Portable Automatic Gas Cutter

BFA00B14

CIR CUT

Piercing Cutter

OPERATION MANUAL

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.

KOIKE SANSO KOGYO CO.,LTD.

INTRODUCTION

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

Cooperation between colleagues in the workplace is essential for safe, smooth operation. Make sure you read, understand and take all 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 operates the machine can refer to it as necessary.

■Do not use the machine carelessly without following the instructions in the manual.

■Use the machine only after you have completely understood the contents of the manual.

■If an explanation in the manual is difficult to understand, contact our company or sales service office.

■Keep the manual to hand at all times and read it as many times as is necessary for a complete understanding.

■If the manual becomes 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 have either of the following qualifications:

1. Gas welding foremen's license
2. Completion of gas welding training course
3. Approval by the Minister 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 port.
	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 damage.
	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.

CONTENTS

1 Safety information

Many accidents are caused by operation, inspection, and maintenance which disregard the basic safety rules. 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 at places that could cause injury or serious accident.

■CAUTION 

This word is used in a caution message and a caution label 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 fully 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.When changing the direction, make sure that the direction switch is in the neutral (stop) position, and operate the direction switch after the machine has stopped.

7. Always turn the power off when not in use.

8. 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. Mount and center the machine correctly and confirm correct motion before operation.
3. Before connecting the power plug to the outlet, make sure that the power switch is in the OFF position (or the normal/reverse changeover switch is in the stop position).
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. Take great care of spatters and dross when operating the machine at a high position. They may injure people below.
7. Be sure to secure the magnet for fixing the machine before cutting.
8. When the machine will not be used for cutting, set the magnet switch in the OFF position. (In the case of CIR-CUT Ⅱ)
9. Be sure to secure the leg with wing bolt.
10. When the machine is in operation on a wall or in a high place, it may fall due to vibration; therefore, correctly secure the machine with a safety bracket or rope.
11. When attraction surface of the magnet is not in complete contact with the steel plate, the machine may fall. Completely remove any dust or other undesirable substances from the attraction surface. (For prevention of drop in attraction force or poor cutting operation)
12. Secure the turning pipe with a stopper to prevent it from falling.
13. Be sure to hold the handle when carrying the machine.
14. Be sure to secure the clutch with the wing bolt before cutting.

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 ±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 that 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 repairing 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, nor 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 are leaking.
2. Install cylinders 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 precautions 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 resistance.

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.

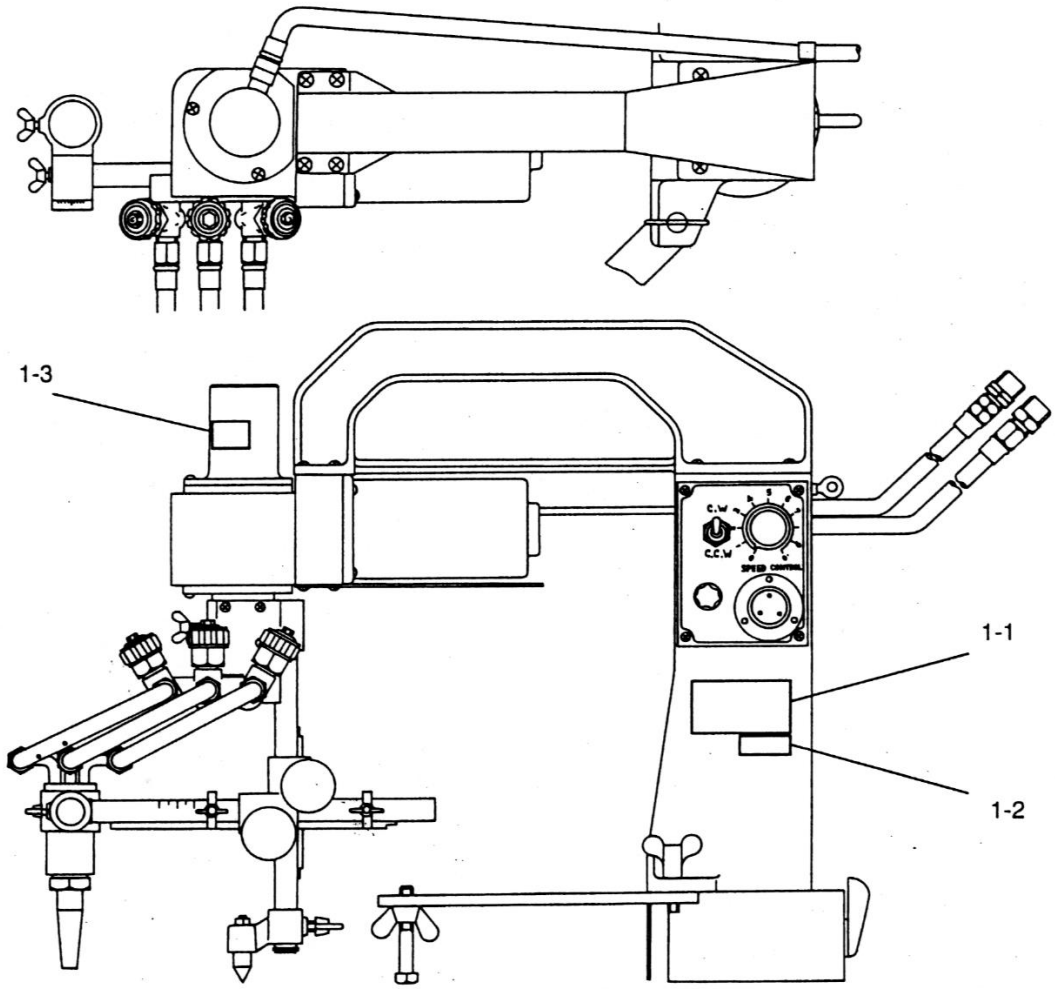
1. Do not perform cutting near flammables. (Move flammables well away from the sparks.)
2. Do not cut containers filled with flammables.
3. Do not keep lighters, matches, and other flammables nearby.
4. Flames from the torch will burn the skin. Keep your body away from the torch and tip, and check the 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 tightened 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, hose 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. Determine the gas pressure.
   - ●The gas pressure must be within the appropriate range. (For the gas pressure, refer to the Cutting Data.)
9. The torch, tip and heat shield are heated to a very high temperature. Always wear gauntlets when handling them. Also the surface after cutting is very hot so do not touch it even while wearing gauntlets.
10. Never move the machine while the preheat flame is on.

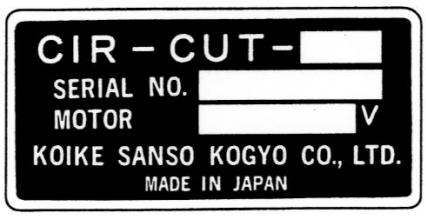
2 Location of safety labels

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.

2.1 Cir-cut (I)





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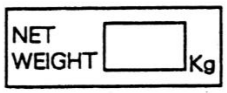

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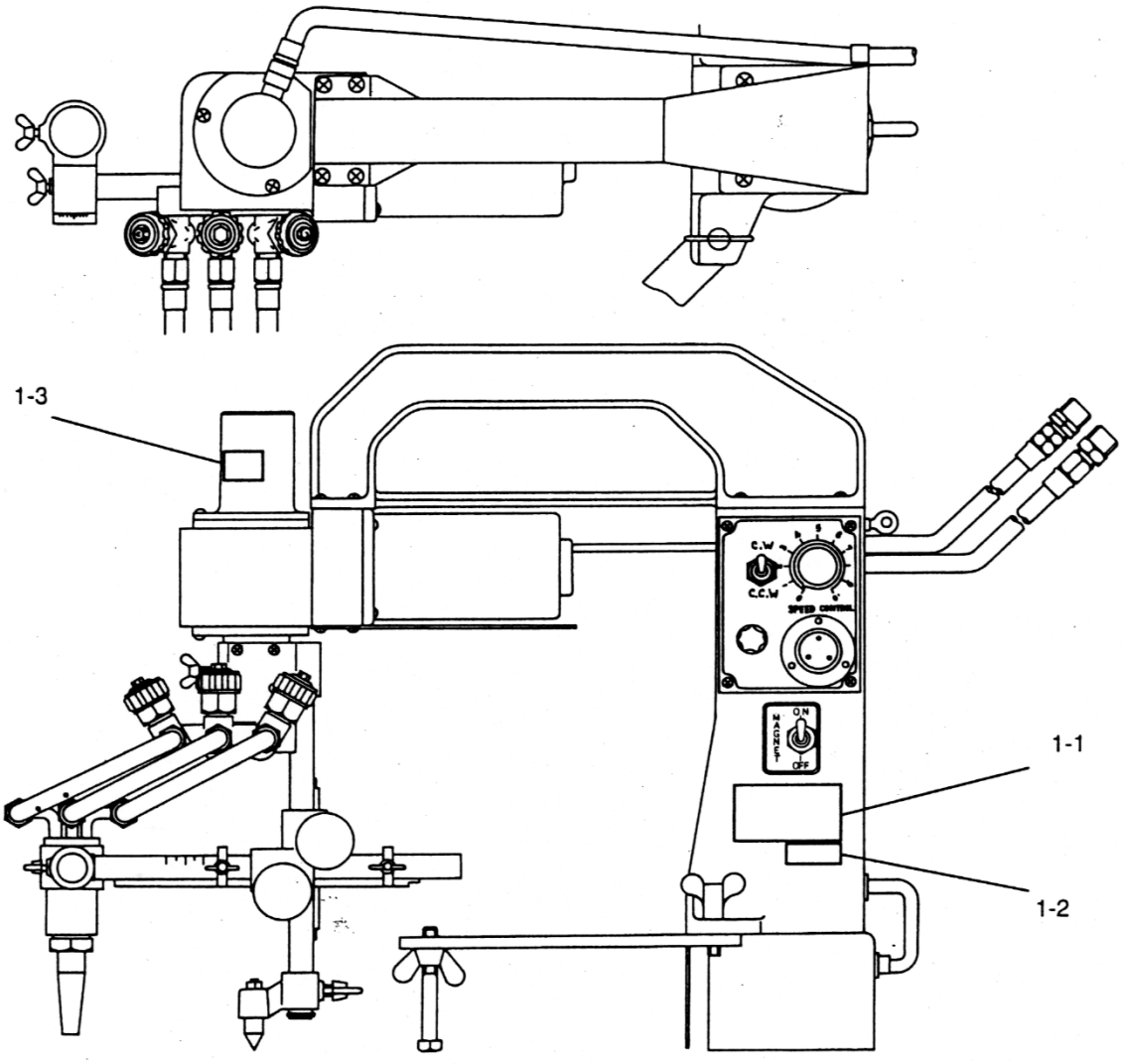
2.2 Cir-cut (II)



CIR－CUT－
SERIAL NO.
MOTOR V
KOIKE SANSO KOGYO CO., LTD.
MADE IN JAPAN

1-1

NET WEIGHT Kg

1-2

《WARNING》→
DON'T CLOSE THIS HOLE. THIS IS FOR LEAK INSPECTION.

1-3

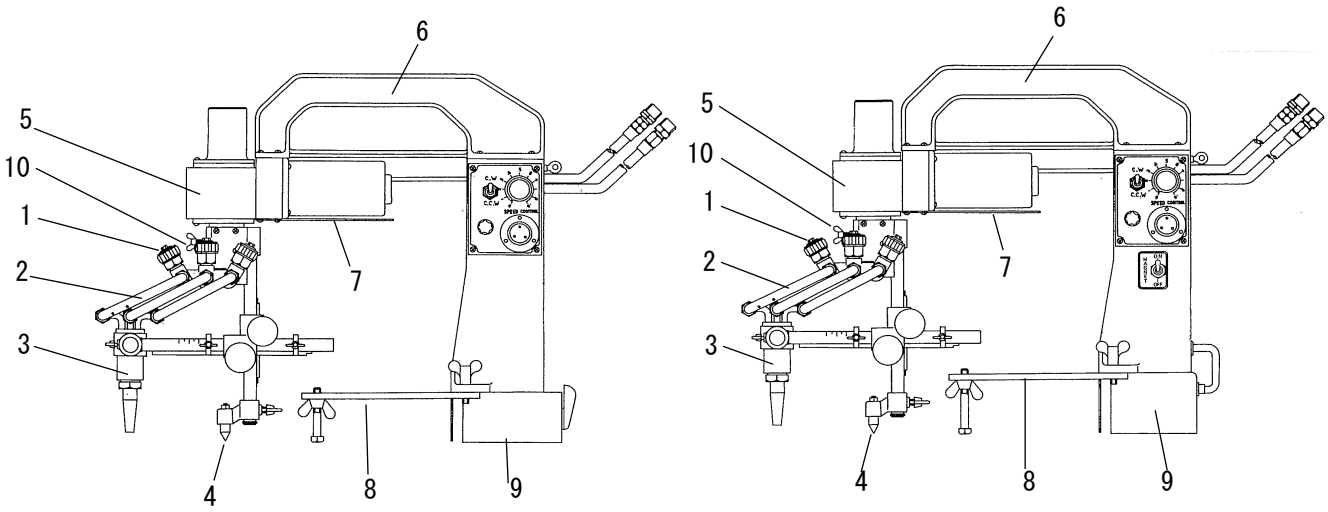
3 Outline of machine

3.1 Features of machine

CIR-CUT is composed of a torch, cut radius adjustment device, rotary distributor, drive unit, operation panel, and gas equipment. A magnet is used for CIR-CUT Ⅰ, while an electromagnet is used for CIR-CUT Ⅱ.

3.2 Name and function of each section

CIR-CUT (Ⅰ) **CIR-CUT (Ⅱ)**



1. Gas distributor

Controls the flow rate of preheating oxygen, fuel gas, and cutting oxygen to produce flame.

2. Hose

A set of hoses between the gas distributor and the torch, consisting of a preheating oxygen hose, fuel gas hose, and cutting oxygen hose.

3. Torch

4. Center

The center is inserted into a punched hole in the center of a circle.

5. Gear box

6. Handle

7. Motor

8. Leg

9. Magnet

10. Clutch

If you loosen wing bolt, it can be rotated torch by hand.

3.3 Specifications

CIR-CUT (I)

Weight:	11kg
Power source:	100 ±10%
Speed control :	PWM control
Torch rotation speed:	0.6 - 6.0 rpm
Cutting thickness:	0 - 30 mm
Bevel angle:	0 - 45°
Tip:	102 (for acetylene) or 106 (for propane)
Gas:	Oxygen, acetylene gas, or LPG gas
Motor:	DC Motor, DC24V, 15W, 5000rpm
Clamping method:	Permanent magnet, MS-2 (100kg)
Cutting diameter:	ϕ 40 - ϕ 200mm

CIR-CUT (II)

Weight:	11.3 kg
Power source:	100 ±10%
Speed control:	PWM control
Torch rotation speed:	0.6 – 6.0 rpm
Cutting thickness:	5 - 30 mm
Bevel angle:	0 – 45°
Tip:	102 (for acetylene) or 106 (for propane)
Gas:	Oxygen, acetylene gas, or LPG gas
Motor:	DC Motor, DC24V, 15W, 5000rpm
Clamping method:	Electro magnet (300kg)
Cutting diameter:	ϕ 40 - ϕ 200mm

Standard accessories

Tip:	102 (for acetylene) or 106 (for propane) No.0,1,2 one each
Tip cleaner:	1 set
Lighter:	1 pc
Spanner(A,B,C,):	1 set
Fuse(1A):	2 pcs
Center:	1 set
Power cable :	1 pc

4 Preparation for operation

4.1 Contents of package (CIR-CUT I and II)

The contents of the standard package are shown below. Check them carefully before assembling the machine.

- ・Body: 1 set
- ・Gas distributor: 1 set
- ・Torch: 1 pc
- ・Torch holder: 1 set
- ・Hose
  - Distribution hose (3pcs set: 250L): 1 set
  - Primary hose (2pcs set: 560L): 1 set
- ・Power cable (3P x 5M): 1 pc
- ・Tip 102 (for acetylene) or 106 (for propane): 1 pc each
- ・Tip cleaner: 1 set
- ・Spanner: 1 set
- ・Fuse (1A) : 2 pcs
- ・Lighter: 1 pc
- ・Center: 1 set

4.2 Machine assembly

1. Carefully take the machine out of its case.
2. Carefully check that the torch holder, gas distributor, torch, etc. are in position.

4.3 Preparation for operation


4.3.1 connecting the power cable

1. Connect the power cable to the body.
2. Before plugging the metal plug on the cabtyre cord side into the socket on the machine side, check there is no dust inside.
3. The metal plugs are screw-threaded, therefore, fully tighten them so that they will not come loose during operation.

4.3.2 Connecting the gas supply hose

1. Connect the respective gas supply hoses to the primary hose.
2. Securely tighten the joints and check there is no gas leak.

4.3.3 Connecting the tip

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 table of cutting data.)

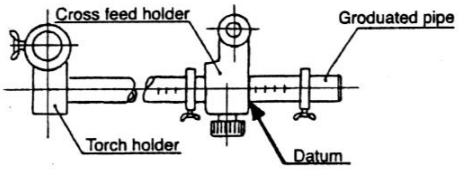
・When fixing a tip to the torch, tighten the nut with the two wrenches attached.
・If the tip is tightened excessively, it will be heated during cutting and tightened still more, making it difficult to remove the tip.
・In addition, avoid damaging the taper of the tip since this may cause backfire.

4.3.4 How to determine cutting diameter

1. The graduation on the graduated pipe represents the diameter c e to be cut. The datum point for aligning the graduation is the edge of the cross-feed holder opposite to the torch side.
2. Calculate the cutting width of the tip. The cutting width is 1.5-2.0 times as large as the cutting oxygen hole diameter.

   (Example) When the plate is 20 mm in thickness and 100 in dia.
   The cutting tip is #2, and the oxygen cutting hole dia. of the #2 tip is 1.4.
   The cutting allowance is 1.4 mm x 1.8 = 2.54
   When the cut piece is needed, the graduation will be 100 dia. + 2.52 mm = 102.52 dia.
   When the cut hole is needed, the graduation will be 100 dia. - 2.52 mm = 97.48 dia.
   Set the stopper at the above values.
3. Stopper setting

   The graduation on the graduated pipe represents the diameter of a circle to be cut. The datum point for aligning the graduation is the arrow on the cross-feed holder. (See the figure on the right.) The stopper to be used when the cut piece is needed (outside cutting) and that to be used when the cut hole is needed (inside cutting) are different. When the cut piece is needed, use the stopper on the torch side to set the cutting diameter, and when the cut hole is needed, use the stopper on the outside.



   1) Align the center with the punched mark. Lift the center so that the distance between the center and the steel sheet will be 0.5-1 mm by means of the wing bolt on the center holder.
   2) Secure the machine with the magnet.
   3) The cutting speed (number of revolutions) differs according to the diameter of the cutting circle and the sheet thickness. Set the number of revolutions by means of the speed adjustor.
   4) When cutting small circles, loosen the wing bolt on the center holder to turn the center by 180 degrees, and set it on the side opposite to the torch to prevent the seizure of the center.

5 Cutting operation

5.1 Safety measures prior to operation

5.1.1 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.

■How to ground the machine

・The ground pin is attached to the rubber plug of a cabtyre cord. Please use a power receptacle with a ground pin opening.

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 Operation of rotating direction changeover switch

・Use the rotating direction changeover switch to change the direction of rotation. The machine is at rest when the switch is in the neutral position.
・When changing the direction of rotation, be sure to return the changeover switch to the stop (neutral) position. After the machine has stopped, change the running direction.
・Be sure to set the switch in the stop (neutral) position unless the machine is to be moved.
・Set the rotating direction, changeover switch in the stop (neutral) position when turning on the power. When the switch is in the clockwise or counterclockwise turning position, the machine will begin to move, which is very dangerous.

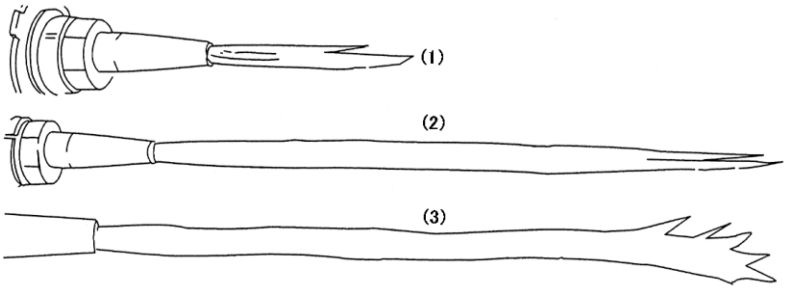
5.2 Ignition and flame adjustment

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

■Flame adjustment method

1. Open the fuel gas valve 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 (3/16-1/14”) in length.)
3. Open the jet oxygen valve 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 gas ……8-10 mm
   ・LPG gas ……5-8 mm

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.



(1)Oxidizing Flame

(2)Neutral Flame

(3)Carbonizing Flame

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 Procedures for starting cutting operation and extinguishing the flame

1. Align the tip with the cutting start point, ignite, and then adjust the flame.
2. Sufficiently preheat the cutting start point.
3. After heating, let the cutting oxygen out, turn the handle, and begin cutting while feeding the graduated pipe.
4. Right before the graduated pipe strikes against the stopper, turn on the rotating direction changeover switch, and continue cutting until the graduated pipe strikes against the stopper.
5. Observe the condition of cut well and adjust with the speed adjustment dial to optimal cut speed.
6. Extinguish the flame after cutting as follows:
   1) Turn off the motor switch (or turning direction switch).
   2) Close the cutting oxygen valve.
   3) Close the preheating oxygen valve.
   4) Close the fuel gas valve.

5.5 Safety measures against backfire and flashback

5.5.1 Prevention of backfire

Backfires may cause serious accidents or fires. 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 the 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.

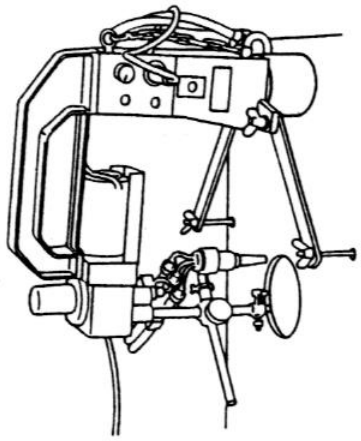
5.6 Special cutting

1. Wall cutting

CIR-CUT Ⅱ(electromagnet fixing type) is fixed to the wall with a magnet.
[Note] : Do not use CIR-CUT I (permanent magnet fixing type) for wall cutting.

■Precautions for wall cutting

・The method of setting the machine on the wall differs according to the working position. The machine is stable when it is set with the magnet facing up and the leg facing down.
・Avoid setting the machine with the magnet in the lateral position; otherwise the machine will slide on its side and fall finally.
・The magnet for fixing the machine is designed to provide sufficient attractive force. However, the attractive force may be weakened substantially depending on the type of the steel sheet. Even if the machine is fixed to the wall, hang the machine from above using the hook on the machine to prevent it from falling.



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 Daily inspection

1. Wipe the outside of the machine with a clean cloth.
   1) Circumference of the graduated pipe and the cross-feed holder
   2) Machine fixing magnet (Especially the attraction surface that touches steel sheets)
2. Check that rotary parts rotate correctly without excessive play.
3. Check that there is no gas leakage from respective joints.
4. Check that the rotary drive and the center are centered.
5. Check that the torch is at right angles to the steel sheet.

■ Periodical inspection

1. Remove dust from the parts related to electrical equipment inside the operation panel which is on the side of the machine.
2. Measurement of insulation resistance. (When the applied voltage is 500V, check that the resistance is 5MΩ or more.)
3. Change the grease in the speed reducer box when it is dirty.
4. Replace parts when they are substantially worn.

7 Troubleshooting

1) The machine will not move. (The motor will not run)

Cause	Inspection point	Correction
1)Power is not supplied.	Check the power supply. Check the connections.	
2)Fuse blown	Check the 1A fuse in the control box to see if it has blown.	Replace the blown fuse.
3)Disconnection of power cable.	Check the cable with a tester. "∞" indicates disconnection.	Repair the disconnected cable
4)Poor connection	Check that lead wires are correctly connected to the terminal block.	Connect the wires again.
5)Defective switch	Remove the switch and check for continuity between terminals with a tester.	Replace the switch if it is defective.
6)Defective speed controlling resistor	Check with a tester that the resistance is 50 kΩ.	Replace the resistor if it is defective.
7)Disconnection of lead wire	Check for continuity between the lead wires with a tester.	Replace disconnected lead wires.
8)Defective motor	If all the above items are normal, the motor is defective.	Repair or replace the motor with a new one.
9)Defective controller	If all the above items are normal, the controller is defective.	Replace the defective controller.

Note:

Protection of the over load.

When the motor was locked by any reason, the motor rotation will be stopped after about four second.

(Recovery: Please turn on the power supply again.)

2) The speed cannot be controlled (The motor runs)

Cause	Inspection point	Correction
1)Defective speed control resistor	Remove the speed control resistor and apply the probes of a tester to resistor terminals 2 and 1 or 2 and 3. If the pointer continuously moves from 0 to 50 K ohm when the handle is turned slowly, the resistor is normal.	Replace the defective resistor.
2)Defective controller	When 1) is normal, the controller is defective.	Replace the defective controller.

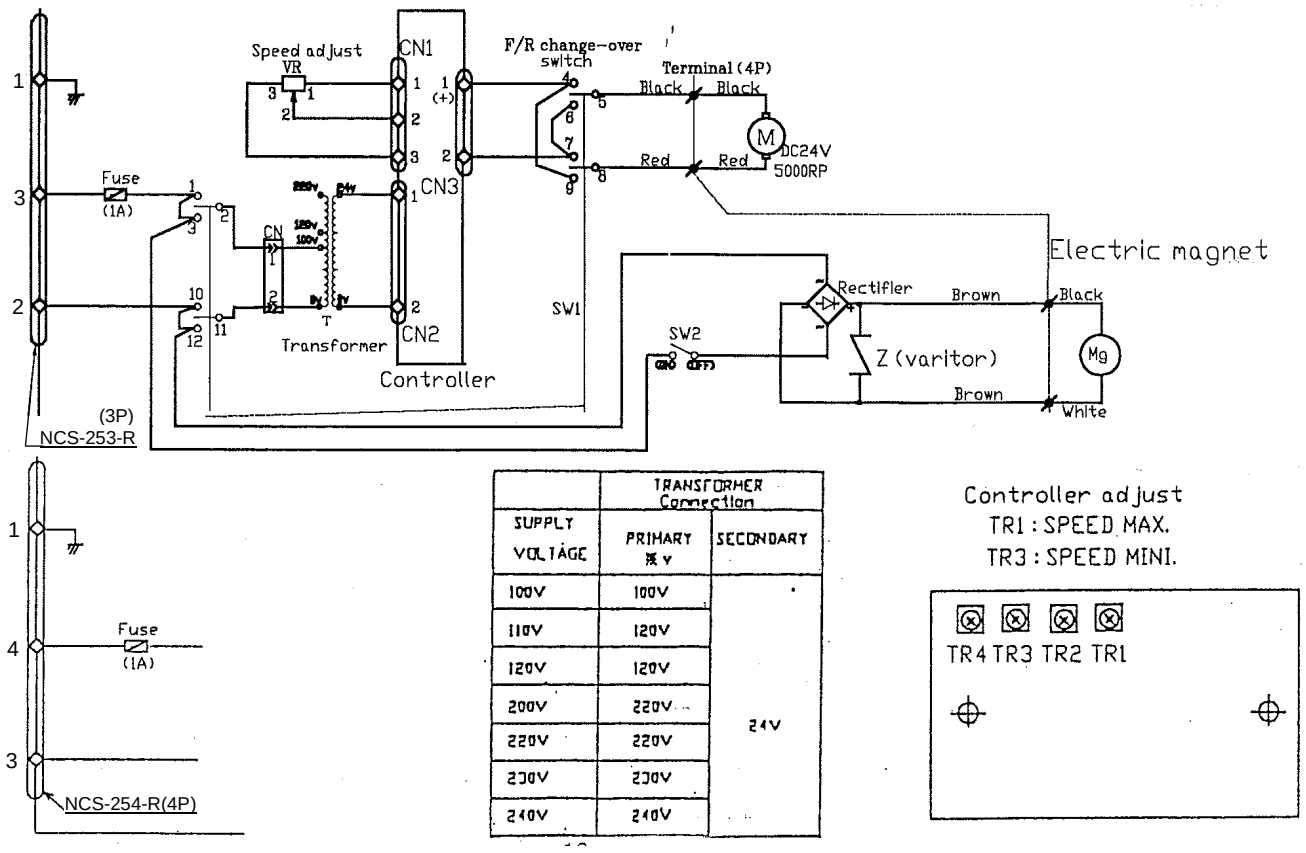
3)The machine will not move. (The motor runs)

Cause	Inspection point	Correction
1)Malfunction	1：Remove the speed reduction box to check the clutch operation.	Disassemble and clean.
	2：Check the loosening of wing bolt of the clutch.	Tighten if there is loose.

4)The machine runs incorrectly.

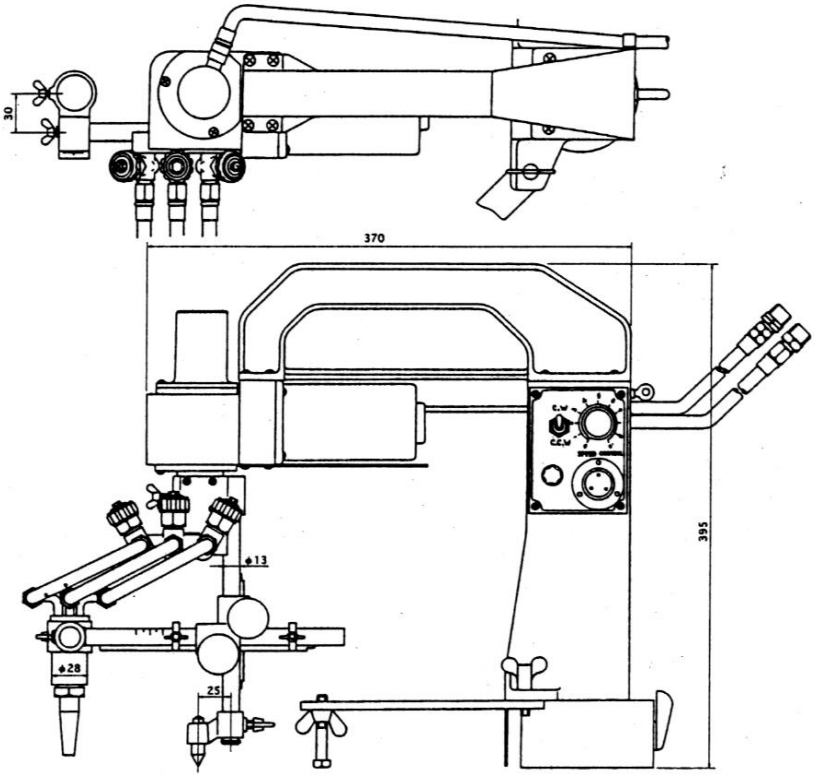
Cause	Inspection point	Correction
1)The speed is too fast.	The supply voltage is abnormal.	Check the voltage.
2)Low speed is not possible.	1: Speed control resistor is defective.	Replace with new one.
	2: Defective wiring.	Correct the wiring.
	3: Defective motor.	Repair or replace the motor with new one.
	4: Defective controller.	Replace with new one.
	5:Check the loosening of wing bolt of the clutch.	Tighten if there is loose.
3)High speed is not possible.	1:When the supply voltage has dropped.	Check with a tester.
	2:Check the loosening of wing bolt of the clutch.	Tighten if there is loose.
4)Knocking occurs.	1: Abrasion of gears.	Replace
	2: Hoses or cabtire cords hinder smooth running.	Consider during operation.
	3: Breakage of FP ring.	Replace
	4.:Check the loosening of wing bolt of the clutch.	Tighten if there is loose.

8 Wiring diagram

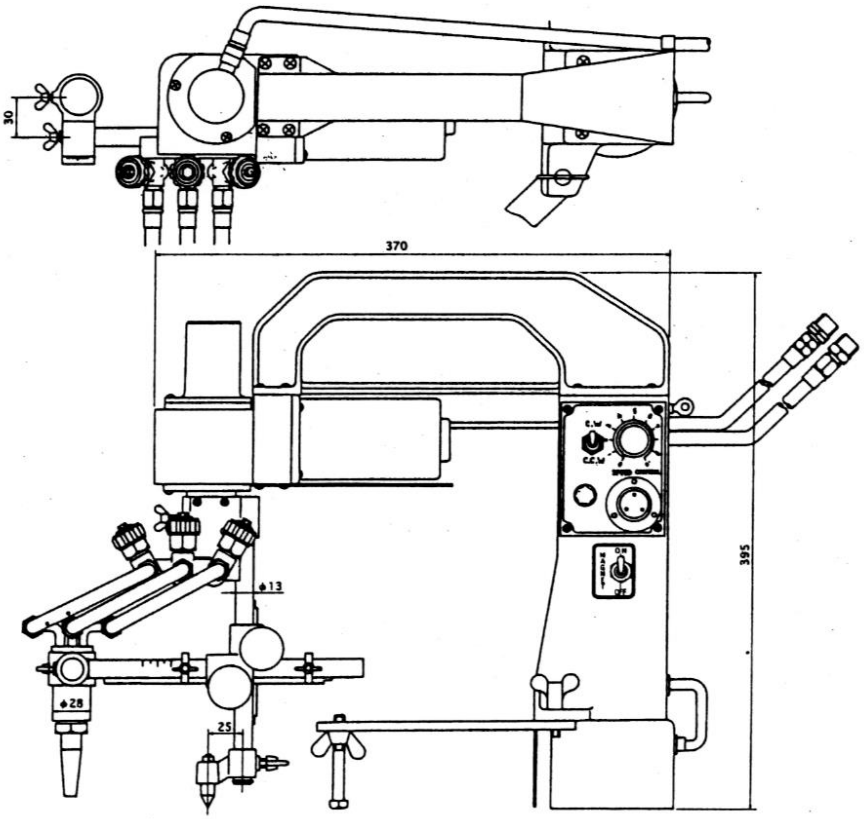


9 Assembly drawing of CIR-CUT

9.1 CIR-CUT Ⅰ

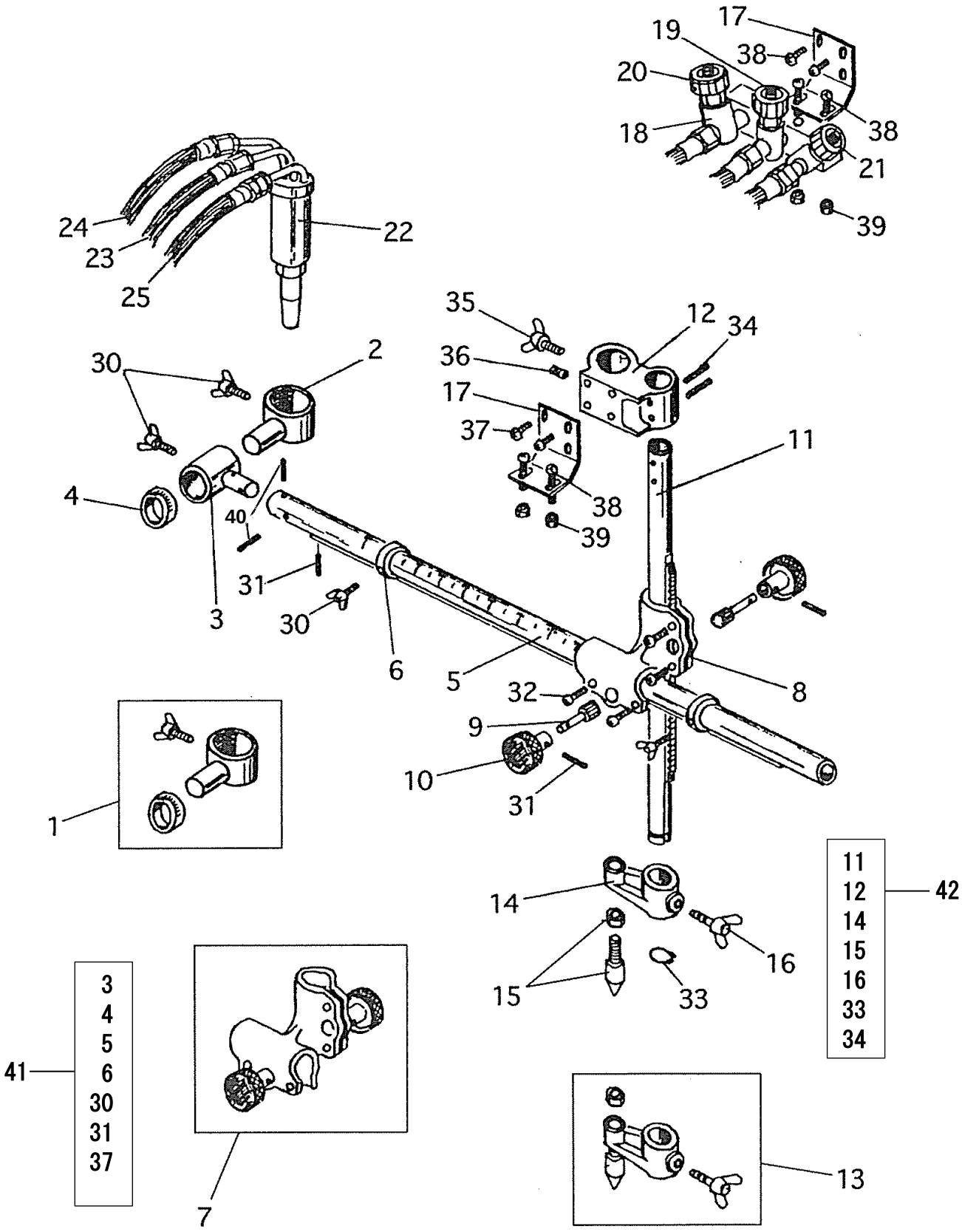


9.2 CIR-CUT Ⅱ



10 Parts List

10.1 Gas unit



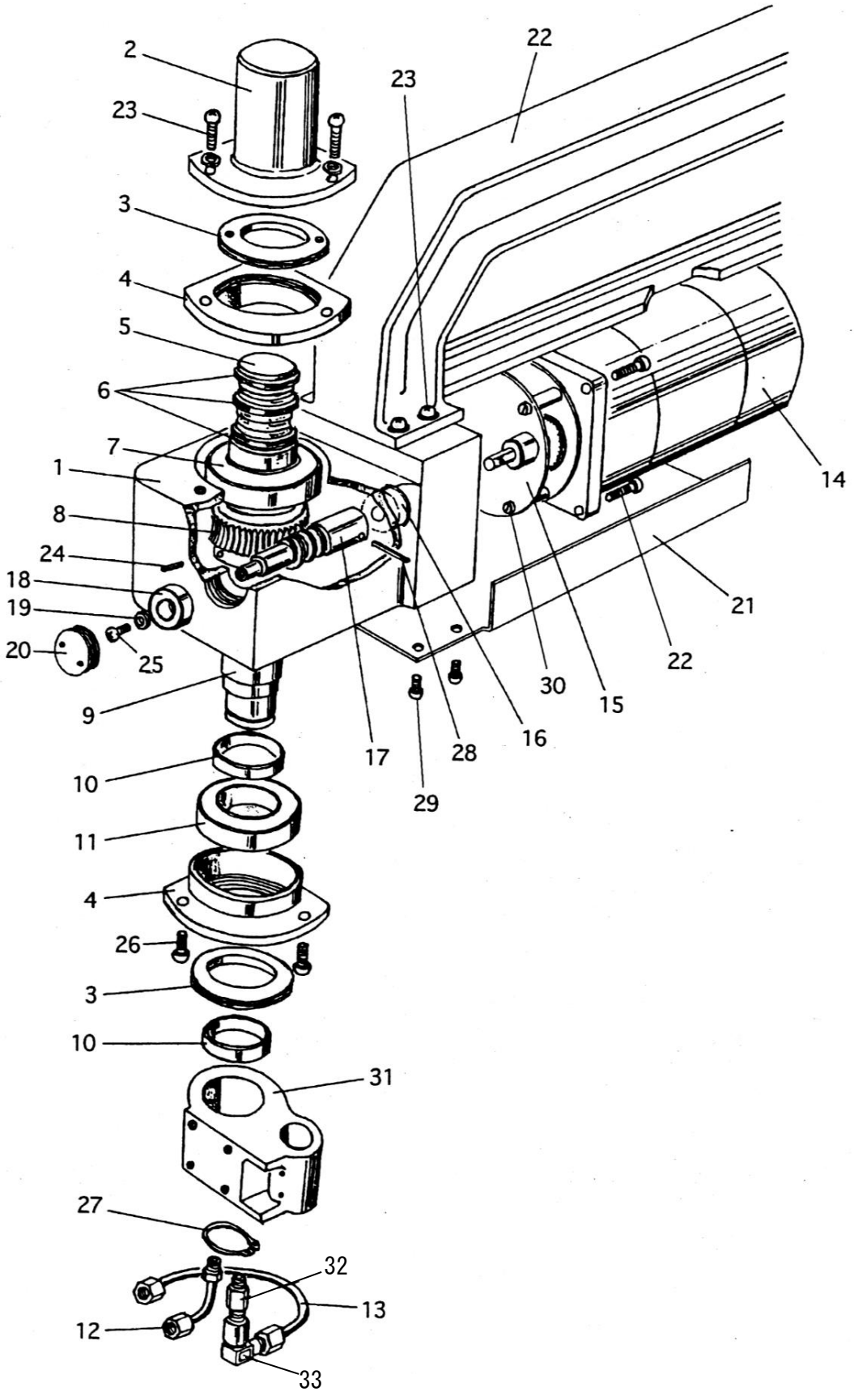
Gas unit

ITEM No.	PART NAME	QTY	STOCK No.	REMARKS
1	Torch holder assembly	1	60032600	
2	Torch holder	1	60032601	
3	Torch holder base	1	60032602	※1
4	Graduation collar	1	60030906	With screw
5	Graduation pipe	1	60032603	With rack Except USA ※1
	Graduation pipe	(1)	60032604	With rack USA Only ※1
6	Stopper	2	60032650	
7	Cross feed holder assembly	1	60032655	
8	Cross feed holder	1	60032605	
9	Pinion	2	60031627	※1
10	Handle	2	60031628	※1
11	Rotary pipe	1	60032606	With rack ※1
12	Rotary pipe holder	1	60032607	※1
13	Center holder assembly	1	60032609	
14	Center holder	1	60032608	
15	Pivot pin	1	60030913	
16	Stop handle	1	60030915	
17	Distributor bracket	1	60032637	
18	Distributor	1	60013103	Except USA,KE
	Distributor	(1)	60013104	USA only
	Distributor	(1)	60013106	KE only
19	Valve for Jet Oxygen	1	60015351	Except KE
	Valve for Jet Oxygen	(1)	60015352	KE only
20	Valve for Preheat Oxygen	1	60015355	Except KE
	Valve for Preheat Oxygen	(1)	60015358	KE only
21	Valve for gas	1	60015356	
22	Torch	1	60010353	Except USA,KE
	Torch	(1)	60010354	USA only
	Torch	(1)	60010355	KE only
23	Hose for jet oxygen	1	60032640	Except USA
	Hose for jet oxygen	(1)	60032639	USA only
24	Hose for preheat oxygen	1	60032640	Except USA
	Hose for preheat oxygen	(1)	60032639	USA only
25	Hose for gas (Red)	1	60032641	Except USA
	Hose for gas	(1)	60032642	USA only
	Hose for gas (Orange)	(1)	61001815	
30	Wing bolt	3	6C110408	BS-4×8
31	Spring pin	2	6B022012	PR-2×12
32	Screw	4	6C520415	SP-4×15
33	Stop ring	1	6B520130	STW-13
34	Spring pin	2	6B022520	PR-2.5×20
35	Wing bolt	1	6C120510	BS-5×10 ★
36	Screw	1	6C540508	SS-5×8
37	Screw	2	6C520408	SP-4x8
38	Screw	2	6C520425	SP-4x25
39	Nut	2	6D010040	NH-4
40	Spring pin	2	6B022512	PR-2.5×12
41	Graduation pipe (with torch holder)	1	61004647	Except USA ★
	Graduation pipe (with torch holder)	(1)	20523015	USA only ★
42	Rotary pipe holder assembly	1	60032669	★

※1 It is necessary to drill and pin the holes to match the actual product.

Note: When replacing parts, the horizontal and vertical directions are there is a possibility of deviation.

10.2 Speed reduction unit

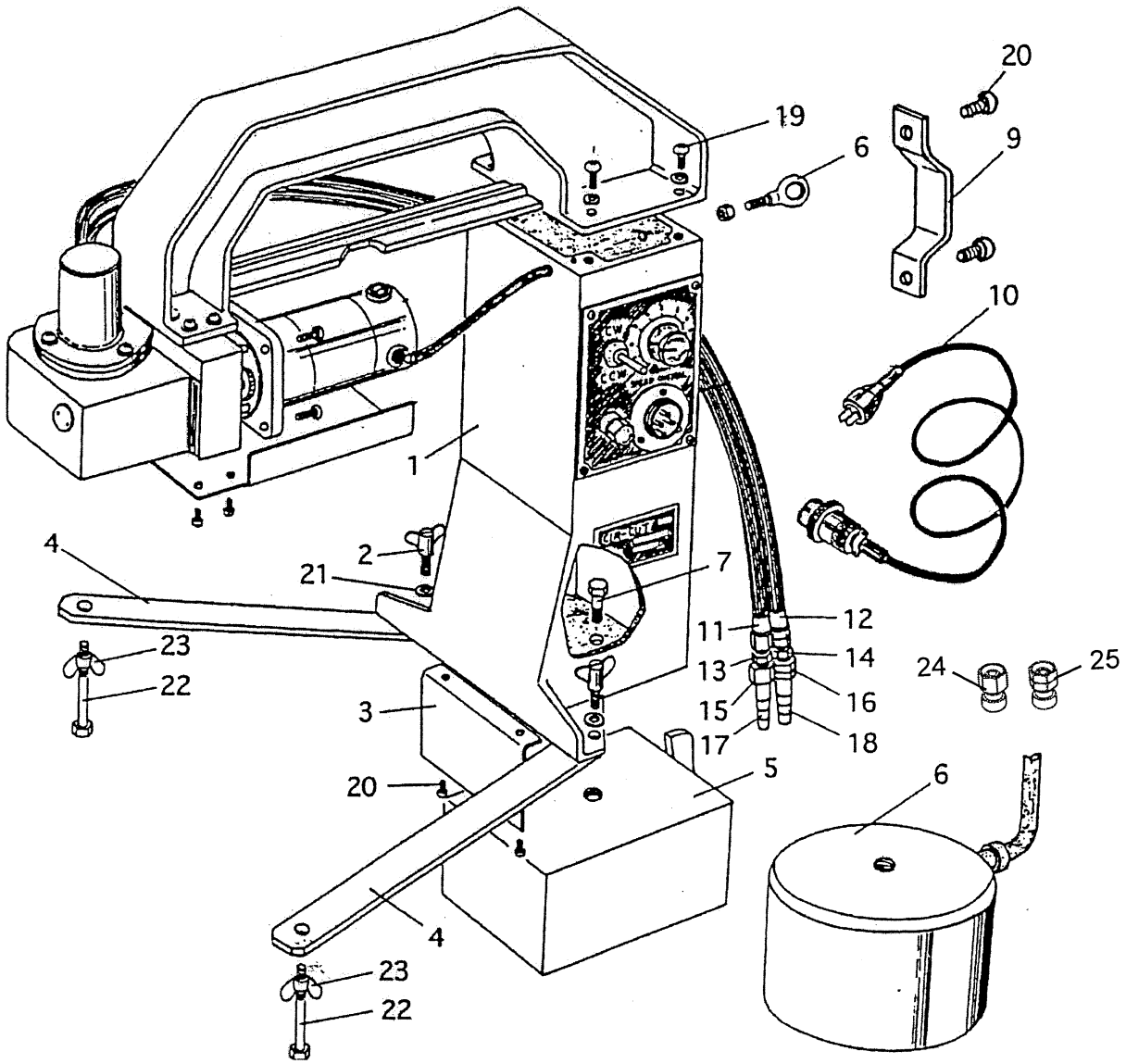


Speed reducer unit

ITEM No.	PART NAME	QTY	STOCK No.	REMARKS
1	Gear box	1	60032612	
2	Distributor Cover	1	60032621	Except USA
	Distributor Cover	(1)	60032622	USA only
3	Adjusting Screw	2	60032614	
4	Casing	2	60032613	
5	Rotary distributor	1	60032620	
6	FP-ring	3	60030922	
7	Bearing	1	6A036005	6005ZZ ★
8	Worm wheel	1	60032617	※1
9	Sleeve	1	60032615	※1
10	Collar	2	60032616	
11	Bearing	1	6A036906	6906ZZ ★
12	Conduit pipe for gas	1	60032623	
13	Conduit pipe for oxygen	1	60032624	
14	Motor	1	20505315	DC24V 15W 5000rpm
15	Gear	1	6P100021	RB-54 1/40 ※1
16	Bush	1	60032625	
17	Worm	1	60032618	※1
18	Bearing	1	6A030627	627ZZ ★
19	Washer	1	60031015	
20	Bearing retainer	1	60031014	
21	Motor cover	1	60032619	
22	Grip	1	60032629	
23	Screw	11	6C530415	SP-4×15(With WS)
24	Spring pin	3	6B022505	PR-2.5×5
25	Screw	1	6C520408	SP-4×8 ★
26	Screw	3	6C520410	SP-4×10 ★
27	Stop ring	1	6B520250	STW-25
28	Spring pin	1	6B022515	PR-2.5×15 ★
29	Screw	4	6C520406	SP-4×6
30	Screw	3	6C520320	SP-3×20
31	Rotary pipe holder	1	60032607	※1
32	Nipple	1	60036701	
33	Elbow	1	60036700	

※1 It is necessary to drill and pin the holes to match the actual product.

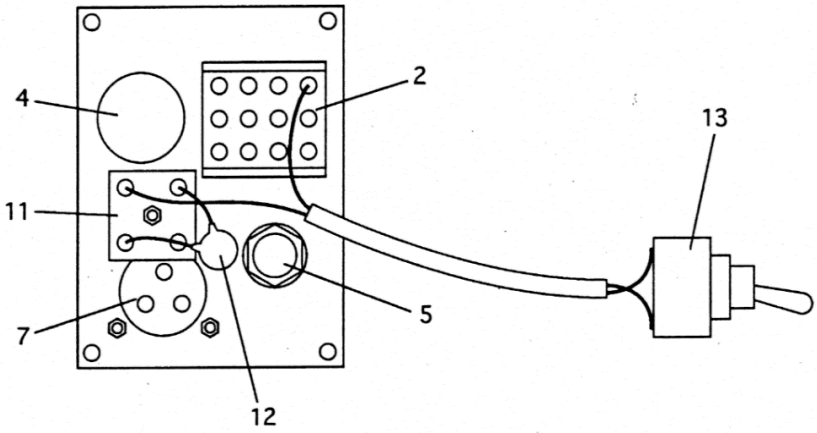
10.3 Frame

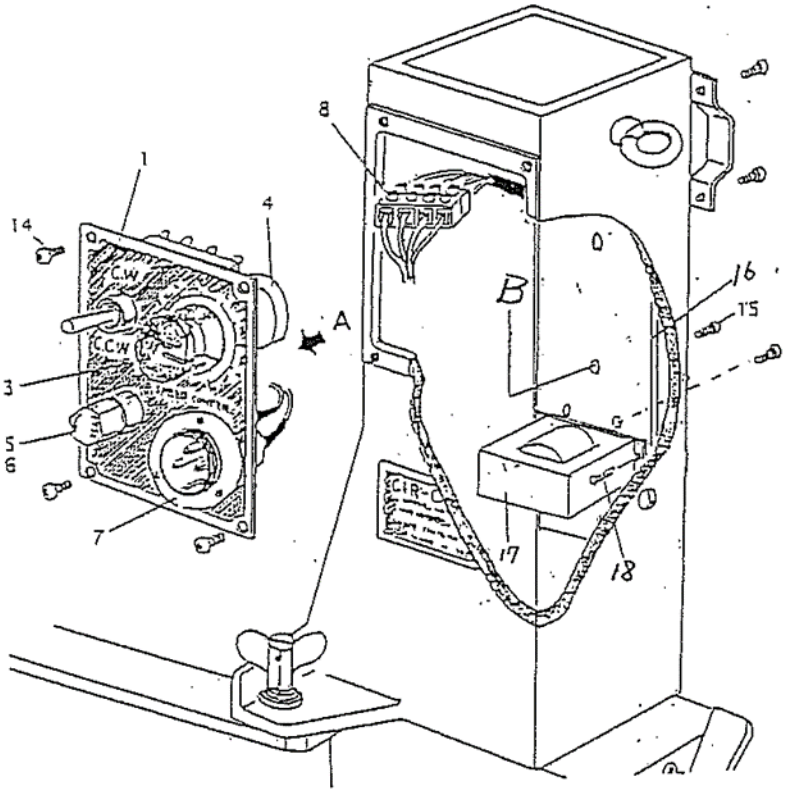


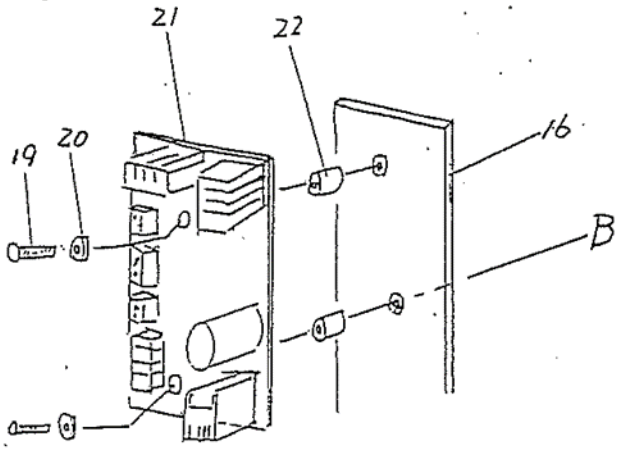
Frame

ITEM No.	PART NAME	QTY	STOCK No.	REMARKS
1	Machine base	1	60032627	CIR-CUT(Ⅰ)
	Machine base	(1)	60032628	CIR-CUT(Ⅱ)
2	Wing bolt	2	60030315	
3	Heat shield	1	60031053	CIR-CUT(Ⅰ)
	Heat shield	(1)	60032633	CIR-CUT(Ⅱ)
4	Leg	2	60032630	
5	Magnet	1	60031653	(Ⅰ)type 100K
6	Electric magnet	1	60032652	(Ⅱ)type KLRM90
7	Hexagon bolt	1	6C021220	(Ⅰ)type BH-12×20
	Hexagon bolt	(1)	6C021025	(Ⅱ)type BH-10×25
8	Hook bolt	1	60031654	M6 With Nut
9	Hose bracket	1	60032631	
10	Cabtyre cord	1	61004264	3Px5M
	Cabtyre cord (200V~240Ⅴ)	(1)	61004265	4Px5M (Ⅰ)type only
	Cabtyre cord (for transformers)	(1)	61004306	3Px5M (Ⅱ)type only
	Cabtyre cord (for DIN type)	(1)	61005384	4Px5M (Ⅰ)type KE only CE type
	Cabtyre cord (for transformers)	(1)	61005386	3Px5M (Ⅱ)type KE only CE type
11	Hose for jet oxygen	1	60031108	Except USA
	Hose for jet oxygen	(1)	60031107	USA only
12	Hose for Gas (Red)	1	60031110	Except USA
	Hose for Gas	(1)	60031111	USA only
	Hose for Gas (Orange)	(1)	61001817	
13	Connection nipple for oxygen	1	60031001	Except USA
	Connection nipple for oxygen	(1)	60031002	USA only
14	Connection nipple for Gas	1	60031003	Except USA
	Connection nipple for Gas	(1)	60031004	USA only
15	Nut for oxygen	1	60015001	
	Nut for oxygen	(1)	60015056	KE only
16	Nut for Gas	1	60015002	
	Nut for Gas	(1)	60015054	KE only
17	Hose connector (OX)	1	60015003	
	Hose connector (OX)	(1)	60015040	KE only
18	Hose connector (GAS)	1	60015004	
	Hose connector (GAS)	(1)	60015062	KE only
19	Screw	4	6C530418	SP-4×18(WS) ★
20	Screw	4	6C520406	SP-4×6
21	Washer	2	6D500080	WF-8
22	Hexagon bolt	2	6C010845	(Ⅰ)type BH-8×45 ★
	Hexagon bolt	(2)	6C010860	(Ⅱ)type BH-8×60★
23	Wing nut	2	6D080080	NB-8
24	Adaptor(OX)	1	61003245	
25	Adaptor(FG)	1	61003246	

10.4 Electrical







Electrical

ITEM No.	PART NAME	QTY	STOCK No.	REMARKS
1	Control panel	1	60032647	
2	Switch	1	60031458	S-43
3	Grip	1	60031332	
4	Variable resistor	1	60030745	
5	Fuse holder	1	64000019	★
6	Fuse	1	60030707	1A
7	Metal socket (3P)	1	6N100061	For 100V
	Metal socket (4P)	1	6N100062	For 200V-240V (Ⅰ) type only
8	Terminal	1	60031666	(Ⅰ) type 2P
	Terminal	(1)	60030656	(Ⅱ) type 4P
11	Rectifier	1	60031636	(Ⅱ)type only
12	Varistor	1	60032645	(Ⅱ)type only
13	Switch assembly	1	61006769	(Ⅱ)type only S-1A With nut
14	Screw	4	6C520408	SP-4x8
15	Screw	2	6C570308	SP-3x8 (WS,WF) ★
16	Bracket	1	61001043	
17	Transformer	1	61000472	For 100V - 220V 220V : (Ⅰ) type only
	Transformer	(1)	61000672	For 230V - 240V (Ⅰ) type only
18	Screw	2	6C530310	SP-3x10 With WS
19	Screw	2	6C520310	SP-3x10
20	Isolation washer	2	60036374	
21	Controller	1	69000105	
22	Spacer	2	6R020001	

ITEM No.	PART NAME	QTY	STOCK No.	REMARKS

11 Cutting data

102 (STANDARD SPEED) for Acetylene

PLATE THICKNESS (mm)	TIP SIZE	CUTTING SPEED (mm/min)	OXYGEN PRESSURE (kg/c ㎡) / (Mpa)		FUEL GAS PRESSURE (kg/c ㎡) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PREHEAT		
3	00	680	1.5 / 0.15	1.5 / 0.15	0.2 / 0.02	1.0
6	0	610	2.0 / 0.2	2.0 / 0.2	0.2 / 0.02	1.3
10	0	560	2.0 / 0.2	2.0 / 0.2	0.2 / 0.02	1.5
12.5	1	530	2.5 / 0.25	2.5 / 0.25	0.2 / 0.02	1.8
19	2	460	3.0 / 0.3	3.0 / 0.3	0.25 / 0.025	2.0
25	2	430	3.0 / 0.3	3.0 / 0.3	0.25 / 0.025	2.0
38	3	355	3.0 / 0.3	3.0 / 0.3	0.25 / 0.025	2.3
50	4	320	3.0 / 0.3	3.0 / 0.3	0.25 / 0.025	2.8
60	5	280	4.0/0.4	4.0/0.4	0.3/0.03	3.0
75	5	250	4.0/0.4	4.0/0.4	0.3/0.03	3.0
100	6	200	4.0/0.4	4.0/0.4	0.3/0.03	3.6
125	6	180	4.0/0.4	4.0/0.4	0.4/0.04	3.6
150	7	150	4.5/0.45	4.5/0.45	0.4/0.04	4.1
200	7	130	4.5/0.45	4.5/0.45	0.4/0.04	4.3
250	8	80	4.5/0.45	4.5/0.45	0.4/0.04	5.6
300	8	50	4.5/0.45	4.5/0.45	0.4/0.04	6.6

102-D7 (HIGH SPEED) for Acetylene

PLATE THICKNESS (mm)	TIP SIZE	CUTTING SPEED (mm/min)	OXYGEN PRESSURE (kg/c ㎡) / (Mpa)		FUEL GAS PRESSURE (kg/c ㎡) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PREHEAT		
3	00	800	7.0 / 0.7	1.5 / 0.15	0.2 / 0.02	0.8
6	0	740		2.0 / 0.2	0.2 / 0.02	1.0
10	0	680		2.0 / 0.2	0.2 / 0.02	1.3
12.5	1	630		2.5 / 0.25	0.2 / 0.02	1.3
19	2	560		3.0 / 0.3	0.25 / 0.025	1.5
25	2	510		3.0 / 0.3	0.25 / 0.025	1.8
38	3	460		3.0 / 0.3	0.2 5/ 0.025	2.0
50	4	410		3.0 / 0.3	0.2 5/ 0.025	2.6
60	5	360		4.0/0.4	0.3/0.03	2.8
75	5	320		4.0/0.4	0.3/0.03	2.8
100	6	250		4.0/0.4	0.3/0.03	3.3
125	6	230		4.0/0.4	0.3/0.03	3.6
150	7	180		4.5/0.45	0.4/0.04	3.6
200	7	140		4.5/0.45	0.4/0.04	4.6
250	8	100		4.5/0.45	0.4/0.04	5.1
300	8	80		4.5/0.45	0.4/0.04	6.1

NOTE

1) All pressures are torch inlet pressures.
2) Oxygen purity is minimum of 99.7%.
3) Depending on the surface condition of the steel plate (scale, paint) either increase the fuel gas pressure or decrease the cutting speed. Also, when precision cutting is required, adjust all data.

106 (STANDARD SPEED) for Propane

PLATE THICKNESS (mm)	TIP SIZE	CUTTING SPEED (mm/min)	OXYGEN PRESSURE (kg/c ㎡) / (Mpa)		FUEL GAS PRESSURE (kg/c ㎡) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PREHEAT		
3	00	680	1.5 / 0.15	1.5 / 0.15	0.2 / 0.02	1.0
6	0	610	2.0 / 0.2	2.0 / 0.2	0.2 / 0.02	1.3
10	0	560	2.0 / 0.2	2.0 / 0.2	0.2 / 0.02	1.5
12.5	1	530	2.5 / 0.25	2.5 / 0.25	0.2 / 0.02	1.8
19	2	460	3.0 / 0.3	3.0 / 0.3	0.2 / 0.02	2.0
25	2	430	3.0 / 0.3	3.0 / 0.3	0.2 / 0.02	2.0
38	3	355	3.0 / 0.3	3.0 / 0.3	0.2 / 0.02	2.3
50	4	320	3.0 / 0.3	3.0 / 0.3	0.25 / 0.025	2.8
60	5	280	4.0/0.4	4.0/0.4	0.3/0.03	3.0
75	5	250	4.0/0.4	4.0/0.4	0.3/0.03	3.0
100	6	200	4.0/0.4	4.0/0.4	0.350.035	3.6
125	6	180	4.0/0.4	4.0/0.4	0.35.035	3.6
150	7	150	4.5/0.45	4.5/0.45	0.4/0.04	4.1
200	7	130	4.5/0.45	4.5/0.45	0.4/0.04	4.3
250	8	80	4.5/0.45	4.5/0.45	0.4/0.04	5.6
300	8	50	4.5/0.45	4.5/0.45	0.4/0.04	6.6

106-D7 (HIGH SPEED) for Propane

PLATE THICKNESS (mm)	TIP SIZE	CUTTING SPEED (mm/min)	OXYGEN PRESSURE (kg/c ㎡) / (Mpa)		FUEL GAS PRESSURE (kg/c ㎡) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PREHEAT		
3	00	800	7.0 / 0.7	1.5 / 0.15	0.2 / 0.02	0.8
6	0	740		2.0 / 0.2	0.2 / 0.02	1.0
10	0	680		2.0 / 0.2	0.2 / 0.02	1.3
12.5	1	630		2.5 / 0.25	0.2 / 0.02	1.3
19	2	560		3.0 / 0.3	0.2 / 0.02	1.5
25	2	510		3.0 / 0.3	0.2 / 0.02	1.8
38	3	460		3.0 / 0.3	0.2 / 0.02	2.0
50	4	410		3.0 / 0.3	0.2 / 0.02	2.6
60	5	360		4.0/0.4	0.25.025	2.8
75	5	320		4.0/0.4	0.25.025	2.8
100	6	250		4.0/0.4	0.3/0.03	3.3
125	6	230		4.0/0.4	0.3/0.03	3.6
150	7	180		4.5/0.45	0.3/0.03	3.6
200	7	140		4.5/0.45	0.3/0.03	4.6
250	8	100		4.5/0.45	0.4/0.04	5.1
300	8	80		4.5/0.45	0.4/0.04	6.1

NOTE

1) All pressures are torch inlet pressures.
2) Oxygen purity is minimum of 99.7%, propane is minimum of JIS Grade 3.
3) Depending on the surface condition of the steel plate (scale, paint) either increase the fuel gas pressure or decrease the cutting speed. Also, when precision cutting is required, adjust all data.

＜MEMO＞

CIR-CUT (Piercing Cutter)
OPERATION MANUAL

Date of issue	Feb.1996
2nd	Dec.2004
3rd	Jun.2007
4th	Jun.2007
5th	Oct.2008
6th	Dec.2008
7th	Mar.2009
8th	Dec.2010
9th	Apr.2015
10th	Jul.2015
11th	Oct.2016
12th	Jan.2018
13th	Nov.2018
14th	Mar.2020
15th	Nov.2020

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