

OPERATING INSTRUCTIONS



For every person who will be engaged in operation and maintenance supervision, it is recommended to read through this manual before any operations, so as to permit optimum operation of this machine. Hold this manual carefully so that you can use it next time.

HK-93-II Portable gas cutting machine

INSTRUCTION

Thank you very much for purchasing this product. Read this instruction manual thoroughly to insure correct, safe and effective use of the machine. Read the manual first to understand how to operate and maintain the machine.

Make sure you read, understand and take all the necessary safety precautions.

SAFETY PRECAUTIONS


This product is designed to be safe, but it can cause serious accidents if not operated correctly. Those who operate and repair this machine must read this manual thoroughly before operating, inspecting and maintaining the machine. Keep the manual near the machine so that anyone who operates the machine can refer to it if necessary.

- Do not use the machine carelessly without following the instructions in manual.
- Use the machine only after you completely understood the contents of the manual.
- If an explanation in the manual is difficult to understand, contact our company of sales service office.
- Keep the manual nearby at all times and read it so many times as necessary for a complete understanding.
- If the manual become lost or damaged, place an order with our company or sales service office for a new one.
- When transferring the machine to a new owner, be sure to hand over this instruction manual as well.

QUALIFICATIONS FOR MACHINE OPERATOR

Operators and repair staff of this machine must completely understand the contents of the instruction manual and they must be qualified and educated to handle this equipment.

1. The license for gas welding ganger
2. The diploma of the training course on gas welding.
3. The qualification certificate approbated by the ministry of labor.

Symbol	Title	Meaning
	General	General caution, warning and danger
	Be careful not to get your fingers caught.	Possible injury to fingers if caught in the insertion part.
	Caution: Electric shock!	Possible electric shock under special conditions.
	Ground this equipment.	Operators must ground the equipment using the safety grounding terminal.
	Pull out the power plug from the outlet.	Operators must unplug the power plug from the outlet when a failure occurs or when there is a danger of lightning.
	Caution against bursting	Possible bursting under certain conditions.
	General	General warning.
	Caution: Hot !	Possible injury due to high temperature under certain conditions.
	Caution: Ignition!	Possible ignition under certain conditions.

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1 Safety instruction

Operation, inspection, and maintenance that disregard the basic safety rules cause many accidents. Carefully read, understand, and master the safety measures and precautions described in this instruction manual and on the machine before operating, inspecting, and maintaining the machine. The safety messages are classified as indicated on the machine safety labels:

■ WARNING

This word is used in a warning message and a warning label is positioned at places that could cause injury or serious accident

■ CAUTION

This word is used in a caution message and a caution label is positioned at places that could cause slight injury or machine damage. This is also used as a caution for frequent dangerous actions.

■ NOTICE SIGNS

This is a sign to show machine operators and maintenance engineers items that relate directly to damage of machines and surrounding facilities and equipment.

1.1 General machine safety precautions

Read and understand the following important safety information:

1.1.1 Machine safety

1. The machine casing is mainly made of aluminum alloy to reduce weight. For this reason, be careful not to drop a heavy item on the machine, or not drop the machine when carrying it, since the alloy is not designed to withstand such impact.
2. When mounting hoses to the torch and distributor, tighten the nut with the attached wrench. After mounting, be sure to check there is no gas leak with a detection liquid. If a gas leak is found, retighten the nut firmly.
3. When fixing a tip to the torch, tighten the nut with the two wrenches attached. In addition, avoid damaging the taper part of the tip since this may cause backfire.
4. Never disassemble the machine other than during maintenance and inspection. Otherwise, malfunction will result.
5. Never remodel the machine. Remodeling is very dangerous.
6. Always turn the power off when not in use.
7. Never use the machine outdoors when the weather is wet. This will cause failure of the machine and could cause a fatal accident by electric shock.

1.1.2 Safety clothing

1. Be sure to wear protector' s gauntlets, goggles, helmet, and safety shoes during operation.
2. Avoid operating the machine with wet clothes or hands in order to prevent electric shock.

1.1.3 Operation and handling safety precautions

1. Read this instruction manual before operating the machine.
 2. Install the machine on the rail correctly before operation and make sure that the universal wheel is in the ark of the rail.
 3. Before connecting the power plug to the outlet, make sure the drive knob is in the stop position in the middle.
 4. Prior to operating the machine, check the safety of the surroundings to avoid accidents.
 5. Never move the machine while the preheat flame is on.
 6. Clean up the waste in the ark of the rail before the rail cutting, else the track of the machine will be affected and that will lead a bad welding quality.
 7. Notice: Don' t knock on the rail!
 8. The rail made of manganese steel is elastic and wearing to some degree, so do not bend it when using or the rail will not come to its raw condition.
 9. Notice: Must tighten the screw of the universal wheel when cutting line.
 10. Be careful not to drop the machine and the cutting steel when finishing the great circle cutting.
 11. You should release the screw of the universal wheel to make the universal wheel revolute flexibly when cutting circle or arc.
 12. Direction changeover switch
 - The direction changeover switch is used to change the direction of cutting between clockwise and anticlockwise. Check the running direction or the direction of revolution button before cutting.
 - When changing the direction of running, make the driving button in the stop position. And change the direction of running after the machine comes to a full stop.
- Instruction: Before electrifying, it is necessary to check if the driving button is in the stop position. It is very dangerous to turn on the machine when the driving button is in the on position.
13. Dot not touch the revolution parts during the operation process, because it is very dangerous!
 14. Keep the machine from vibrating during the cutting process.
 15. The gas used for the cutting process is dangerous in the case of wrongly used, so it is necessary to connect the fuel gas hose correctly..
 16. You must close warm-up liver and gas liver when checking the running of the installing before operations and cut-allocation.
 17. The bottom of the nozzle, torch and the butterfly-screws etc are very hot after cutting, so

it is necessary to wear gloves if you want to touch them.

18. You must not drag the cable conductor of power supply.

19. Don't leave the machine alone before it flames out.

20. The gas-in junction must be locked tightly used the hose-hoop in order to prevent serious accident caused by gas leakage.

21. When the fuse burns out frequently, it is not allowed to use the fuse bearing high-current before finding out the cause.

22. When moving the machine it is not allowed tot drop, bump or shake it strongly.

1.1.4 Electrical system precautions



1. Be sure to check the input power voltage of the machine before operation. The input power

voltage should be in the range of $\pm 10\%$ of the rated voltage. The machine should not be operated out of this range.

2. The metal plugs are screw-threaded, therefore, fully tighten them so that they will not come loose during operation.

3. Be sure to ground the power cable of the machine.

4. Stop operation and turn off the power in the following cases, and ask a qualified electrician to repair the machine.

1) Broken or abraded cables

2) When the machine has been in contact with water, or in case of liquid damage to the machine.

3) Abnormal machine operation despite operating the machine according to the instruction manual

4) Machine breakdown

5) Poor machine performance the requires repair

5. Periodically inspect the electrical system.

1.1.5 Maintenance and inspection precautions



1. Ask a qualified electrician to perform repair and inspection service.

2. Disconnect the power plug before inspecting and repair the machine.

3. Maintain the machine periodically.

1.2 Gas cutting safety precautions.

Strictly observe the safety rules and precautions to ensure the safety of gas cutting operations.

Operators and supervisors MUST keep safety in mind.

1.2.1 Prevention of explosion



1. Never cut pressurized cylinders or hermetically sealed containers.

2. Ensure sufficient ventilation for gas cutting to prevent the air from becoming stale

1.2.2 Pressure regulator safety precautions

1. Before starting operation, check that all pressure regulators are operating correctly.
2. Ask a skilled repair engineer to perform maintenance and inspection service.
3. Do not use pressure regulators from which gas is leaking, or malfunctioning pressure regulators.
4. Do not use pressure regulators smeared with oil or grease.

1.2.3 High pressure gas cylinder safety precautions

1. Never use broken cylinders or cylinders from which gas is leaking.
 2. Install cylinder upright and take measures to prevent them from falling.
 3. Use cylinders only for specified purposes.
 4. Do not smear container valves with oil or grease.
 5. Install cylinders in a place free from heat, sparks, slag, and open flame.
 6. Contact the distributor if the container valves will not open.
- Never use a hammer, wrench, or other tools to forcibly open container valves.

1.2.4 Safety precaution for hoses

1. Use the oxygen hose for oxygen gas only.
2. Replace cracked hoses or other hoses damaged by sparks, heat, unshielded fire, etc.
3. Install hoses without twisting.
4. To prevent breakage of hoses, take great care during operation and transportation.
5. Do not hold the hoses when moving the machine.
6. Periodically check the hoses for damage, leakage, fatigue, loose joints, etc, to ensure safety.
7. Cut hoses to the minimum possible length. Short hoses reduce hose damage and pressure drop, as well as reduce the flow resistances.

1.2.5 Safety precautions for fire

Take safety precautions to prevent fire prior to gas cutting.

Ignoring hot metal, sparks, and slag could cause a fire.

1. Keep a fire extinguisher, fire extinguish sand, bucket full of water, etc. ready on the site where gas cutting is performed.
2. Keep flammables away from the cutting area to avoid exposure to sparks.
3. Always cool down steel plates that have become hot after cutting, as well as hot cut parts or scrap, before bringing them close to flammables.
4. Never cut containers to which flammable materials are stuck.

1.2.6 Safety precautions for skin burns

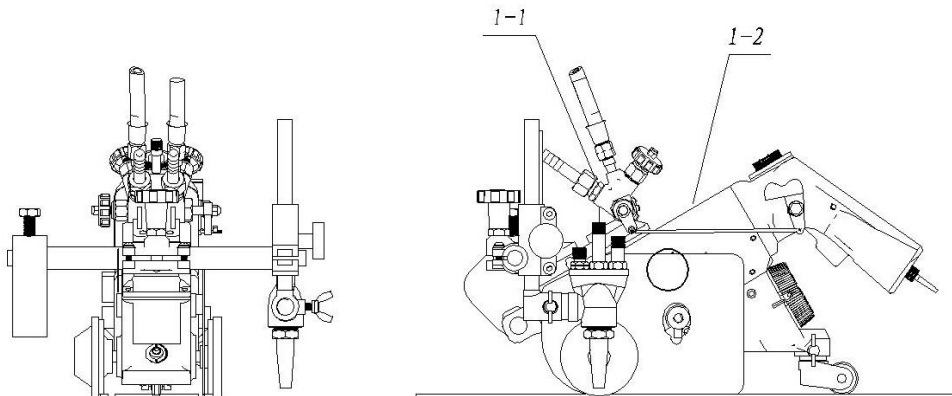
Observe the safety precautions to prevent skin burns. Ignoring heat, spatter, and sparks during operation could cause a fire or burned skin.

1. Do not perform cutting near flammables. (Move flammables well away from the sparks.)
2. Do not cut containers filled with flammables.
3. Do not keep lighters, matches, and other flammables nearby.
4. Flames from the torch will burn the skin. Keep your body away from the torch and tip, and check the safety before operating the switches and valves.
5. Wear the correct protectors to protect your eyes and body.
6. Correctly tighten the tip to prevent backfire.
 - When fixing a tip to the torch, tighten the nut with the two wrenches attached.
 - If the tip is tighten excessively, it will be heated during cutting and tightened still more, making it difficult to remove the tip.
 - Avoid damaging the taper of the tip since this may cause backfire.
7. Check with soapsuds for any leakage of gas from the connection part of the distributor, hoses and torch. Never use oil or grease on the connection of the oxygen pipe to avoid backfire which may lead to explosion.
8. Be sure to check the following when igniting:
 - Place the torch on the torch holder before igniting.
 - Always wear the required protectors (gauntlets, helmet, goggles, etc.)
 - Check for any obstacles, dangerous materials and flammables near or in the direction of cutting.
 - The surface temperature is very high, so don't touch it even you wear gauntlets.

2 Location of safety labels

Safety labels and other labels for correct operation are affixed to the machine.

- Carefully read the labels and follow the instructions on them when operating the machine.
- Never remove the labels. Keep them clean and legible at all times.

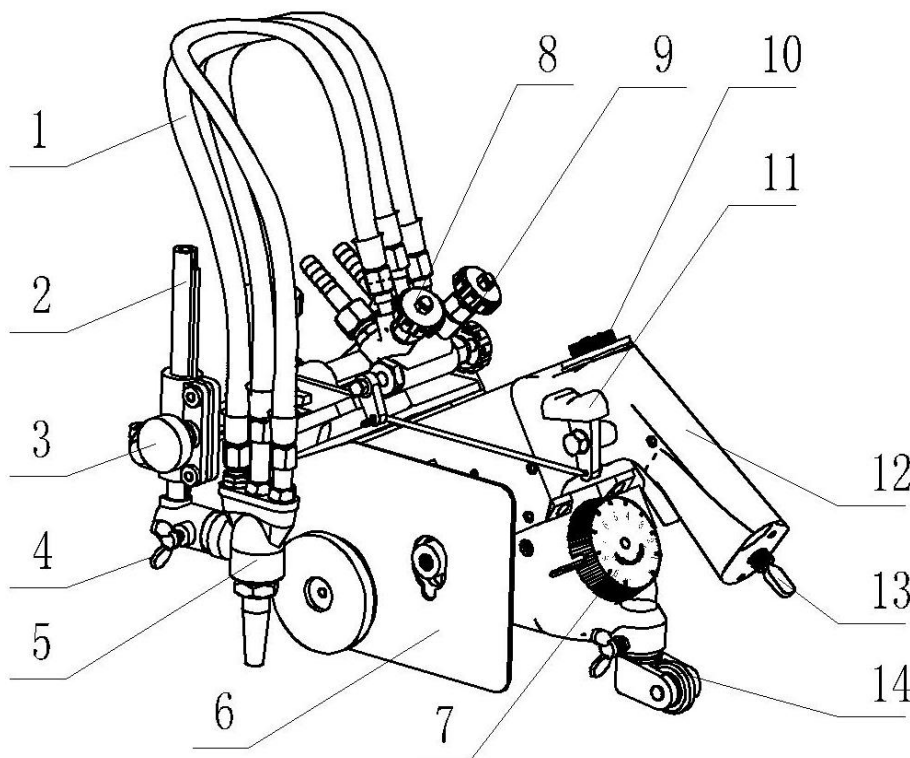


3 Outline of machine

3.1 Features of machine

HK-93-II is a kind of portable automatic gas-cutting machine, and you can know from its name “Eagle cutting machine” that it is characterized by rapid moving, convenient, and easy to fast turning. It is widely used and has a proper structure and good looking. Its operability and durability has been well improved after years of using and under some customers’ guide.

3.2 Name and function of each section



1. Adjusting handle: When traversing the handle, the torch moves left or right.

2. adjusting handle: When traversing the handle, the torch moves up or down.

3. Contrate gear rack

4. Thermal baffle: Stop the thermal diffuse outside.

5. balance-weight

6. two-port valve: Adjust the gas-flow rate.

7. On-off handle: Hold tightly the machine is off and hold loosely the machine is automatically on.

8. Adjusting handle: Adjust the moving speed.

9. Power socket

10. Cutting oxygen switch.

11. Gas delivery hose.

12. Normal-reverse switch.

13. Universal wheel

14. cutting nozzle

3.3 Specifications

1 Weight (body)	: 8.5 KG
Accessory	: 3.8 KG
2.Machine dimension	: 420×290 ×250H (mm)
3.Speed control	: SCR control
4.Power source	: AC 220V±10%
5.Cutting speed	: 50 ~ 1000 mm/min
6.Cutting thickness	: 5-30 mm
7.Bevel angle	: 0 ~ 45°
8.Diameter of the cutting circle	: Φ 50 ~ Φ 550 mm
9.Tip	: G02(for acetylene)orG03(for propane)
10.Motor	: DC110V 50HZ 30W 4200RPM

4 Preparation for operation

4.1 Contents of package

Carefully take the machine out of its case. The contents of the standard package are shown below. Check them carefully before assembling the machine.

1) Body	1set
2) Unit assembly of the standard torch	1 set
3) balance-weight	1 set
4) Tip G02 or G03 #1,2,3	1 pc each
5) up-down foundation(Include contrate gear rack)	1 set
6) Gas-in junction	1 set
7) Spanner	1 set
8) Specification sheets and certificate of qualification	1 pc each
9) Power cable	1 set
10) Radius gauge(set screw)	1 set
11) Special clamping fixture for groove	1 set
12) M5 inner hexagon spanner	1 set
13) Phillips screwdriver	1 set
1) Body	1set

Standard accessories:

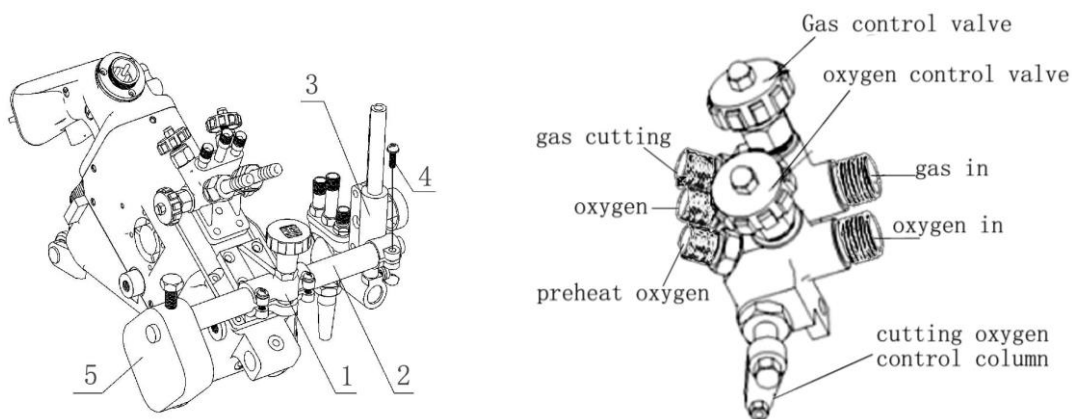
1 scoop channel caterpillar track 1set

4.2 Machine assemble

1. Take machine out of packing box carefully
2. Insert the contrite gear rack (2) to the fixed amount of the in the machine.
3. Adjust a proper distance of run and then lock it by the screw.
4. Take out the up-down moving unit assemblage (3) and install it to the contrite gear rack(2) then fix it using the curved face hand grip(4).
5. Install the balance counter weight (5) to the contrite gear rack (2) and fix it with screw M10.
6. Insert the torch into the gripper.

NOTE: The balance counter weight is very useful in keeping the machine balanced so it is necessary to use it. The barycentre of the machine is different in the different position of the balance counter weight, and you can change the barycentre according to the working condition.

7. Connect the primary hose to the gas distributor and make sure the connection is correct. (As shown in the graph)



4.3 Preparation before operation



4.3.1 Connection of power cable

1. Before plugging the metal plug of the power wire in the metal consent on the machine side, make sure that there is no sundries or dust.
2. The metal plugs are screw-threaded, therefore, fully tighten them so that they will not come loose during operation.

4.3.2 Connecting the tip

1. Select a proper tip according to the thickness of the steel plate and attach it to the torch.

(To select a tip, refer to the cable of Cutting Data.)

- When fixing a tip to the torch, tighten the nut with the two wrenches attached.
- If the tip is tightened excessively, it will be heated during cutting and tightened still more, making it difficult to remove the tip.
- In addition, avoid damaging the taper of the tip since this may cause backfire.

4.3.3 Adjustment of speed:

Turn on the clutch after the machine is running and select the cutting speed according to the thickness of the rolled steel. Turn from “ 0” to “ 10” means pushing the speed and “ 10” to “ 0” the reverse.

5 Cutting operation

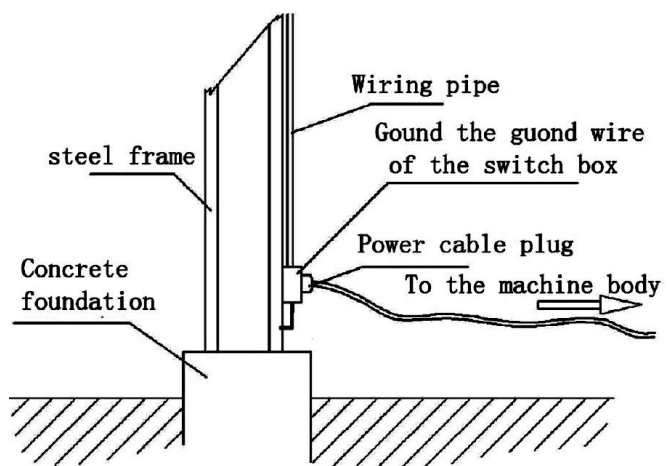
5.1 Safety measures prior to operation

5.1.1 Safety precautions for grounding the machine



The cable of this machine is equipped with a grounding wire. For safety, be sure to ground the wire as follows, in addition to checking the connection of the power cable.

(As shown in diagram)



5.1.2 Selection of tip

Referring to the Cutting Data, select the suitable tip according to the plate thickness. For a heavily rusted plate or for a bevel cutting angle of more than 20°, select the tip one grade higher than the one shown in the Cutting Data.

5.1.3 The Switches for running direction conversion



1. The switch on the device is used for converting between moving ahead /backing off in line cutting or clockwise/ inverted hour in circular cutting. Check the direction of running or rotation.
2. Restore the driving rotating knob to the stop position when you want to change the direction. Change the direction after the device completely stops.

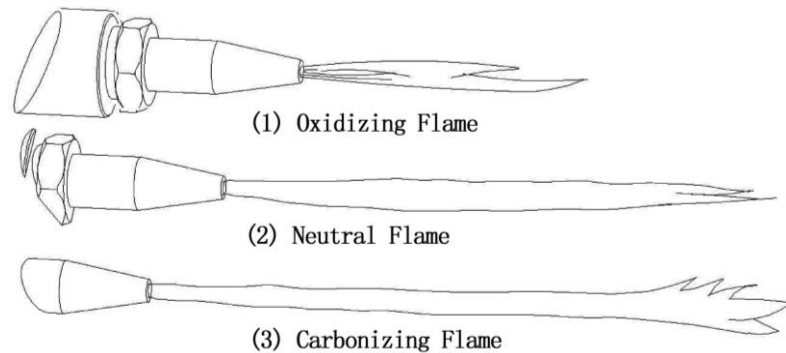
NOTE: It is necessary to check if the driving button is turned off, if not, it is very dangerous for a start-up action.

5.2 Ignition and flame adjustment

NOTE: Adjust the gas pressure according to the Cutting Data. The data shows the pressure when all valves are open. Readjust the pressure after ignition.

1. Open the fuel gas valves 1/4 to 1/2 a turn, and light the torch with an igniter.
2. Then, open the preheating oxygen valve gradually until a white cone of the standard flame gas been obtained.(The incandescent area should be uniform and about 5-6 mm in length.)

3. Open the jet oxygen value fully. Readjust the flame if its condition has changed. A disorderly flow of the jet oxygen will adversely affect the quality of the cutting surface. In such a case, clean the tip with a suitable cleaning needle while the jet oxygen is flowing.
4. Appropriate distance between the tip end and cutting surface:
 - Acetylene gas8-10mm
 - LPG gas5-8mm
5. Neutral flame ensures good quality cut surfaces. (Oxygen flame may be used for bevel cutting.) Oxygen flame causes short cutting-oxygen current, allowing slugs to adhere, melting the upper edge of the cutting surface, and causing adverse effects on the cut surface. Similar defects will result when the cutting oxygen pressure is too high.



5.3 Cutting and piercing method

1. Cut in from the end of steel plate.
 2. Pierce steel plate before cutting.
 3. Drill a hole before cutting.
- Piercing method
- 1) Ignite and adjust the flame.
 - 2) Thoroughly preheat the cut-in point until it is white hot.
 - 3) Open the cutting oxygen valve to pierce the steel plate. The tip should be about 15-20 mm from the plate to prevent slag from splashing onto the tip and adhering there, which will shorten the working life of the tip.

5.4 The steps for starting the cutting operation and extinguishing the flame

1. Align the nozzle with the starting point, fire up and then adjust the flame.
2. Fully preheat the cutting start point.
3. Turn on the valve of the cutting oxygen gas for cutting 1/8 or more after preheating, then the pressure switch will switch on the motor power automatically. At that moment the machine begins to ambulate. If the valve doesn't open sufficiently, you can not run cutting through interlocking with the pressure switch. When cutting, you must turn on the pressure switch and cut off the power on the electrical cabinet.(set the pressure according to the cutting data)

4. Check the cutting state carefully, and control the speed with the rate fixer. Refer to the cutting data to find the suitable cutting speed.
5. Do as follows to extinguish the flame:
 - 1) Turn off the oxygen gas for cutting, at the same time the motor will stop working;
 - 2) Turn off the fuel gas;
 - 3) Turn off the oxygen gas for preheating.

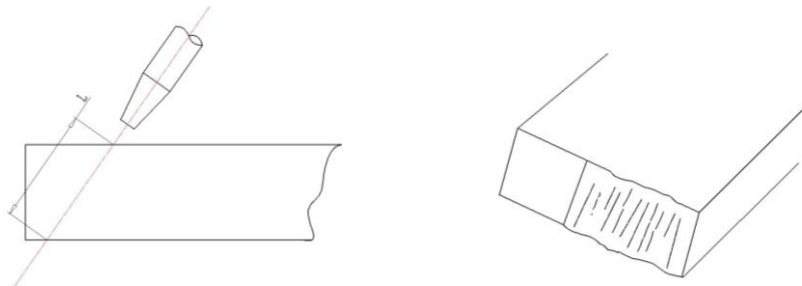
5.4.1 Thin plate cutting

When you cut thin plate such as 6mm :

- 1) Choose the right nozzle and suitable pressure according to the cutting data, and then adjust the flame to a weaker level.
- 2) Loosen the screw which moves up and down and always shapes into curved surface to make the nozzle inclined ahead, then start cutting. When the pressure of the oxygen gas for cutting is too high or the plate is over-heated, the departure of the plate will not be complete or there will be cinder at the bottom of the nick.

5.4.2 Cutting groove

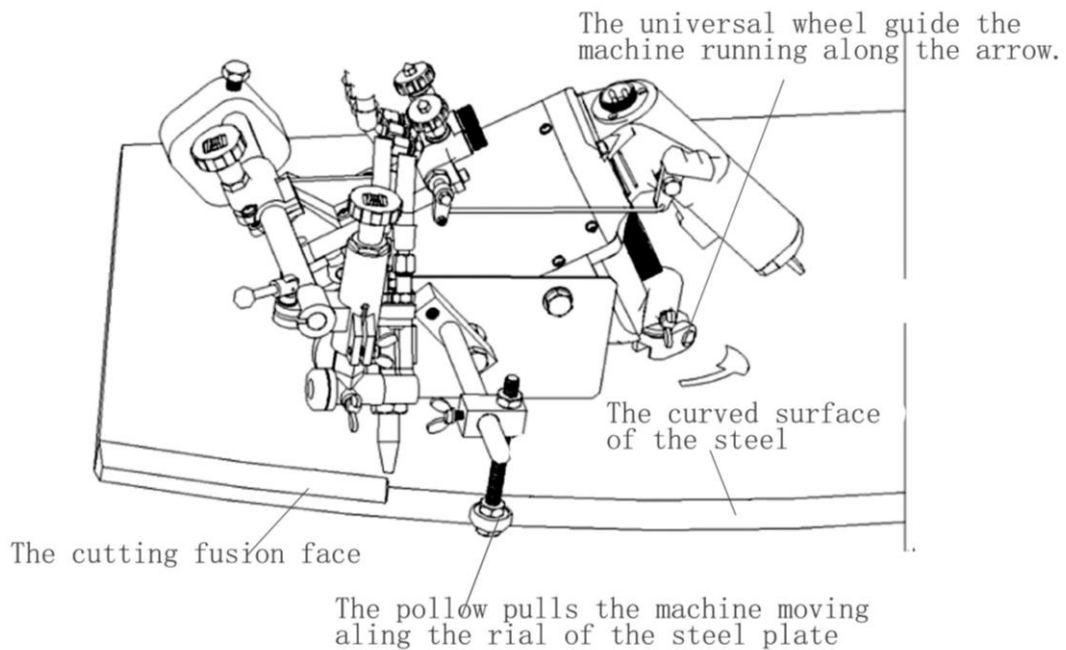
When cutting groove use the angle (use 5° as its basic unit) on the gripper of the cutting torch to allocate the torch on an expected angle. When choosing an cutting nozzle for groove cutting the thickness of the steel plane is L as the following figure indicates. In order to compensate the over-dose heat loss due to the groove cutting the operator should choose an upper rank cutting nozzle based on the cutting data. Blaze that is slightly oxygenized will lead to an increase of efficiency and set the speed with an decrease of 20%-30%. The groove cutting surface in the figure is an result of inadequate warming-up, that requires another choice of the cutting nozzle and readjustment of the warming-up and speed.



5.4.3 Curved surface groove cutting

Because of the special design of fixed with a groove locating device, HK-93-II can accomplish groove cutting for large curved surface. Operate as the method that the following figure shows: First make the rolling bearing lean against the curved surface of the steel plate which will be cut. Rotate universal wheel to a certain angle with the groove surface, and then tighten airfoil profile screw to make it fixed, which is used to guide the machine to move to the other side of the groove of the steel plate when the machine starts. The locating device leans against the curved surface of the steel plate, so the running device will not deviate from the trace on the curved

surface. The locating device is effective for line cutting as well.



5.4.4 Line cutting

Spare guide rail is needed most of the time when you carry out line cutting. The guide rail should be parallel with the line of cut down ahead of time and the distance should be 50-100mm. Adjust both road wheels and make them stuck on the both sides of the guide rail. The universal wheel will fall into the channel between the guide rail. Tighten the butterfly screw for locating.

Put the cutting torch on the cutting starting point. Fire up and adjust the flame. Completely preheat the starting point and turn on the cutting oxygen gas valve and the power. Adjust the speed with the speed adjusting controlling knob according to the cutting state.

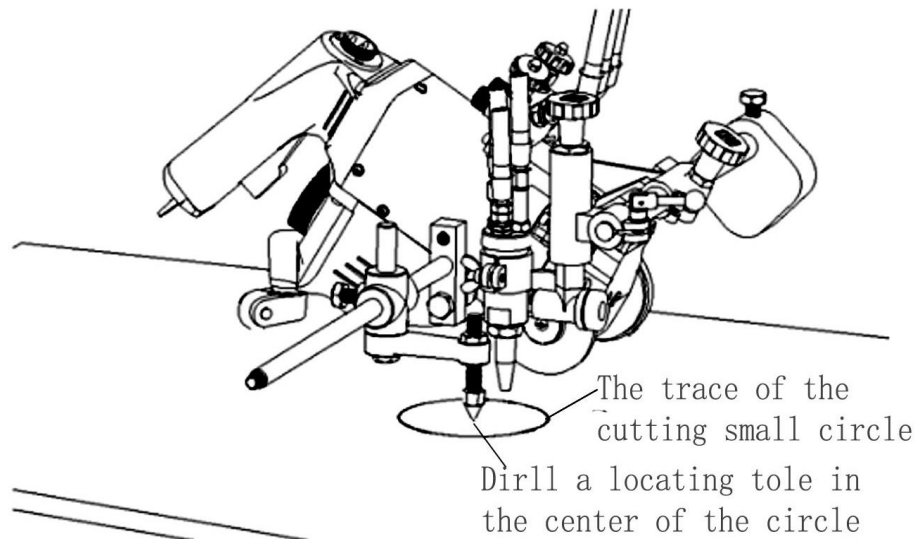
Turn on the oxygen gas for cutting totally. When the pressure for cutting is too high, this valve is used to lower the pressure so it can make the cutting operation easier.

The cutting length can be increased when lengthening guide rail is applied. If there is big soil block or splashing object, the device will shock strongly and as well cause damage to the cutting surface, so make sure that there is no solid blocks or splashing objects on the guide rail. If there is, clear it away immediately. By the way, don't hang any hose on the edge of the steel plate.

5.4.5 Circular cutting (Spare device)

There is some difference between large and small circular cutting. Refer to the figure below and place the corresponding parts as the figure shows.

Small circular cutting



Large circular cutting

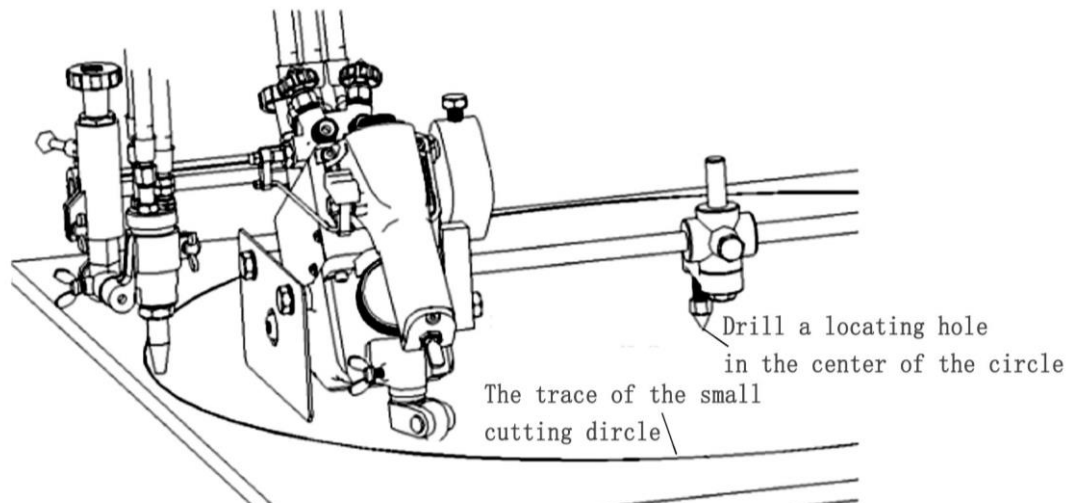


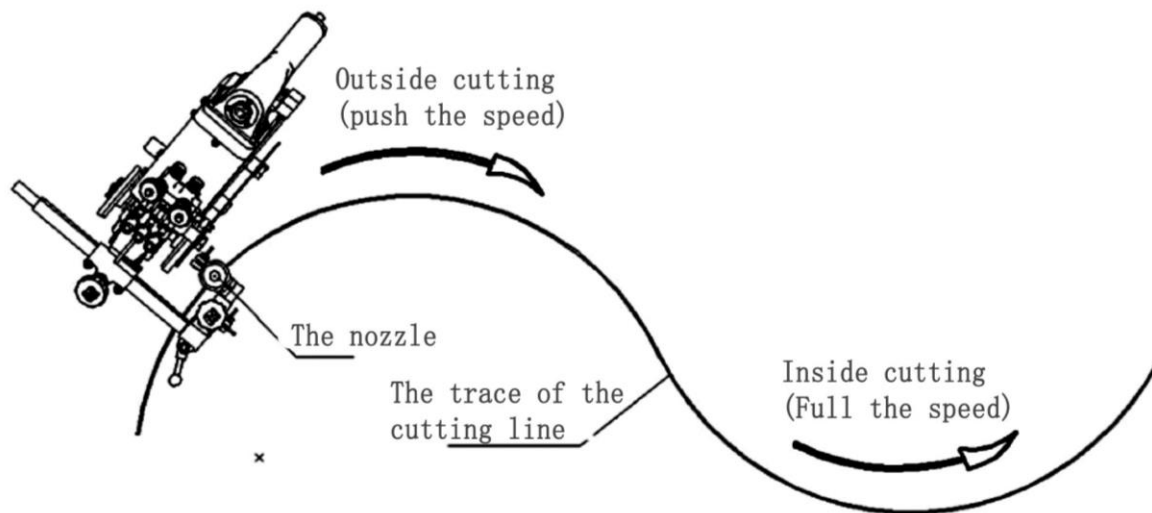
Illustration: No matter it is large or small circular cutting, you should always cut a hole in advance on the surface of steel plate in the centre of the circular cutting ,as a locating centre hole which is 60°and deep.

1. Fix the circular cutting radius arm (1) into the hole in front of the machine, and then screw it up with M10 screws.
2. Fix the radius gauge (2) to the circular cutting radius arm (1), adjust it to a suitable position and then lock it with locating butterfly screw and locate it in the middle of the punched hole in the steel plate, adjust the allocation screw in order to make the propelling wheel suspending on the steel plate at the distance of 1~2mm then tighten the screw.
3. Loosen the butterfly screw on both sides of the universal wheel, making it easy to rotate.
4. Fix the cutting torch vertically and place the nozzle on the line drew previously. Loosen the clutch and then push the device around the centre for one circle and check if the machine can move on the cutting trace that is demanded.

5. Pay attention to the leather hoses and the wires and check if they are winding. Make sure they won't bring trouble, or else they will affect the trace of the machine, as a result you can not get needed quality.

5.4.6 Manual oriented cutting

Make off on the steel plate, and mark the cross point where a line meets a curved line. Rotate the adjusting handle of the cross sliding rack, and move the nozzle to the position that is 30-50mm far from the driving wheel. Hold the oriented handle with your forefinger and middle finger to disengage clutch. Make the guide roller free to move and move the machine to the starting point. Arrange the leather hoses and the wires and make sure that they won't cause trouble to the cutting work. Completely preheat the starting point, and then rotate the control rod with your thumb to turn on the cutting oxygen gas, at the same time switch on the power and make the machine move along the orientation of the oriented handle, guide the machine to cut manually. Make the nozzle cut along the line drawn previously. Make sure the machine only work under the driving force of the motor (Don't push or pull it manually.) and guide the machine only by your hand. Smooth surface can't be obtained if the machine shocks strongly. (as illustrated in the figure)



5.4.7 Small radius circle cutting:

Get the torch close to the propelling wheel and put the fore-finger on the speed console-panel in order to modify the cutting speed when the torch reaches the circular. Get back the machine to the original speed immediately after the torch get out of the circular. When cutting circle which is smaller than 50mm through the inner side, slow down the speed until the machine stops at the initial point of the arc and then lead the machine along the cutting direction to the end and restart the speed.

5.4.8 Wedge angle cutting:

Turn off the control column for cutting oxygen using the thumb when the torch reaches the tip of the wedge angle and at the same time declutch the propelling wheel by holding tighten the

clutch hand grip under the guide grip, drive the machine to a new direction that is align to the drawn line. Warming-up the start point again and turn on the control column for cutting oxygen then unclamp the clutch to begin a new cutting process.

Note: It is a long time of practice before you become a skillful operator. However, please practice more and master the skill of manually guide and only can this exert the strong suit of the machine.

5.5 Safety measures against backfire and flashback

5.5.1 Prevention of backfire

Backfires may cause serious accidents or fire. Be careful to prevent such disaster. When a Backfire occurs, find the cause and inspect and maintain the machine correctly before using the machine again.

The followings are causes of backfire:

1. Improper gas pressure adjustment
2. Overheated tip
3. Slag clogged in tip
4. Damage to the tapered section of tip or torch will cause backfire.

5.5.2 Prevention of flashback

Flashback could cause fire and break the machine. Should there be a hissing sound in the torch, quickly take the following action:

1. Close the preheating oxygen valve.
2. Close the fuel gas valve.
3. Close the cutting oxygen valve.

Should flashback occur, find the cause and take appropriate action before using the machine again.

6 Maintenance and inspection

Refer to the following points for maintaining and inspecting the machine in order to use the machine under the best conditions.

6.1 Maintenance of the gear case

Because there are gears that run at a high speed in the gear case, so the operator should remove the shell of the machine, take out the gear case and wash the gears and the case with detergent every seven months. When reassembling, we should put new lubricant into the machine. If the turbine is abraded, we must change a new one.

6.2 Maintenance of the tip

The durability and security of the tip used in HK-93-II is very good. So the operator should abide the right maintenance and carriage precautions in order to ensure cutting quality.

1. Put the torch up a little and keep a 15mm distance from the plate when piercing, in order to avoid injury when the flame back up.
2. Clean the jet hole of the tip carefully use suitable dip washer.
3. Pay attention not to damage taper seat.

Replace the tip if the following cases occur.

- a. The injection stream of cutting oxygen can't extend straightly.
- b. The injection stream of cutting oxygen bifurcates at the end.
- c. The click may be heard in the tip when cutting.
- d. The gas leaks and burns at the hold-down

6.3 Maintenance of carbon brush

Remove the carbon brush cap to ensure the state of carbon brush every three months or 1000 hours. If the length of the carbon brush doesn't reach 3mm, the operator should change it to a new one. When change the carbon brush, the operator must check that whether put the carbon brush in right place. The direction of the carbon brush must be right and the flexure should be consistent with commutation.

7 Troubleshooting

1) The electric engine can't move

Possible Cause	Inspection Step	Correction
1) Power is not supplied	Check the power supply	
2) Fuse blown	Check the fuse	Replace
3)Defective Drive- switch	Check that whether the click can be heard under the condition that the switch is on. (The click shows the switch doesn't be damaged.)	Repair
4) Broken power cable	Check the cable with a tester.	Repair or Replace

2) The motor will not run while the power supply is on.

Possible Cause	Inspection Step	Correction
Disconnection of 10Ω resistance	Remove the electric panel and check whether the resistance is good.	Replace
Carbon brush of motor is jammed	Take out the carbon brush, grind the forepart and fix it. If the problem can't still be solved, then change a new one.	Replace

3) During operation, the machine vibrates much and brings a big noise.

Possible Cause	Correction
1) Skidding gear	Remove the gear case apart and rivet the gear again.
2) Damaged gear	Check whether the turbine has been worn and worm has bad burr. Then replace the bad parts.
3) Damaged motor	Change the motor.

4) Gas leakage and fire leakage.

Possible Cause	Correction
1) The 30° taper is not contacted well due to incorrect usage.	Mend the 30° taper carefully with thin emery cloth to make it contacted well.
2) The cater nut is not tightened.	Tighten the cater nut.

5) The cut flame is instability

Possible Cause	Correction
1) The duct tip is jammed by impurity.	Make the duct expedite with needle.
2) The gas pressure is not enough and oxygen fineness is low.	Check air-feed pressure oxygen fineness whether in state confine.

8 Maintenance illustration

If you operate the machine according to the operating manual and the machine generates occurs accidents because of the product quality, we guarantee to keep the machine in good repair free of charge in half year based on invoice from the day we sell. According to the rules, if the following cases occur, we can't keep the machine in good repair free of charge:

- 1) The damages are led because of incorrect carriage or improper keeping.
- 2) The damages are led because of operating not according to the instruction manual and beyond the specified range of voltage.
- 3) The machine don't have maintenance card and receipt invoice.
- 4) The maintenance card don't match the machine.
- 5) The damages are led by natural disasters or some irresistible incidents.
- 6) The damages are led because the machine is taken apart by unprofessional person
- 7) The damages are led because of using the fitting parts and accessories, which don't belong to our company.

(Illustration: Do not inform if the specifications and technical contents of the machine have been modified!)

Acknowledgment

Honored company to choose the company's production

The main production of the company:

CG1-30	Carriage gas flame cutter
CG1-30A	Precision gas flame cutter
CG1-30H	Fast carriage gas cutter (Can ticket plasma torch cutter)
CG1-100	Gas flame cutter (two torches)
CG1-100	Aprrecision gas flame cutter (two torches)
CGD2-100	Multi-head gas flame cutter (three-five groups of torches)
CG1-2H	H beam cutter
CG1-75	Ingot gas cutting machine
CG1-13	Multi-direction gas cutter
CG2-150	Profiling gas cutter
CG2-150A	Profiling gas cutter (cutting dia.1800mm)
CG2-2700	Move style profiling gas cutter (cutting dia.2700mm)
CG2-600	Circular cutter
CG2-11	Magnet pipe gas cutter
CG2-11G	Hand pipe cutter
CG2-11D	Automatic pipe gas cutter
HK-30	Portable cutting machine
HK-30A	Multi-using cutter
HK-55	Handy auto kit
HK-66	Metal cutter
HW-2000	Automatic welding machine
HK SERIES	Auto- welding carriage
KMQ SERIES	Portable profiling cutter
LGK8 SERIES	Air plasms cutting machines
CG SERIES	Multi-head straight cutting machines (five-twenty groups of torches)
HNC SERIES	Numerical control flame / plasma cutting machine
ZYHC SERIES	Auto-control far-infrared electricity welding dryer machines
TRB SERIES	Welding dryer
YJJ-A SERIES	Suction flux drying machine

WELDING&CUTTING FUTTINGS:

The regulator of Oxygen, acetylene , propane , argon and CO₂; Handmade-welding torch and handmade-welding tip;

Acetylene, propane equi-pressure tip, pitch needle, conduit conflux and so on cutting and welding fittings.