



PORTABLE EDM BROKEN TAP REMOVER EDM-2000B OPERATION MANUAL



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Profile

EDM-2000B EDM Broken Tap Remover Machine can fast remove broken taps, drills, drifts, screws, plug gauges etc., without damaging the workpiece, and it can easily process on workpieces at any size, especially effective for large machine tools. The machine adopts the split structure of chassis and storage box. With a high efficiency in processing, it is especially good at removing broken taps, screws and processing marks.

PORTABLE EDM MACHINE
EDM-2000B Parameter

Input Voltage (V)	AC110V/220V 50Hz/60Hz
Input Power (W)	2000
Output Voltage (V)	DC75-80V
Working Liquid	Tap water (Pure water / Distilled water is better.)
Electrode Chuck Diameter(mm)	0.8-10
Max Travel of work head (mm)	70
Short Hole Processing Speed (Processed Material: Hardened Steel)	Electrode Ø4 (1.5mm/min) Electrode Ø10 (1mm/min)
Dimensions of the power box (L*W*H mm)	405×220×370
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)	16
Gross Weight (kg)	19

I. Overall Appearance



Figure 1: Overall Appearance

1. Work head Part: consists of work head and magnetic base.
2. Power Box Part: controls the work head lift, high frequency discharge and pump work and stop.
3. Integrated case Part: stores accessories such as the work head, pump, wiring harnesses, etc.

II. Functions and Features

1. EDM-2000B abides by the principle of spark erosion to remove broken taps, drills, and other tools without direct contact, thus, there will be no external force and damage to the workpieces.
2. Excellent Structure: it is convenient to carry due to small size and light weight. It shows its special superiority especially for the processing of large workpieces. The work head is separated from the machine and could rotate in any direction, which is helpful for complex processing.

3. Convenient Operation: It is very easy to operate with a one-key start-stop, and it is easy to control with the current stepless adjustment. The magnetic base can be attached to the workpiece 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 or pure water. The power consumption is moderate. The inlet pipe is detachable.

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

8. Long Working Hours: a cooling fan is installed for ventilation, which ensures that the machine can work continuously for a long time.

III. Components of EDM

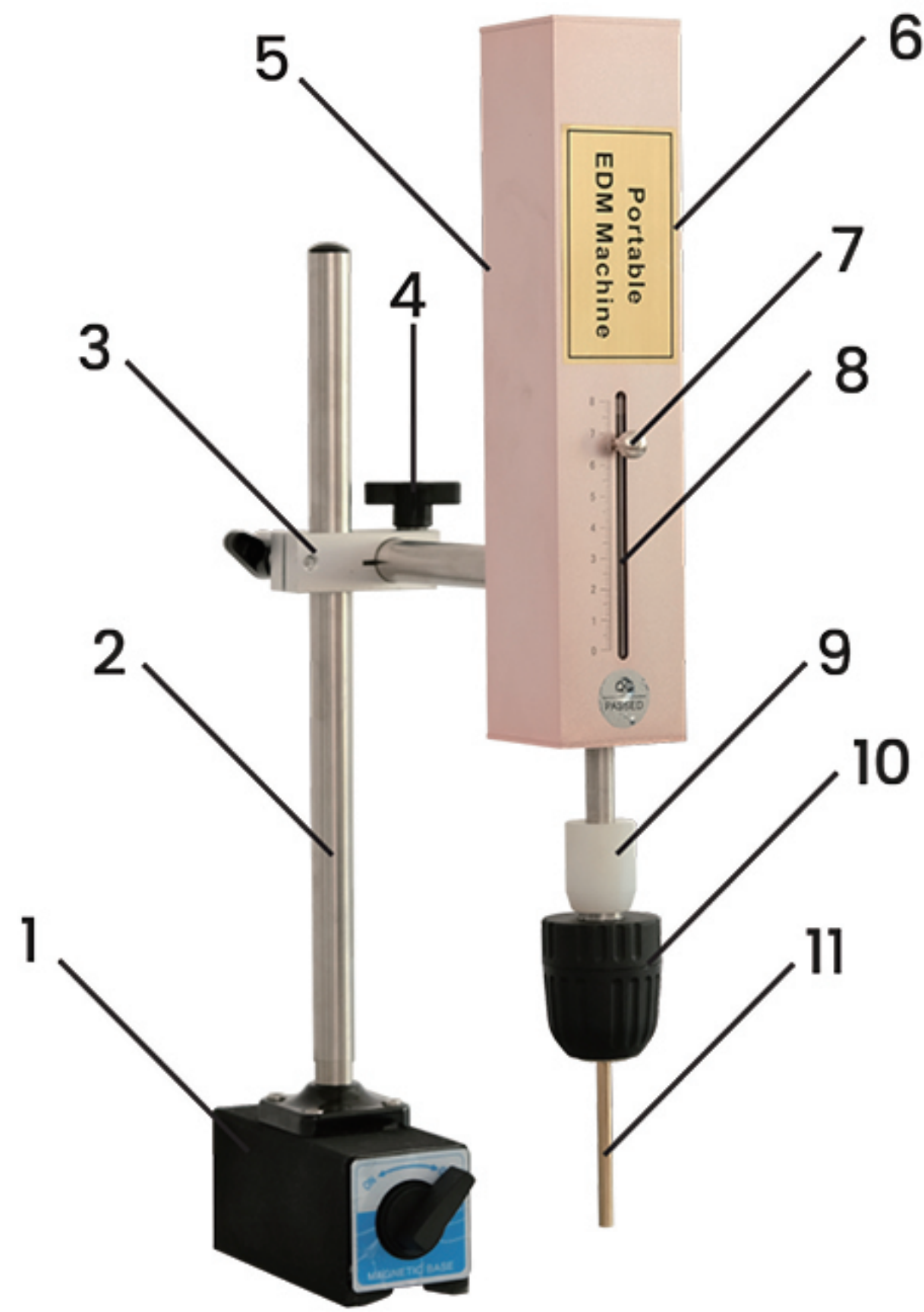
1. The machine is mainly composed of power box, work head, external water pump and accessories.

2. Power box: The power box of EDM-2000B has its special storage box with portable combination case.

3. Accessories: power cable, high-frequency cable, servo cable, water pump, magnetic external water supply pipe, electrode chuck, adapter sleeve, etc.

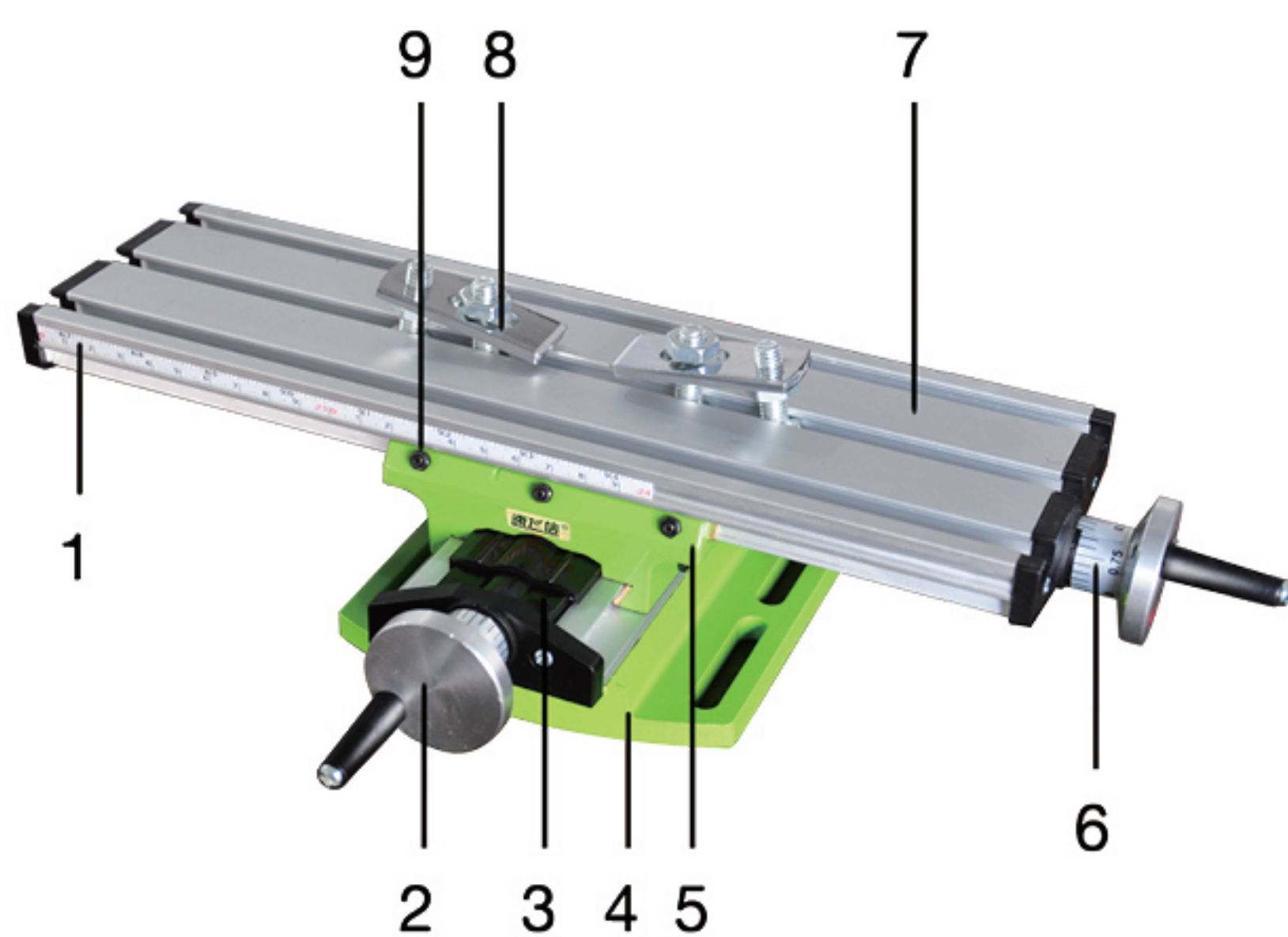
4. Consumptive materials: brass rod, hexagonal electrode, brass sheet.

1. Work head parts:



1. Magnetic base
2. Lifting arm
3. Aluminum cross connector
4. Arm
5. Principal axis servo input interface
6. Work head
7. Depth setting locking screw
8. Depth ruler
9. Electrode chuck Connector
10. Electrode chuck
11. Electrode

Work head parts(Figure 1.1)



1. Sliding ruler
2. Hand wheel
3. Protection cover
4. Base
5. Support frame
6. Scale axis
7. Work bench
8. Jig
9. Adjusting screw

Optional: Aluminum Jig and Fixture(Fig. 1.2)

2.Power Box:

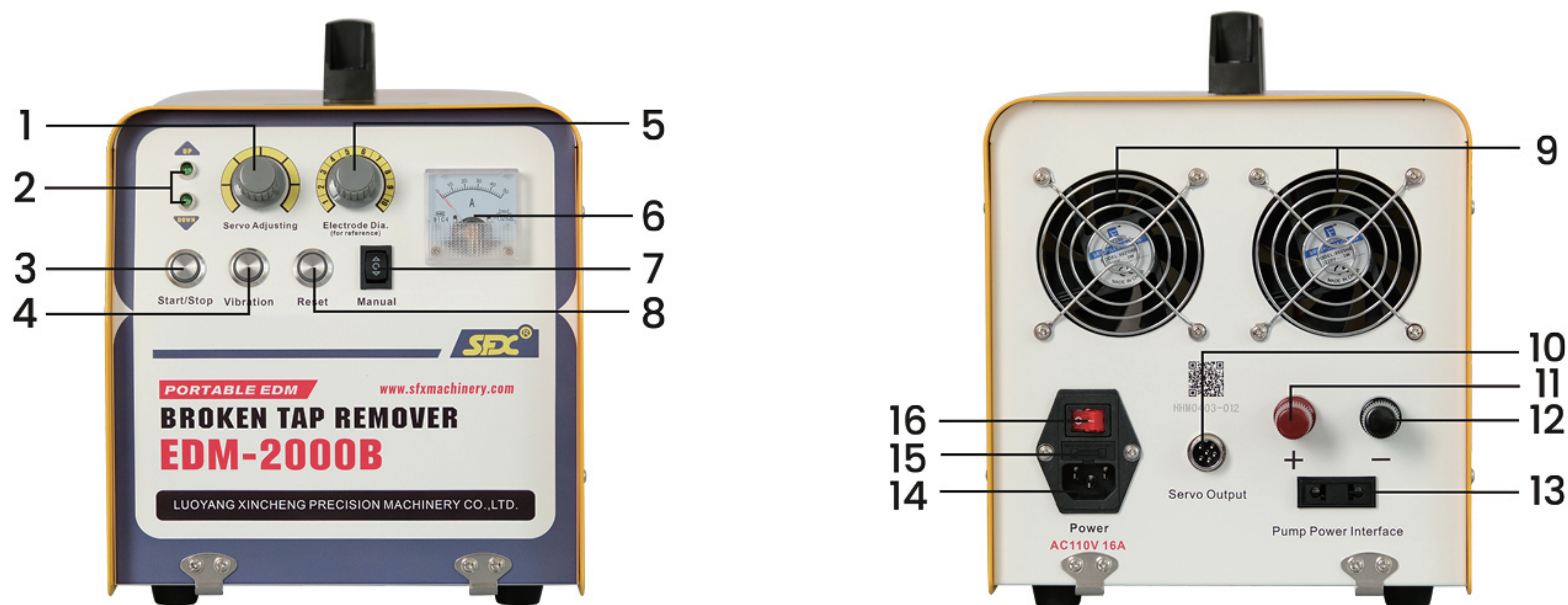


Fig. 2

1. Servo Adjusting
2. Indicators
3. Start/Stop
4. Vibration
5. Electrode Dia.(for reference)
6. High-frequency Current
7. Manual
8. Reset
9. Fan
10. Servo Output
11. Positive Armature Terminal
12. Negative Armature Terminal
13. Pump Power Output
14. Power Socket
15. Protective Tube
16. Power Switch

IV. Operation Instructions

1. Installation Steps:

1.1 Work head assembly:

(1) Place the work head at a proper position according to the needs, put the magnetic base on a flat workbench to guarantee stability, and turn on the magnetic switch.

(2) Loosen the screw of the cross connector, and adjust the vertical position of the work head, so that the distance between electrode tip and workpiece is about 2-3mm.

1.2 Circuit conjunction:

(1) Insert the high-frequency power cord and servo control plug into the Armature Terminal 11, 12, and 10 on the back of the power box respectively, make sure they are well connected.

Note: Pay attention to the "+" (red) and "-" (blue) Armature Terminal.

(2) Insert the power cord plug into the power socket (14), then connect the power supply. Make sure the ground electrode is grounded.

(3) As for outputs of the high-frequency power, connect the red alligator clip

(positive pole) to the workpiece, and the other line (negative pole) to the work head by electrode chuck.

1.3 Connection of water pipe:

Connect the water outlet of the external water pump with the universal joint and set the universal joint at the machining parts, then align the processing point. Put the water pump into the tank, and ensure that the water pump is submerged in the liquid to avoid the pump damage. Or connect the water outlet pipe to the water inlet of the electrode chuck connector of the main shaft part to realize the water outlet from the center of the electrode chuck.

2. Processing Steps:

2.1 Manually adjust the position and height of the work head, make sure the electrode and broken items are coaxial to avoid damaging the workpiece.

2.2 After adjusting the position, press the "Start/Stop" button (3). When the work head descends to the dischargeable gap, the up and down indicators flash alternately, the processing begins. At this moment, you can turn the "Current Adjusting" knob (5) to adjust the current according to the electrode diameter and adjust the discharge gap through the "Servo Adjusting" knob (1) to make the current stable and control the processing efficiency.

3. Work head up and down

3.1 Manual Up&Down: After the machine is started, press the “Manual ” (8)upwards, the work head will rise, release it to stop and press the “Manual” downwards, and the work head will descend, and release it to stop.

3.2 Press the Start/Stop knob (3), the down indicator light will light up, and the work head will automatically descend to start processing. Start/Stop knob (3) to stop processing, and the up indicator will light up and the work head will rise.

Press the “Manual ” knob after stop processing, it will automatically switch to “Manual” mode.

4.Usage of Reset

When the work head reaches the set depth, the work head will touch the limit switch and automatically retreat, and an alarm sound will be issued. At this moment, press the “Reset” button (8), and the work head will resume the processing state, and the alarm sound will stop.

5.Usage of Vibration Button

During processing, the vibration motor in the work head will start working when you press the “Vibration” button (4), and 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.

6.Shutdown Procedures

Press “Start/Stop” button (3),the pump will be turned off, and the rising indicator light will be on. The work head begins to rise, so that the electrode moves away from the workpiece. Turn off “Power Switch” (16).

V.Attentions

The external water pump is a precision part, please be careful when using it.

1.1 The working liquid must be clean water or special cutting liquid. The inlet pipe should install the filter to avoid mixing impurities in the working fluid to block the water pump.

1.2 When it is turned on for the first time, it will be delayed for about 3-5 seconds, and the water will flow out after there is no air in the pipe.

1.3 When the temperature is below zero, please guarantee no water in the pump before shutting down the machine to avoid damage.

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 workpiece can be intruded into kerosene for processing, and the level of working liquid should be more than 20mm higher than the workpiece. 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 a short circuit discharge, which could prevent electric shock.

4. Avoid using in heat-treatment workshops, electroplating workshops and the field with corrosive materials or a large amount of dust. Please pay attention to keeping the machine away from water and protecting the circuit from being damaged by corrosive substances. Store properly after use to protect it from foreign objects. It is forbidden to work in hazardous environments, such as the fire ban area.

5. When the work head is close to the upper limit or lower limit, please turn off the servo switch or turn back the work head to avoid the work head stopping at the limit position for a long time.

6. The machine is equipped with precision electronic components, please avoid bumping it when moving. When using, do some shock prevention, keep it 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 the workpiece and the electrode clamping have great influences on the processing efficiency. Before processing, clean up the rust or oxide film of the workpiece to get better conductivity. Clip the alligator clip in a proper position to keep the electrode and alligator clip nearby, and meanwhile keep the workpiece from damaging by electric current.

8. After a period of using, the work head 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 repairs.

VI. Selection of Electrode Materials and Working Liquid

Easy processing and electrical erosion resistance materials are usually used as tool electrodes, such as copper, graphite, copper-tungsten alloy, etc. Generally, the economic brass which works well is mainly being used in removing broken taps, etc.

The working liquid is the dielectric medium, which plays the role of cooling and chip removal. 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. When processing aluminum parts, kerosene could be used as the working liquid. For iron or steel parts, clean tap water could achieve a good effect.

VII. Failures and Solutions

Failures	Failure Reasons and Solutions
After turning on the machine, the work head does not move.	<ol style="list-style-type: none"> 1.The power cord is not connected. Please connect the power line again. 2.The 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	<ol style="list-style-type: none"> 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 touches the workpiece, there is no electric spark.	<ol style="list-style-type: none"> 1.The high frequency cord are not connected or not connected well. Connect/ Reconnect the high frequency cord. 2.Something is wrong with the high frequency cord. Contact us immediately.

<p>The processing speed is good, but the hole is not very deep, and the electrode consumption is very large.</p>	<ol style="list-style-type: none"> 1.The polarity of the high frequency is reversed. 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.
<p>The processing is unstable, the pointer of the ammeter swings back and forth with a large amplitude.</p>	<ol style="list-style-type: none"> 1.The servo knob is not at the best position. Adjust the servo knob. 2.The workpiece or electrode are not clipped well. Replace the workpiece 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 the water pipe. 4. After the processing comes into a certain depth, the electrode swings too much, resulting in unstable discharge. Lift the work head and reprocess. Adjust the position of the workpiece. Change the electrode and make sure the vertical machining.

VIII. Selection of Electrode Size

The 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 the 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	Φ7×2	Sheet electrode
Tap	M16	Φ8×2	
Tap	M30	Φ10×2 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.	

IX. How to remove broken tap, drill, screw etc.

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)

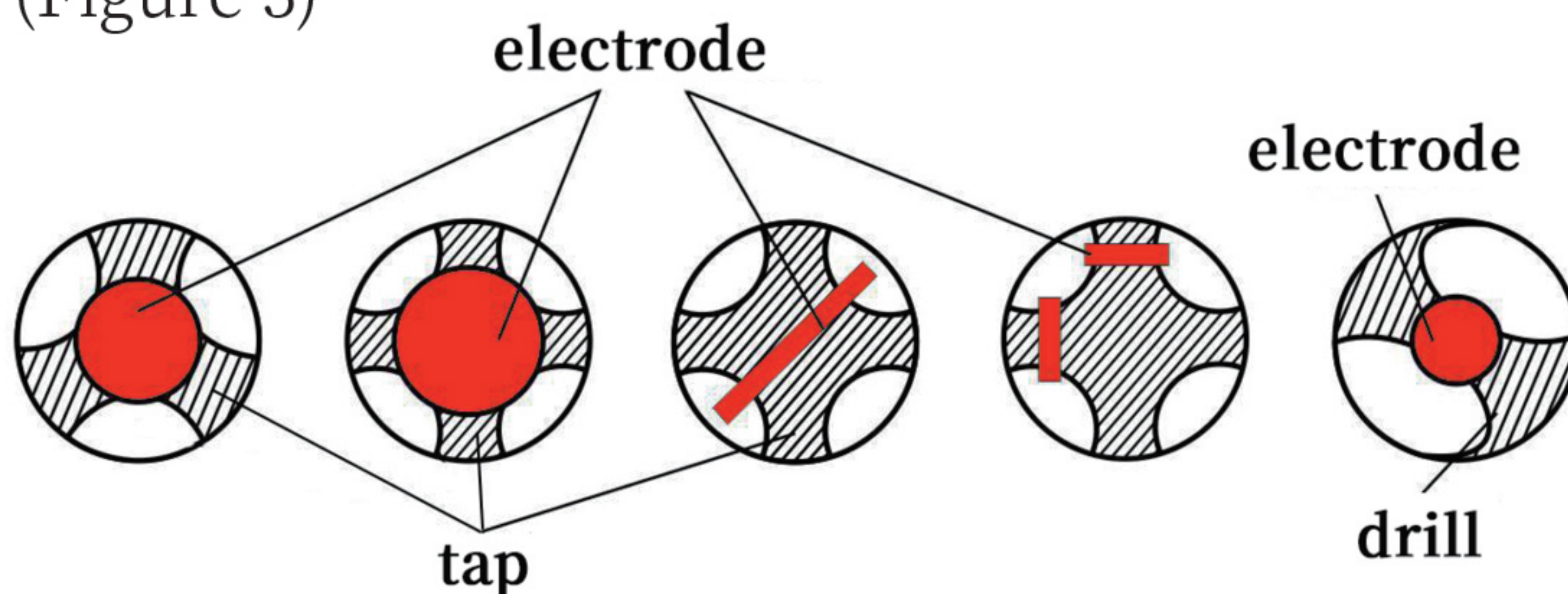


Figure 3

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)

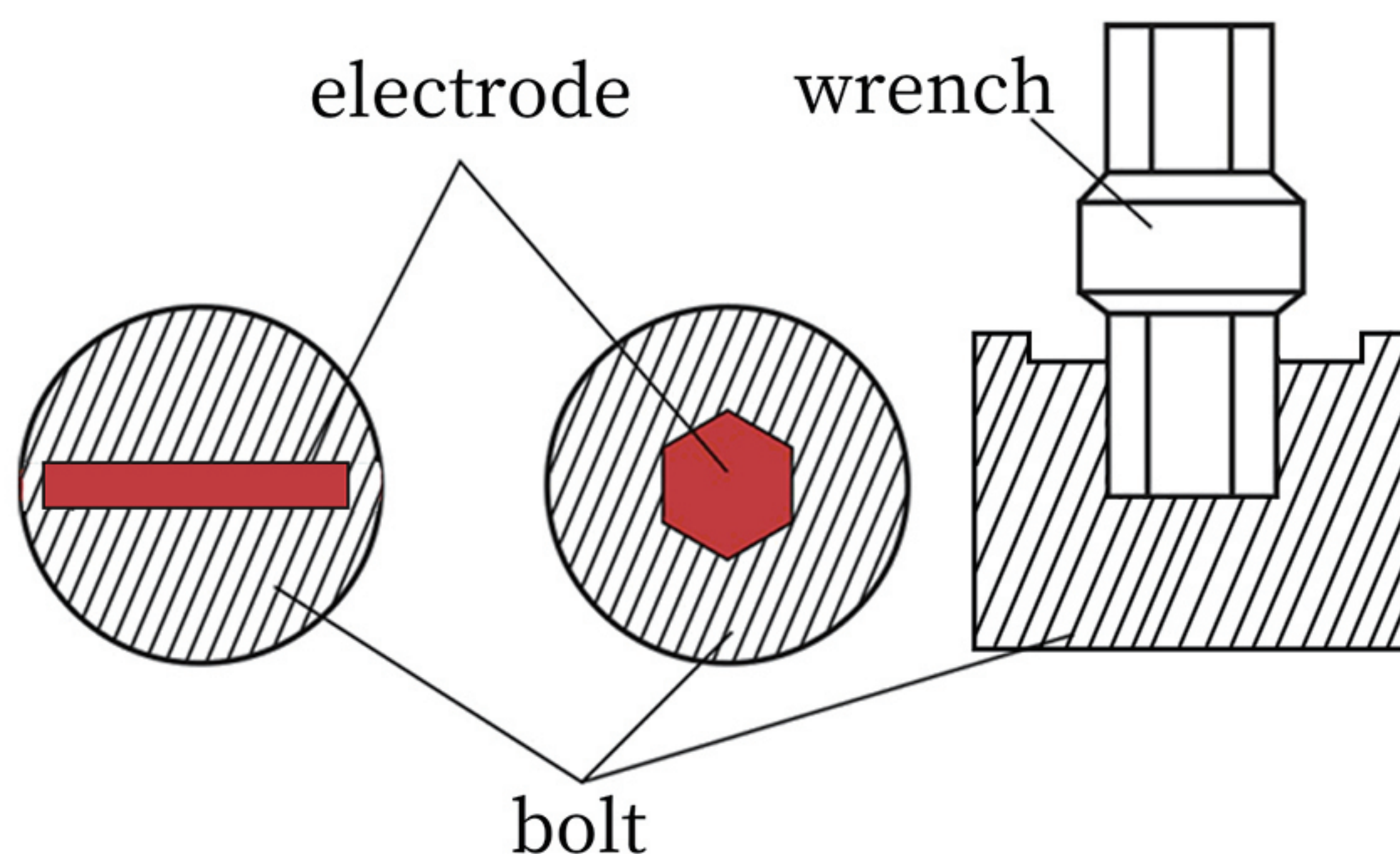


Figure 4

X.How to Clamp the Electrode to Avoid Workpiece being Damaged

During electric discharge machining, the negative pole (blue line) should connect to the tool electrode and the positive pole (red line) should connect to the workpiece. This method could reduce the consumption of the tool electrode and decrease the surface roughness. As there is a slight gap between the alligator and the terminal, the electric discharge may damage the workpiece. 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 insert a pin, then clamp the screw or pin. Or clamp an unimportant position. The clamping distance of positive and negative poles should maintain the principle of proximity to reduce the current losses in transmission. Make sure the workpiece is well fixed, the electrode alignment of the central axis of the workpiece is an important assurance of the processing quality.

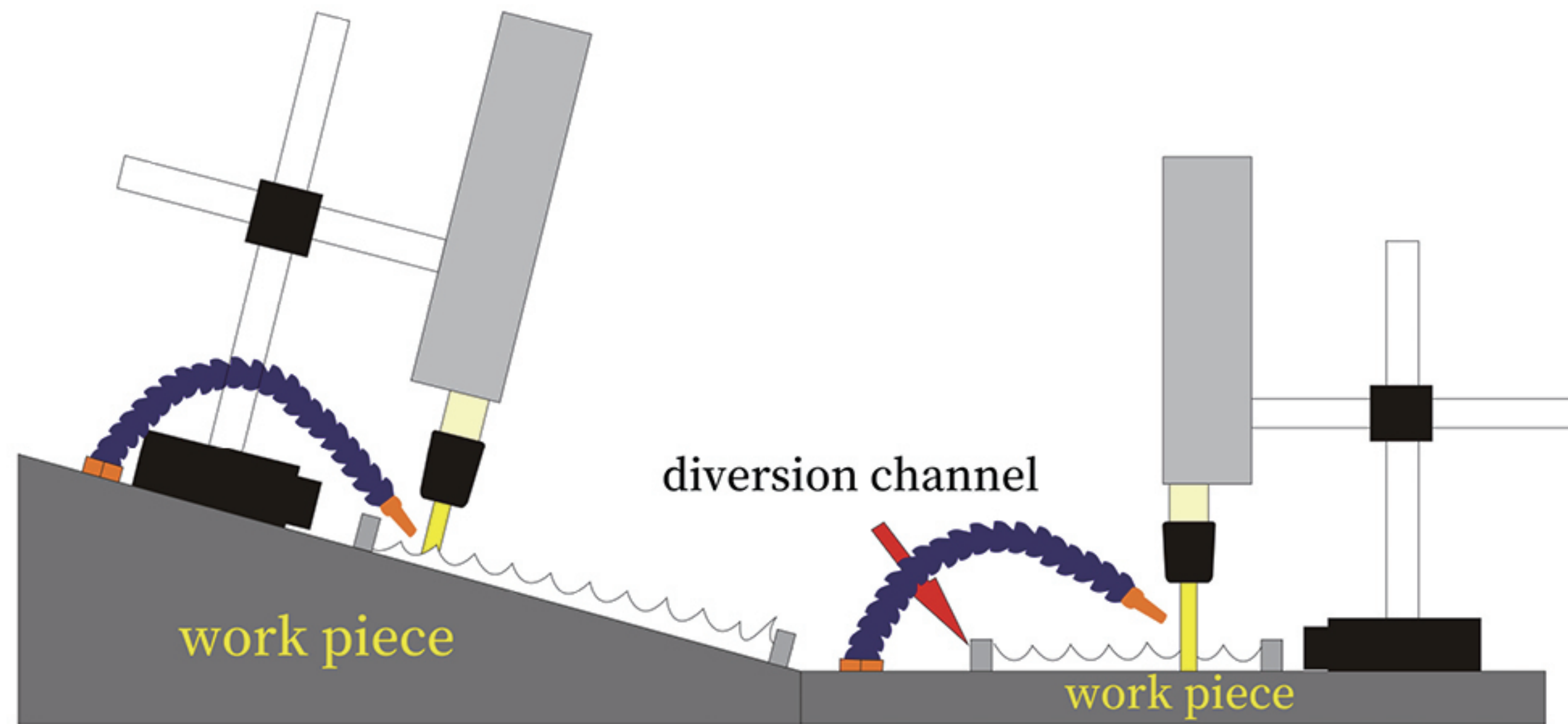
XI.Schematic diagram of EDM processing methods

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

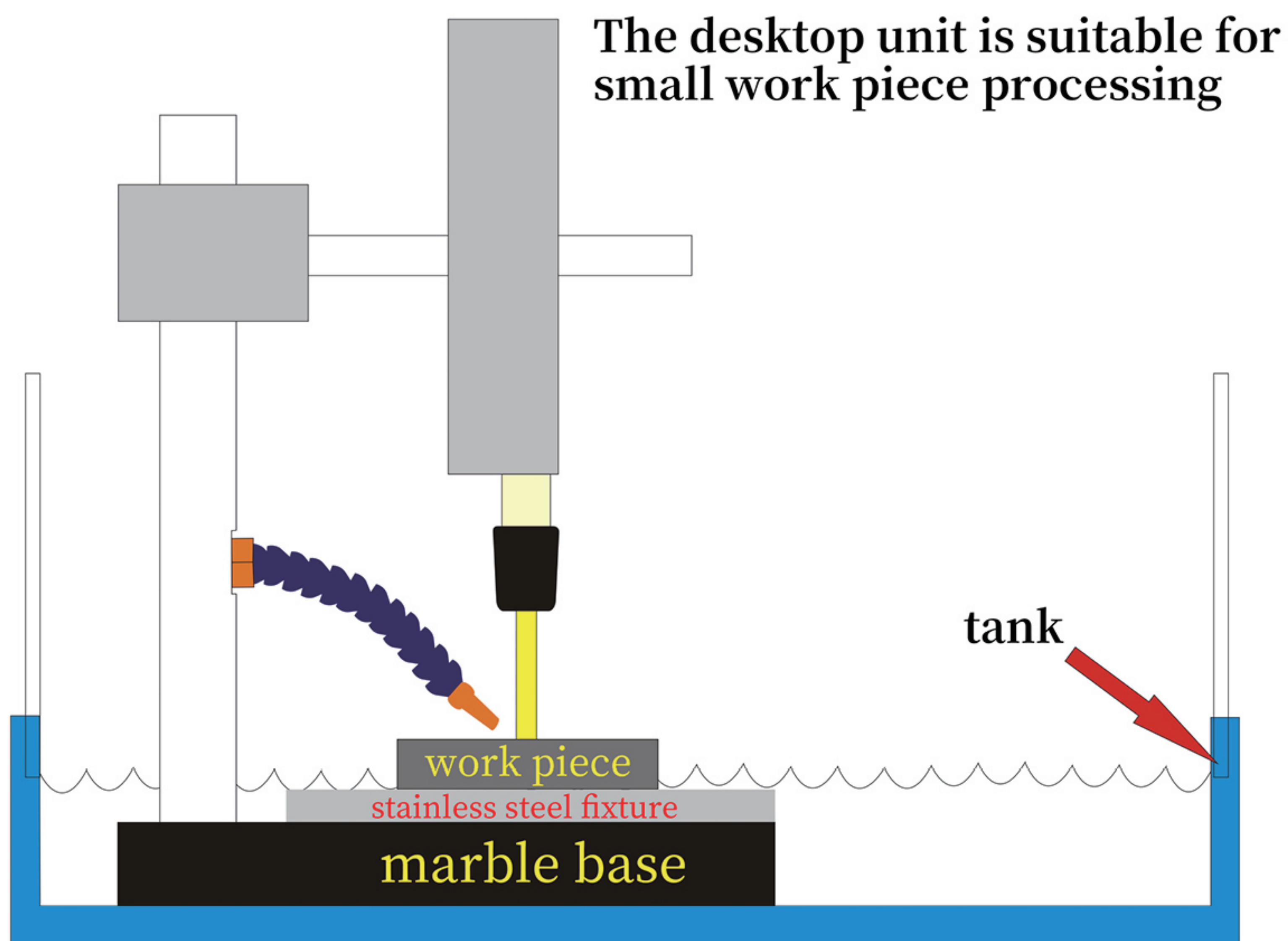
Here are the schematic diagrams of processing methods:

Non-vertical processing

Build a diversion channel with a piece of rag or tape.

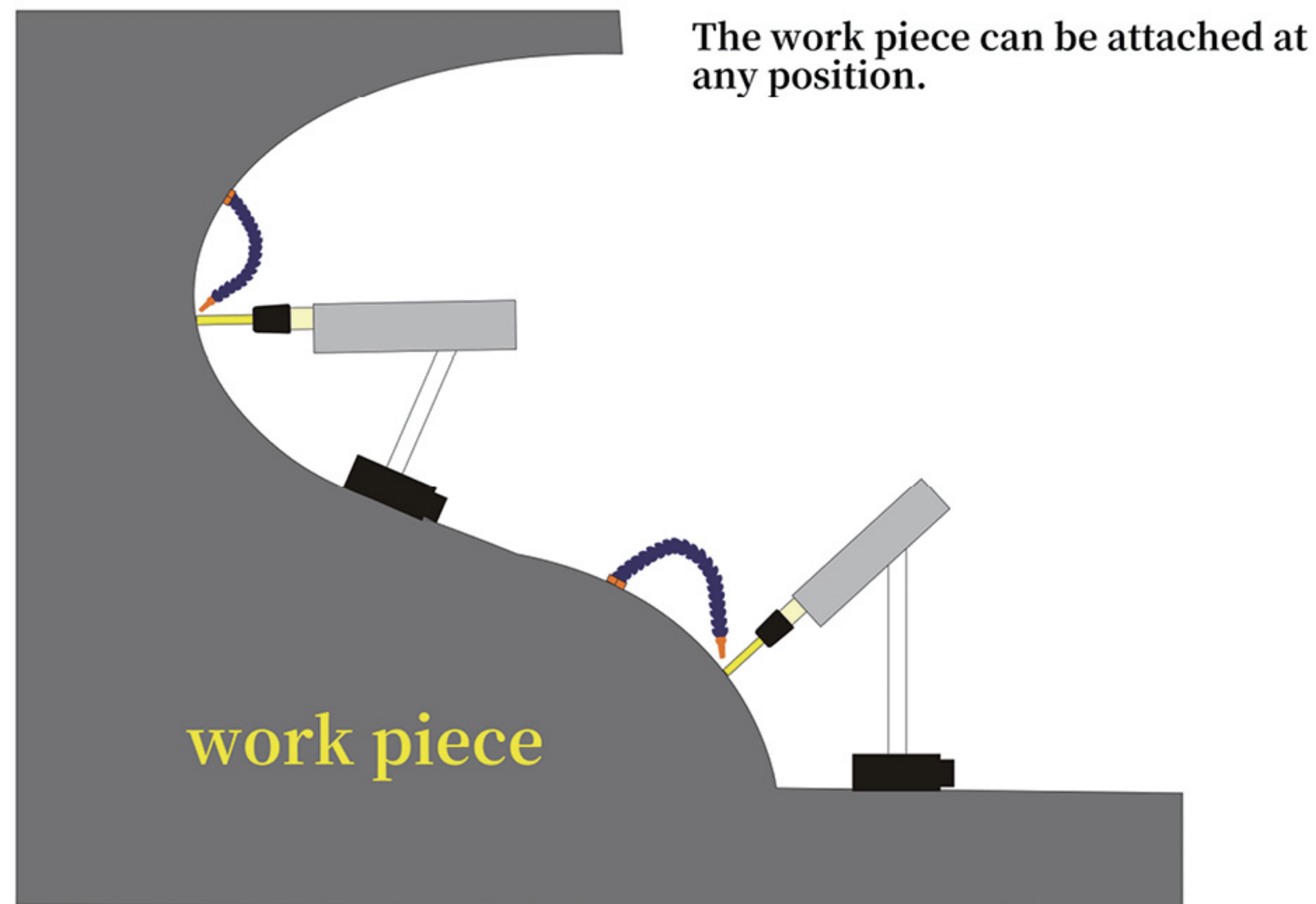


Vertical processing on the big workpiece. Attach the base directly on the workpiece and build a diversion channel under the work head to drain coolant outside.



Use the desktop unit to fix the workpiece. It could process the small workpiece. Put the desktop unit into the tank to avoid the coolant loss.

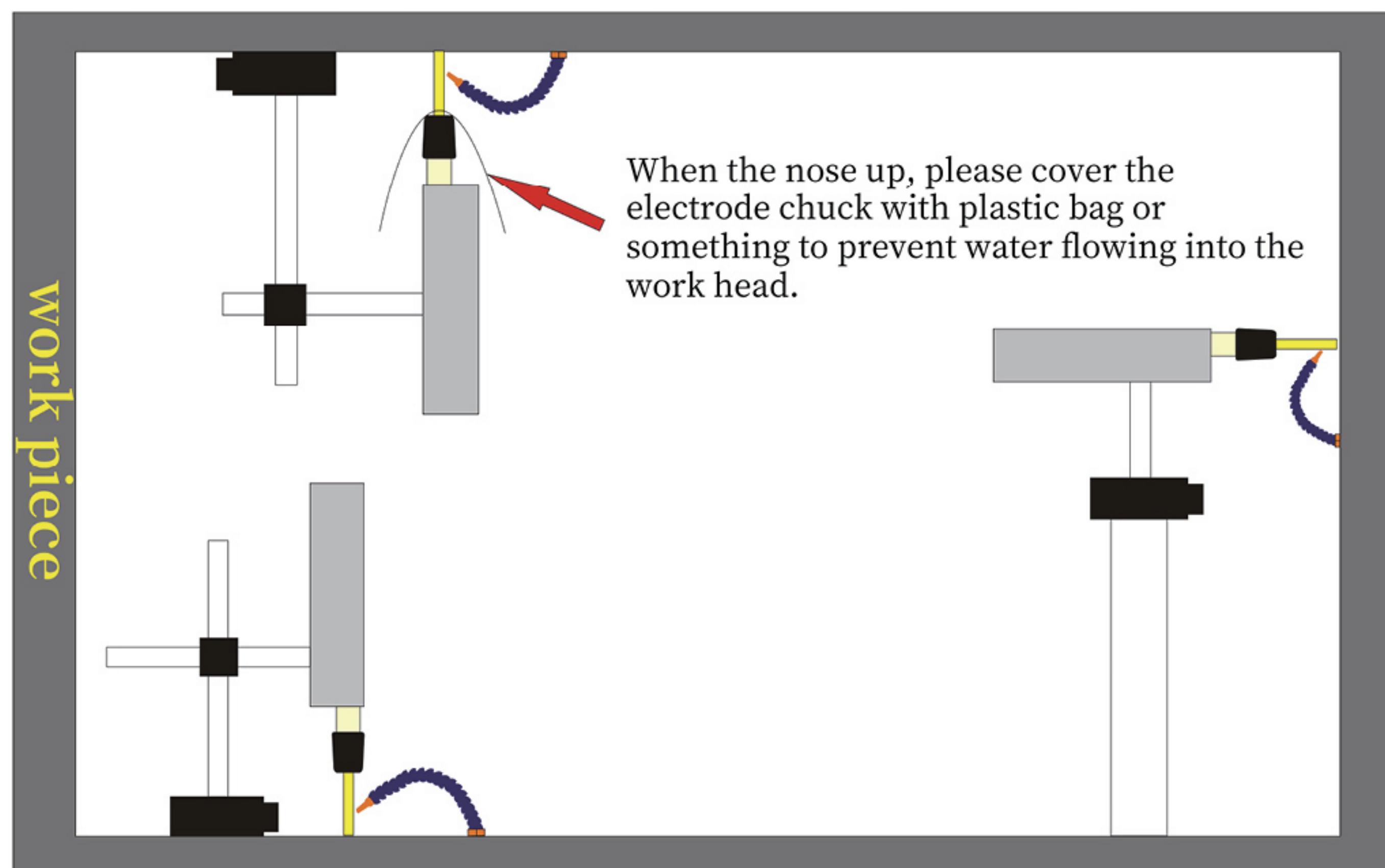
Super-big work piece processing



The machine can be attached on the super-big workpiece 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 the big workpiece, the work head can be attached to the side part of the workpiece.

Note: When horizontal processing, pay attention to the waterproofing of the work head.

Customer Service

With our 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 disassembles, repairs and modifies 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.

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