



Portable EDM Broken Tap Remover

EDM-8C Operation Manual

HONESTY DESERVES SINCERE
BEHAVIOR BEFORE WORK

Luoyang Xincheng Precision Machinery Co.,Ltd

Add: No.256 Tangong Road, Luoyang, Henan, China 471002

Tel: +86-0379-63512276

Fax: +86-0379-69960770

E-mail: tapremover@lyxc.com

Website: www.brokentapremover.com



LUOYANG XINCHENG PRECISION MACHINERY CO.,LTD
www.brokentapremover.com

Profile

With the rapid development of automation equipment, high demand of products' precision and extensive usage of difficult-to-cut materials in machining, tools broken into work pieces has heavily affected the defective rate of products. The common methods of removing broken taps and drills are smashing items by hand, screwing them out after welding, or even acid corrosion and flame cutting, which contribute to low efficiency and damage to work pieces.

EDM-8C 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. With a high efficiency in processing, it could remove broken tap, screw and is especially good at processing mark.

Please feel free to contact us if you got any problem in processing or would like to share your valuable experience.

Luoyang Xincheng Precision Machinery Co., Ltd

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PORTABLE EDM MACHINE

EDM-8C Parameter

Input Voltage (V)	AC220V/110V 50Hz/60Hz
Input Power (W)	800
Output Voltage (V)	DC70V
Stepper Current	Yes
Accessories Storage	Toolkit
Working Liquid	Tap water (Pure water / Distilled water is better)
Electrode Chuck Diameter(mm)	0.8-10
Max Travel of Working Head (mm)	70
Short Hole Processing Speed (Processing Material: Hardened Steel)	≈1 ElectrodeØ4
Machine Size (L*W*H mm)	380*160*300
Work Head Size (L*W*H mm)	DK8 300×50×50
Pump Size (L*W*H mm)	60×45×55
Net Weight (kg)	16

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-8C abides 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: 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

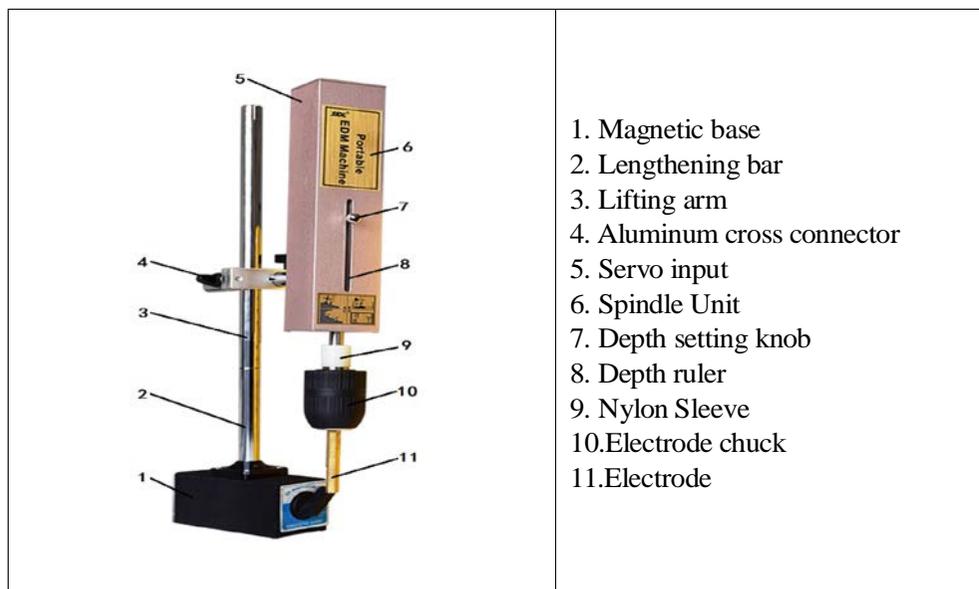
Working part: power box, operation panel, work head, water pump, magnetic base.

Power box: The power box of EDM-8C is portable designing unit. The carrying handle on the top of power box is good for carrying.

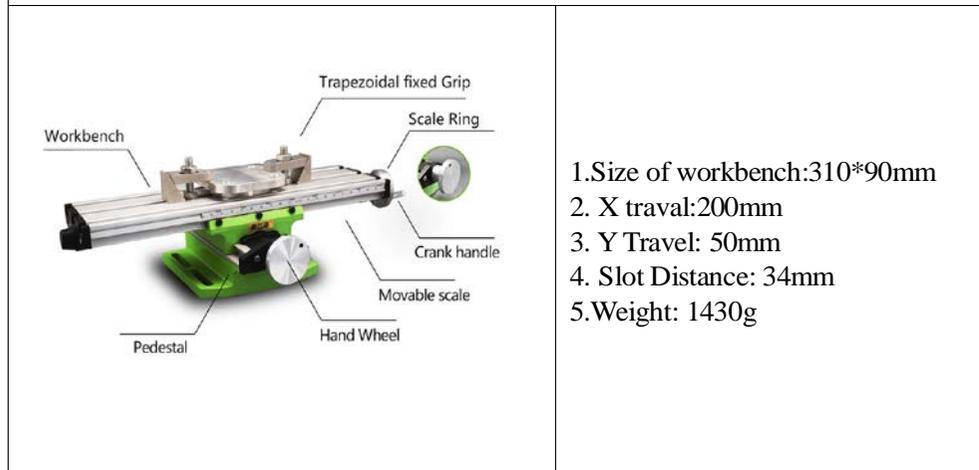
Assist devices: power cable, high-frequency cable, servo cable, water pipe, magnetic external water supply pipe, electrode chuck, adapter sleeve, etc.

Consumptive materials: brass rod, hexagonal electrode, brass sheet.

1. Work Head:



Work Head (Chart 1)



Optional: Aluminum Jig and Fixture (Chart 2)

2. Power Box



Figure 2

1. Stepper 2. High Frequency 3. Pump 4. Servo Switch 5. Servo Control
6. Current Adjusting 7. Ampere Meter 8. Power Switch 9. Protective Fuse
10. Power Socket 11. Pump Power Output 12. Positive Armature Terminal
13. Negative Armature Terminal 14. Servo Output 15. Reset Button

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 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 12, 13 and 14 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 (10), then connect AC220V/110V 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 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, turn on the power switch (8), press the water pump button (3) press high-frequency button (2) after water flowing. Press servo switch (4) to the bottom position. Turn Servo Control (5) clockwise to the right of central line until Down Indicators light up, the spindle begins to decline. When electrode approaches the work piece, up and down indicators flash alternately, the processing begins. At this moment, you can adjust the discharge gap by turning the servo adjusting knob (5) or adjust the current by pressing the stepper current buttons(6).

3. Usage of Reset Key

When work head reaches 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(15) to stop the alarm and get the work head back to work.

4. Usage of Vibration Button

During processing, turn the servo switch (4) to the upper position to start vibration motor in the work head. The vibration motor would oscillate the electrode which would double the processing efficiency. When processing high precision holes, the vibration should be closed as oscillation may reduce accuracy.

5. Shutdown Procedures

When the processing is unstable or processing speed is too fast or the spark is visible from the bottom , it is proved that the drill or tap has been smashed. Shutdown procedures.

5.1 Press the high-frequency button (2)

5.2 Turn Servo Control (5) counterclockwise until up indicator lights on and spindle begins to rise , leaving the electrode away from the work piece. Turning off the spindle servo and water pump.

5.3 Turn off main power switch(8)

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. Otherwise, fires will occur when the oil level is too low.

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 keep the machine away from water and protect the circuit from being damaged by corrosive substance. Store properly after use to protect it from foreign object.
Prohibit 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 stopping 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 to ensure the good condition of the work head.
9. To avoid accidents, non professionals please do not attempt to open the power box for servicing.

VI. Selection of Electrode Materials and Work Liquid

Easy processing and electrical erosion resistance materials are usually 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
Unable to boot	1.The power supply is not connected. Please make sure the power cord is securely connected 2.Fuse Burn, replace the fuse
After turning on the machine, the spindle cannot move.	1.The power cord is not connected. Please connect the power line again. 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. 3.Something is wrong with the servo controller. Please contact us immediately.
The pump does not work	1.Check the liquid level of the water supply source to ensure that the water pump is under the liquid surface 2.Open the pump to clean the rotor timely.

When the electrode touch the work piece. There is no electric spark.	1.The high frequency cord are not connected or not connected well. Connect/ Reconnect the high frequency cord. 2.Something wrong with the high frequency cord. Contact us immediately.
The processing speed is good but the hole is not very deep, and the electrode consumption is very large.	1.The polarity of the high frequency is reverse. Adjust the polarity of the high frequency cord. 2.The machining parameter is unsuitable. Adjust the machining parameter. 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 current.
The processing is unstable, pointer of the ammeter swing back and forth with a large amplitude.	1.The servo knob is not at the best position. Adjust the servo knob. 2.The work piece or electrode are not clipped well. Replace the work piece stably and clamp the electrode tightly. 3.The water is not flowing at the best position. And the water is not enough. Adjust the position of water pipe. 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.

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.	

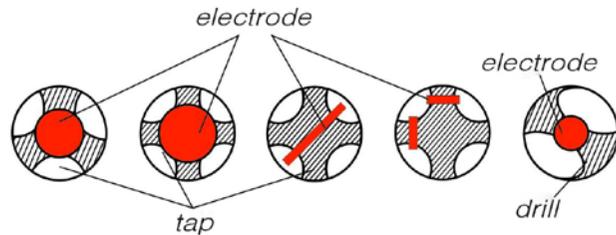
VIII. How to remove broken tap, drill, screw etc. out

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) Tap smaller than M12 can be removed out by smashing the central part.

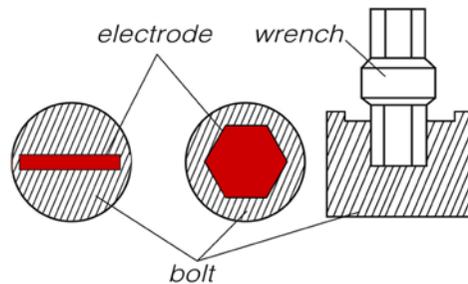
For the tap that diameter is too big, it can be divided into two parts or four parts by sheet electrodes. In practical use, after process for a while, you could use a chisel to knock the debris down and then use a tweezers or magnet to remove the debris, and restart the processing again. In this way, it

can reduce the discharge area, and improve the processing efficiency.

When the diameter of the bolt 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 wrench. If the processing position is too deep for general screw extractor, the Allen wrench would help.(Figure 4)



(Figure 3)



(Figure 4)

X .How to adjust current and servo.

The broken tap remover's current has four grades, what they are: high frequency switch, stepper switch, stepper current (I) and stepper current (II). High frequency switch controls the on/off of the pulse current, stepper switch controls the discharge time(pulse width), stepper (I) and stepper (II) control the magnitude of current; The more switches you turn on, the bigger current you have.

Please refer to the table below:

Electrode	Current Adjusting	Stepper
$< 1\text{mm}^2$	All Turn Off(Low)	Turn Off
1-3 mm^2	One On One Off(Medium)	Turn On
$> 3\text{mm}^2$	All Turn On(High)	Turn On

When adjusting the servo switch, firstly turn servo knob to the right of the central line, the spindle begins to decline. After the electrode reaches a certain distance to the work piece and starts to discharge, please slightly adjust the servo knob to reach a suitable discharge gap(there will be a sound of clear and continuous electric shock and the ammeter is in a stable state). Now the current is stable, the machine works efficiently. The control system will automatically detect this suitable distance and keep this proper discharge gap to ensure the continuous and stable discharge. When processing is finished, please turn the servo knob to the left of the central line, the spindle will rise.

XI. How to clamp the electrode to avoid work piece being damaged

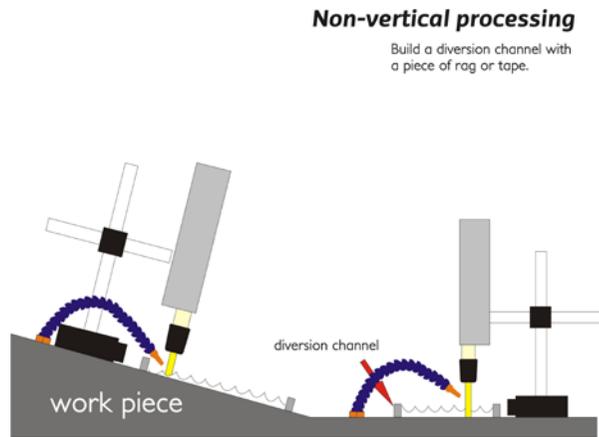
During electric discharge machining, the negative (blue line) should connect the electrode while the positive (right line) should connect the work piece. This method could reduce the consumption of tool electrode and decrease the surface roughness.

Sometimes there is a slight gap between alligator and terminal, the electric discharge may damage the work piece. To avoid this situation, you could screw on a threaded hole or insert a pin to the hole nearby, then clamp it by the alligator. The clamping distance of positive and negative should maintain the principle of proximity to reduce the current losses in transmission. Make sure the work piece is well fixed, the alignment between the central axis and the work piece is very important for the processing quality.

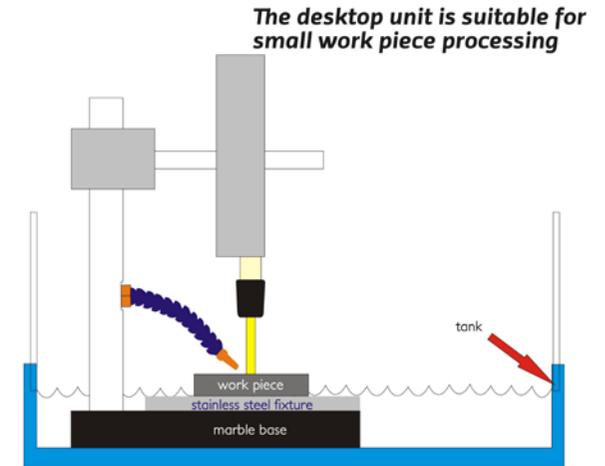
XII. Schematic diagram of EDM processing method

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

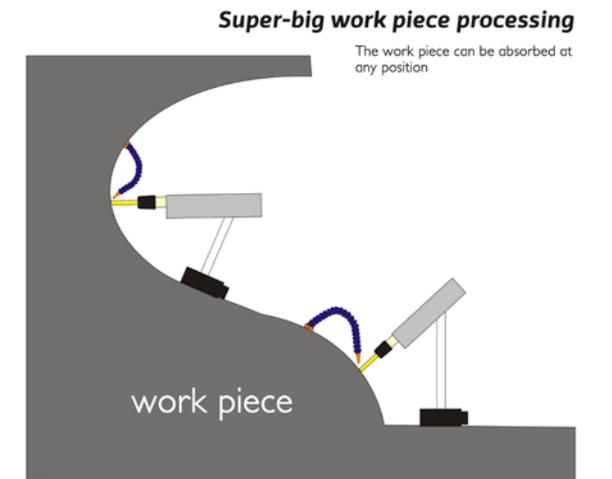
Here are the schematic diagrams of processing methods:



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.



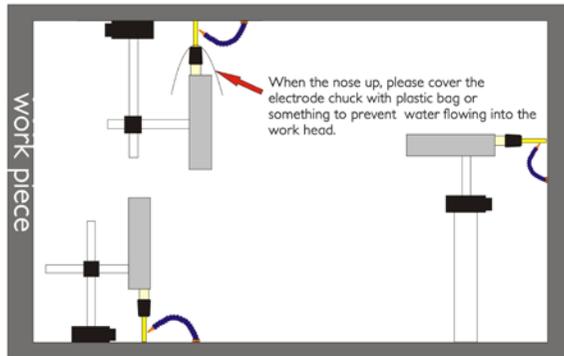
Choose desktop unit to fix the work-piece. It could process small work piece. Put the desktop unit into the tank to avoid the coolant losing.



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

Super-big work piece processing

The work piece can be absorbed at any position



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 warranty time begins from 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.