Servo up/down
5. Reset Button
6. Servo Adjusting Knob
7. Indicators
8. Current Adjusting
9. Ampere Meter
10. Cooling Fan
11. Negative Armature Terminal
12. Positive Armature Terminal
13. Pump Power Output
14. Storage Box
15. Power Socket
16. Protective Fuse
17. Power Switch
18. Servo Output

### IV. Operation Notices

#### 1.1 Working part assembly:

- 1.1.1 Place working part at a proper position accordingly, put the magnetic base on a flat workbench to guarantee the stability, turn on the magnetic switch..
- 1.1.2 Loosen screw of the cross connector, adjust vertical position of the spindle unit, so that the distance between electrode tip and work piece would be controlled within 2-3mm.

#### 1.2 Circuit conjunction:

- 1.2.1 Insert the high-frequency power cord and servo cord into Armature Terminal 11, 12 and 18 on the back of the power box

respectively, make sure they are well connected.

**Note: Pay attention to the “+” (red) and “-” (blue) Armature**

### **Terminal**

1.2.2 Insert the power cord into power socket (15), then connect AC110V/220V power supply. Make sure the machine is grounded.

1.2.3 As for outputs of the high-frequency power, connect the red alligator clip (positive pole) to the work piece, the other line (negative pole) to the spindle by electrode chuck.

### **1.3 Connection of water pipe**

Connect the water outlet of external water pump with universal joint and set the universal joint at the machining parts, then align the processing point. Put the water inlet with filter into the tank, ensure that the water pump submerged in the liquid to avoid the pump damaging.

## **2. Processing Steps:**

2.1 Turn on the power switch (17), adjust position and height of the spindle, make sure the electrode and broken items are coaxial to avoid damaging the work piece.

2.2 After adjusting the position, press the water pump button (3) and start/stop button (1). The spindle decline and the corresponding indicator light up. If the spindle doesn't decline, please press the reset button (5). When spindle reach the position of discharge gap, up and down indicators flash alternately, and the processing begins. At this moment, you can adjust the discharge gap by turning the servo adjusting knob (6) and control the current by turning the current adjusting knob (8) to control the processing speed.

## **3. Usage of Servo Up and Down Button**

3.1 After the device is started, press the manual servo switch upwards(4),

the spindle rises; Press the manual servo switch down(4), the spindle declines.

3.2 Press the start/stop button (1), the indicator "down" light up, the spindle automatically down and starts machining; Press the start/stop button (1) again to stop machining, the indicator "up" light up, the spindle rises. After the machining is stopped, press the manual servo up/down button (4) to enter manual control mode.

## **4. Usage of Reset Key**

When work head reach the default depth, spindle would start the trip switch and fallback automatically. At the same time, power box would alarm. Then you can press the reset button to stop the alarm and get the work head back to work.

When spindle fallback to the upper limit it would stop, but the alarm won't. Then you should press the reset button for 3 seconds longer to get it back to work.

## **5. Usage of Vibration Button**

During processing, press vibration button to start vibration motor in the work head. The vibration motor would oscillate the electrode. It would double the processing efficiency. When processing high precision holes, the oscillation would reduce accuracy. Then the vibration should be closed. P.S.: The vibration button only works when the servo is turning on. If you turn off the servo, the vibration would stop too.

## **6. Shutdown Procedures**

Press the start/stop button (1) and the pump off indicator light is on. The spindle begins to rise, leaving the electrode away from the work piece and turning off the main power switch (17)

## V. Attentions

1. The external water pump is a precision part, please be careful when using.
  - 1.1 The working liquid must be clean water or special cutting liquid.  
The inlet pipe should install the filter.
  - 1.2 At the first time, you should wait for about 3-5 seconds, after there is no air in the pipe, the water will flow out.
  - 1.3 When the temperature is below zero, if you do not use the machine, please guarantee no water in pump to avoid damaging.
2. In case the working liquid is kerosene (the flashing point is above 70°C), PLEASE DO NOT USE THE PUMP (the pump will be broken when it meets kerosene). The level of working liquid should be more than 20mm higher than the work piece, in case, the oil level is too low, causing fire, and also please be ready for fire.
3. When the machine is working, please do not touch the electrode.  
After processing, please make the high frequency output “+、-” pole touch each other to make short circuit discharge, which could prevent electric shock.
4. Avoid being used in heat-treatment shop, electroplating workshop and the field with corrosive materials or a large amount of dust. Please pay attention to protect the machine from water and protect the circuit from being damaged by corrosive substance. Store properly after use to protect it from foreign object. Prohibiting working in hazardous environments, such as the fire ban area.
5. When the spindle is close to the upper limit or lower limit, please turn off the servo switch or turn back the spindle to avoid the spindle remaining at the limit position for a long time.
6. The machine is equipped with precision electronic components, avoid

bumping it when moving. Before using, do some shock prevention, keep away from stamping equipment or planer which could cause vibration and shock. Cut off the main power after use, clean up and keep it properly.

7. The electric conductivity of work piece and the electrode clamping have great influences on the processing efficiency. Before processing, Clean up the rust or oxide film of the work piece to get better conductivity. Clip the alligator clip in a proper position to keep the electrode and alligator clip nearby, and meanwhile keep the work-piece from damaging by electric current.
8. After a period of using, the spindle should be lubricated from the chute part to keep well operation of the head.
9. To avoid accidents, non professionals do not attempt to open the power box to repair.

## VI. Selection of Electrode Materials and Work Liquid

As discharge machining material, easy processing and electrical erosion resistance materials with good conductivity, high melting point are usually being used as tool electrodes, such as copper, graphite and copper-tungsten alloy, etc. Generally, the economic brass which works well is priority being used in removing broken taps, etc.

The working liquid is dielectric medium, which plays the role of cooling and chip removal. So the dielectric medium with low viscosity, high flash point and stable performance are usually being used, such as pure water, kerosene, liquid to prevent oxidation of aluminum. For iron or steel parts, clean tap water could achieve good effect.etc. When processing aluminum parts, kerosene could be used as the working liquid.

## VII. Failures and Solutions

Failures	Failure Reasons and Solutions
After turning on the machine, the spindle cannot move.	<ol style="list-style-type: none"> <li>1.The power cord is not connected. Please connect the power line again.</li> <li>2.The spindle reach the upper limit and start the travel switch. Open the machine and press the reset button for 2-3 seconds to get the machine back to work.</li> <li>3.Something is wrong with the servo controller. Please contact us immediately.</li> </ol>
The pump does not work	Check the liquid level of the water supply source to ensure that the water pump is under the liquid surface, and avoid the water pump from damaging the water pump for a long time.
When the electrode touch the work piece. There is no electric spark.	<ol style="list-style-type: none"> <li>1.The high frequency cord are not connected or not connected well. Connect/ Reconnect the high frequency cord.</li> <li>2.Something wrong with the high frequency cord. Contact us immediately.</li> </ol>
The processing speed is good but the hole is not very deep, and the electrode consumption is very large.	<ol style="list-style-type: none"> <li>1.The polarity of the high frequency is reverse. Adjust the polarity of the high frequency cord.</li> <li>2.The machining parameter is unsuitable. Adjust the machining parameter.</li> <li>3.The diameter of the electrode is too small while the electric current is very large. Adjust the current switch and the servo knob to reduce the electric current.</li> </ol>

<p>The processing is unstable, pointer of the ammeter swing back and forth with a large amplitude.</p>	<ol style="list-style-type: none"> <li>1.The servo knob is not at the best position. Adjust the servo knob.</li> <li>2.The work piece or electrode are not clipped well. Replace the work piece stably and clamp the electrode tightly.</li> <li>3.The water is not flowing at the best position. And the water is not enough. Adjust the position of water pipe.</li> <li>4.The processing comes into a certain depth. The amplitude of swing is large which cause the current unstable. Lift up the work head and reprocess. Adjust the position of work piece. Change the electrode and make sure the vertical machining.</li> </ol>
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## VIII. Selection of Electrode Size

Electrode discharge area is generally about 0.5mm diameter larger than themselves. For example, an electrode of 3mm diameter could process a hole of 3.5 diameter. The electrode should be chosen according to the actual processing conditions to avoid injury to thread and the discharge area should be considered.

Selection of electrodes for removing general broken objects could refer following table:

Broken Items	Size	Electrodes Recommended (mm)	Remarks
Tap	M3	Φ1.5	For the electrodes, the shorter, the better. (there will be less jitter with short electrode)
Tap	M4	Φ2.0	
Tap	M6	Φ3.0	
Tap	M8	Φ4.0	
Tap	M10	Φ5.0	
Tap	M12	Φ6.0	

Tap	M14	7×2	Sheet electrode
Tap	M16	8×2	
Tap	M20~30	10×2 Sheet electrode	Taps above M20 can be processed by several times.
Screw	M3~M20	Method Recommended: drill a straight, triangular, square or hexagonal groove, and remove it with matching tools.	

### VIII. How to remove broken tap, drill, screw etc. out

The common ground of tap, drill, etc. tools is that the central part is solid. So the tap or drill could be removed out by smashing the central part. Before processing, please clean up the rust or oxide layer. When processing deep hole or work piece in deep channel, hollow electrode and high pressure water pump could help increasing the pollution discharge speed. (Figure 3)

When the diameter of the screw is too big or its strength grade is over 8.8, general processing method is unsuitable. You can process a groove of 2-3mm depth with a sheet electrode. Then unscrew it with a screwdriver or hexagon spanner. If the processing position is too deep for general screw extractor, the hexagon spanner would help.(Figure 4)

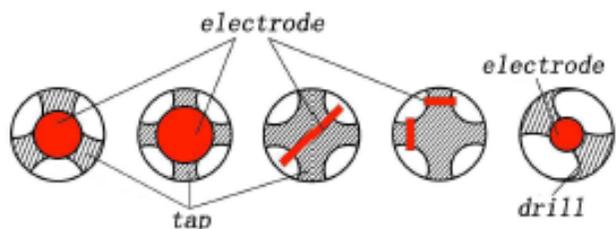


Figure 3

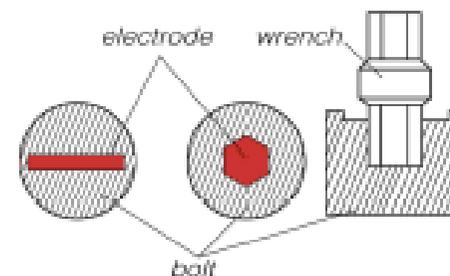


Figure 4

### X. How to clamp the electrode to avoid work piece being damaged

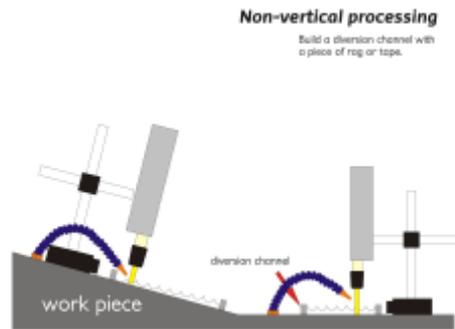
During electric discharge machining, the negative electrode (blue line) should connect the tool electrode while the positive electrode (right line) should connect the work piece. This method could reduce the consumption of tool electrode and decrease the surface roughness.

As there is a slight gap between alligator and terminal, the electric discharge may damage the work piece. To avoid this problem, you could choose a threaded hole near the processing point to screw on a screw or choose a hole near the processing point to inset a pin, then clamp the screw or pin. Or clamp a position which is unimportant. The clamping distance of positive and negative electrodes should maintain the principle of proximity to reduce the current losses in transmission. Make sure the work piece is well fixed, the electrode alignment of the central axis of the work piece is an important assurance to the processing quality.

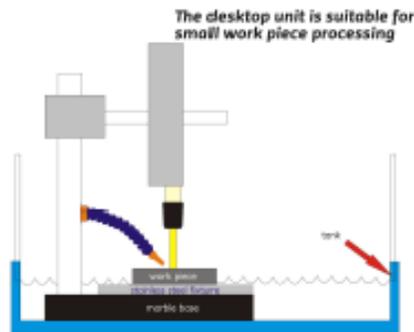
### XI. The schematic diagram of EDM processing method

Portable EDM machine applies a magnetic base and a cross stand to support the head, it can be placed at any position, adjust the processing direction comprehensively. It can be applied on any size of work-pieces.

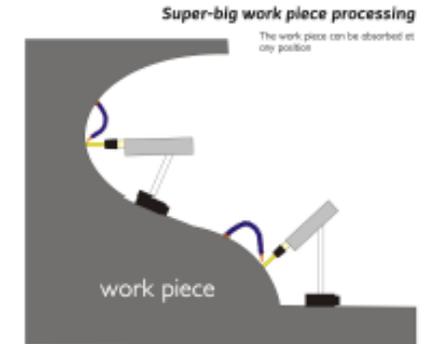
Here are the schematic diagrams of processing methods:



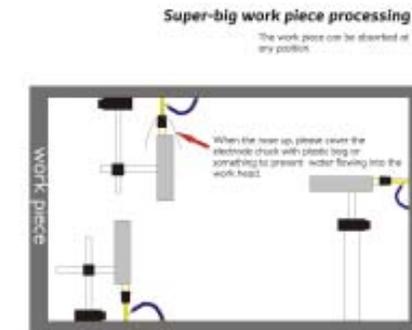
Vertical processing on big work piece. Adsorb the base directly on the work piece, and build a diversion channel under the work head to drain coolant outside.



Choose desktop unit to fix the work-piece. It could process small work piece. Put the desktop unit into the tank to avoid the coolant losing.



Super-big work piece can be absorbed on directly, and the head position is adjustable.



When processing the inner wall of big work piece, the work head can be absorbed on the side part of the work piece.

**Note: When horizontal processing, pay attention to the water proof of work head.**

## **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.

### **Warranty Terms:**

1. Our product will have to go through a thorough quality exam process to ensure that our devices won't have any glitch before delivery.

2. The warranty period is usually around 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 the repair.

3. We would offer free repair only when the damages are caused by technical deficiencies of the product itself, not man made errors, namely, the damages were done by mishandling the machine.

4. The purchasing date is the delivery date,

5. If the models are stopped producing, we only do the function repairing.

6. The maintenance service does not include the magnetic base, the water pipe, the universal water pipe, the electrode chuck and so on.

### **No warranty scope:**

1. The fault caused by improper use.

2. The damage caused by improper storage or natural disaster.

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

### **After-sales service**

1. Service Purpose: serve the customers, satisfy the customers, the satisfaction of the attitude, perfection of the technology.

2. Service Goal: Service and quantity to win customers' satisfaction