

Portable Automatic Gas Cutter



BCC00B16

IK-12 max3

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 SANZO 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





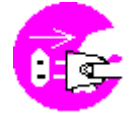




This product is designed to be safe, but it can cause serious accidents if not operated correctly. Those who operate and repair this machine must read this manual thoroughly before operating, inspecting and maintaining the machine. Keep the manual near the machine so that anyone operates the machine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

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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 follows for 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 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. In addition, avoid damaging the taper 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 protectors 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. Make sure that the clutch is engaged before letting the machine travel. Improper clutch engagement will cause machine failure.
- 8. Be careful not to get you hand caught between rails when connecting them.**
9. When cutting on the rail, correctly fix the caster.
10. Correctly fix the heat prevention plate so that it will not touch the rail.
11. To prevent the torch holder from dropping, fix it with the wing bolt (BS-6x22) on the torch slide.
12. Be sure to hold the handle when carrying the machine.
13. Be sure to remove the machine from the rail when moving the rail.

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. The ground pin is attached to the rubber plug of a cabtyre cord. Please use a power receptacle with a ground pin opening.
 - 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) Water leakage from the machine or 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 is 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 naked 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 extinguishing 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 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

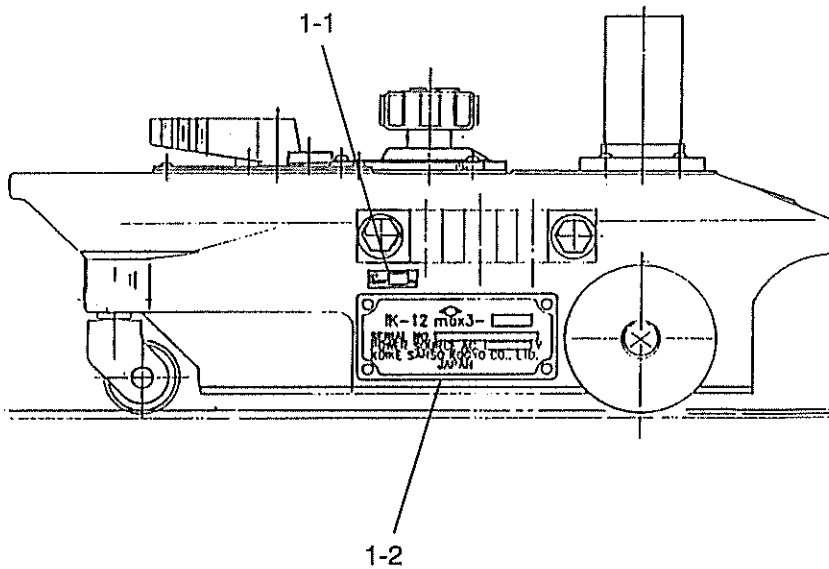
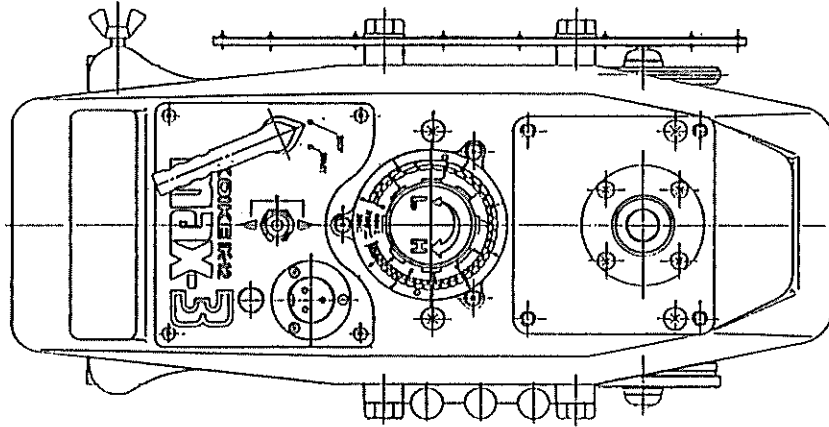


Observe the safety precautions to prevent skin burns. Ignoring heat, spatter, and sparks during operation could cause a fire or burned skin.

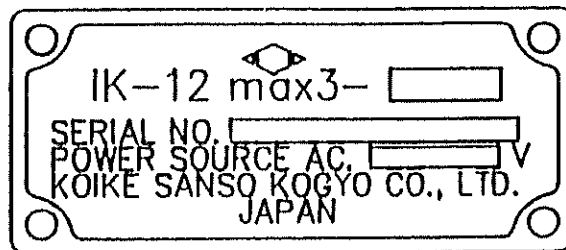
1. Do not perform cutting near flammables. (Move flammables well away from the sparks.)
2. Do not cut containers filled with flammables.
3. Do not keep lighters, matches, and other flammables nearby.
4. Flames from the torch will burn skin. Keep your body away from the torch and tip, and check the safety 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 .
 - 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, goggles, helmet, 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 Locations 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.



1-1

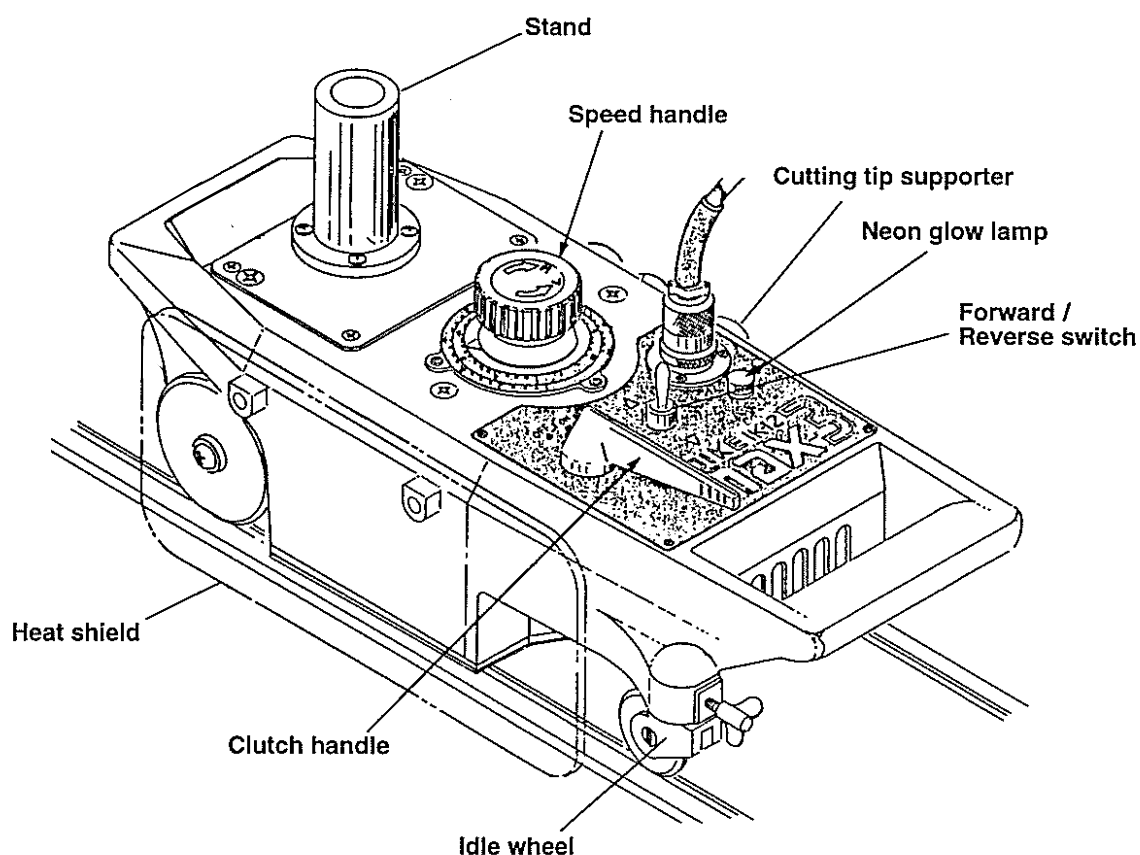


1-2

3 Outline of machine

3.1 Features of machine

- 1) Excellent operability
- 2) Unrivaled heat resistance and durability
- 3) Excellent tractive force
- 4) The well-balanced center of gravity ensures stable traveling.
- 5) The motor, which is the motive force of traveling, is a compact high-efficiency motor developed after a long period of hard work, excelling in heat resistance and durability, and its operation is exact at all times.
- 6) The speed change mechanism is composed of parts designed on the basis of approx. 5000-hour trial loaded operation particulars.
- 7) The side of the machine is of a heat prevention plate construction. In comparison with other types of machines, the temperature rise of the machine surface is gradual, facilitating the transportation of the machine after use over an extended period of time.
- 8) A heat preventive plate is used as a bottom plate.
- 9) The simplified mechanism facilitates maintenance and inspection.
- 10) Cutting operation can be started smoothly.
- 11) There is no speed change due to temperature rise.



3.2 Specifications

Weight (body):	10Kg
Machine size:	430×220×215mm
Wheel distance:	160mm
Power source:	±10%
Reduction gear:	Double cone system
Cutting speed:	80 mm/min-800 mm/min (50Hz) 100 mm/min-1000 mm/min (60Hz)
Cutting edge shape:	I,V(45°)
Cutting thickness:	5 mm/min-30 mm (102 or 106 #0,1,2)
Motor:	1500r.p.m. /1800r.p.m. (9w/10w)
Cabtyre cord:	1 set
Tip support:	1 pc
Hexagon bolt:	2 pc

● option

Rail:	1.8m, 2.5m, 3.0m
Circle rail:	
Circle cutting attachment:	
SR-100 torch set	
SR-200 torch set	
SPR-100 torch set	
SPR-200 torch set	
S-100 torch set	
S-200 torch set	
SP-100 torch set	
SP-200 torch set	
SP-300 torch set	
SP-400 torch set	
L-100 torch set	
EPOCH-300 torch set	
EPOCH-600 torch set	

4 Preparation for operation

4.1 Contents of package

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

- Body:.....1 set
- Tip support:1 set
- Power cable (5M):1 pc

4.2 Standard composition of gas equipment

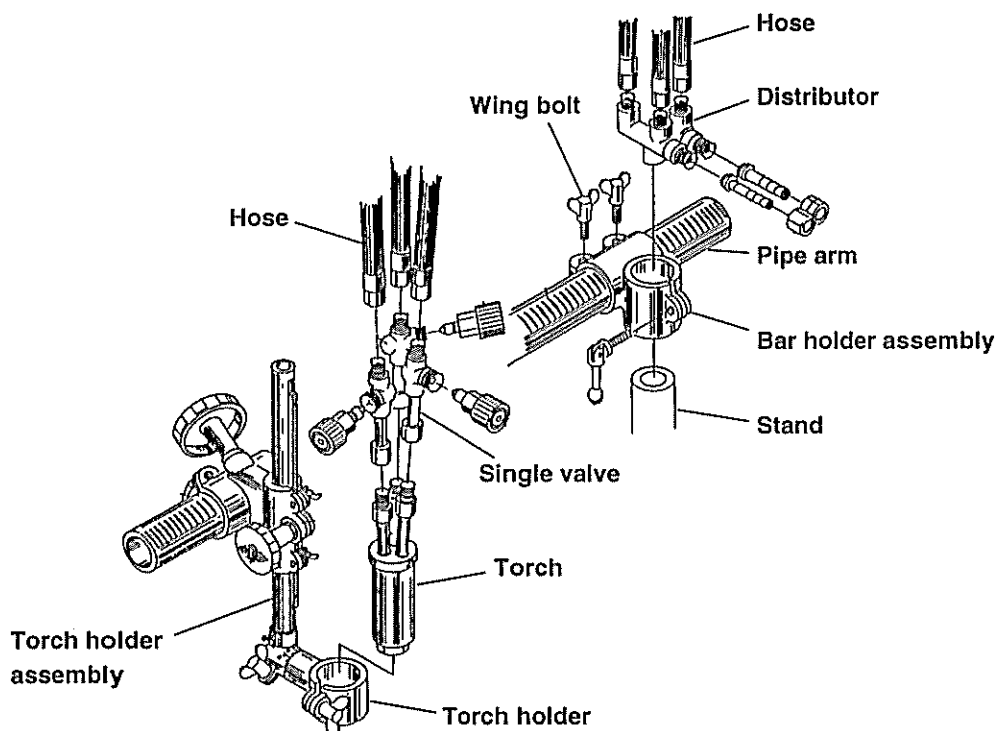
1) Composition of gas equipment for linear and parallel cutting

		SR-100	SR-200	SPR-100	SPR-200
1	Pipe arm	350mm 1 pc.	500mm 1 pc.	350mm 1 pc.	500mm 1 pc.
2	Arm holder	1 pc.	1 pc.	1 pc.	1 pc.
3	Torch holder	1 set	2 sets	1 set	2 sets
4	Distributor	single 1 pc.	double 1 pc.	single 1 pc.	double 1 pc.
5	Hose	600mm (OX) 2 pcs. (GAS) 1pc.	900mm (OX) 4 pcs. (GAS) 2 pcs.	600mm (OX) 2 pcs. (GAS) 1 pc.	900mm (OX) 4 pcs. (GAS) 2 pcs.
6	Torch	$\phi 32 \times 70$ 1 pc.	$\phi 32 \times 70$ 2 pcs.	$\phi 32 \times 70$ 1pc.	$\phi 32 \times 70$ 2pcs.
7	Guide roller	-	-	1 set	2sets
8	Balance weight	-	1 pc.	-	1pc.
9	Spanner	Open ended spanner with double end type. 1 set (3pcs.)			
10	Driver(+ #2)	1 pc.	1 pc.	1 pc.	1 pc.
11	Hose band(16mm)	2 pcs.	2 pcs.	2 pcs.	2 pcs.
12	Tip cleaner	1 set	1 set	1 set	1 set
13	Weight Fixing bolt	M10×35 with washer			
		-	2pcs.	-	2pcs.
14	Tip	102(acetylene) or 106(propane) #0,1,2each 1pc.	102(acetylene) or 106(propane) #0,1,2each 1pc.	102(acetylene) or 106(propane) #0,1,2each 1pc.	102(acetylene) or 106(propane) #0,1,2each 1pc.
15	Single valve	3 pcs.	-	3 pcs.	-

4.3 Machine assembly (1-piece single set)



1. Unpack the machine.
2. Attach the primary hose to the gas distributor.
 - Oxygen hose
 - Gas hose (acetylene or LPG)
3. Attach the arm support (set) to the stand and insert the pipe arm into the arm support (set).
4. Insert the torch holder (set) into the pipe arm.
5. Connect the distributor with the hose and insert them into the stand.
 - * Check the cutting oxygen (JO), preheating oxygen (PO), acetylene, and LPG gas (AC, LPG), as well as the markings, when attaching the hoses.
6. Connect the torch, three single pipes (set), and hoses, and then insert them into the torch holder.



4.4 Preparation for operation



4.4.1 Connecting the power cable

1. Connect the power cable to the body.
2. Before plugging the metal plug on the cable 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.

4.4.2 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 table of cutting data.)
 - When fixing a tip to the torch, tighten the nut with the two wrenches.
 - 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.

4.4.3 Attaching the rail



1. Place the rail in parallel with the marked line and move the machine by hand in advance or use a jig to check the parallelism before installing the rail. When the influence of heat on the rail is taken into consideration, the distance between the rail and the marked line should ideally be more than 100 mm.

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.

■ Method 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

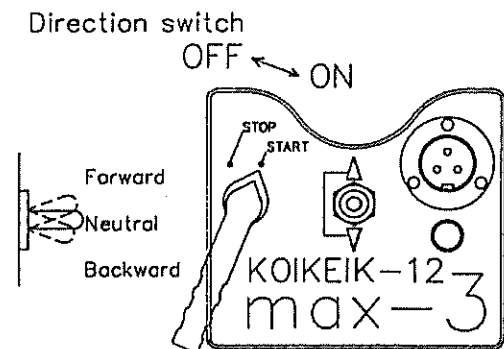
Referring to the Cutting Data, select the suitable tip according to the plate thickness.

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 running direction changeover switch



- By changing the direction switch, the machine can move forward and backward. The neutral position on the switch is the stop position of the machine.
- 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.
- Be sure that the switch is in the neutral position before starting the machine.
- Make sure that the switch is in the neutral position before turning the power on. If the switch is in the forward or backward position, the machine will start as soon as the power is turned on, which could cause serious accidents.
- Never put your hands in the space between the guide roller and rail, as well as between the body and the rail, while the machine is running; otherwise your hands may be caught.



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 has 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 gas8-10 mm
 - LPG gas5-8 mm

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. Set the clutch in the START position to sufficiently heat the cutting start position.
3. After preheating, supply oxygen and simultaneously turn on the motor switch or the turning direction switch to start cutting.
4. Carefully check the cutting condition, and control the cutting speed with the speed adjuster. For the cutting speed, refer to the Cutting Data.
5. 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 following 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 Cutting operation

1. Place the tip along the marked cutting line.
2. Open the gas valve and slightly open the preheating oxygen valve, and then ignite the oxygen with an ignition lighter. Then fully open the gas valve and make the flame neutral by controlling the preheating oxygen.
3. Adjust the height of the tip as against the steel sheet. (2-3 mm from the tip of the white point)
4. Engage the clutch, and after sufficient preheating, open the oxygen valve and turn on the forward or backward switch simultaneously. Then cutting operation will begin.
5. When cutting begins, carefully observe the cutting condition to set the optimum cutting speed.
6. After cutting, close the cutting oxygen valve and turn off the switch. Then close the gas valve and preheating oxygen valve in this order, and return the clutch to the stop position.

(Precautions)

- * Check that the flow of cutting oxygen is at the right angles to the steel sheet.
- * For correct cutting, set the gas pressure according to the Cutting Data. Correct the gas pressure according to the actual cutting conditions.

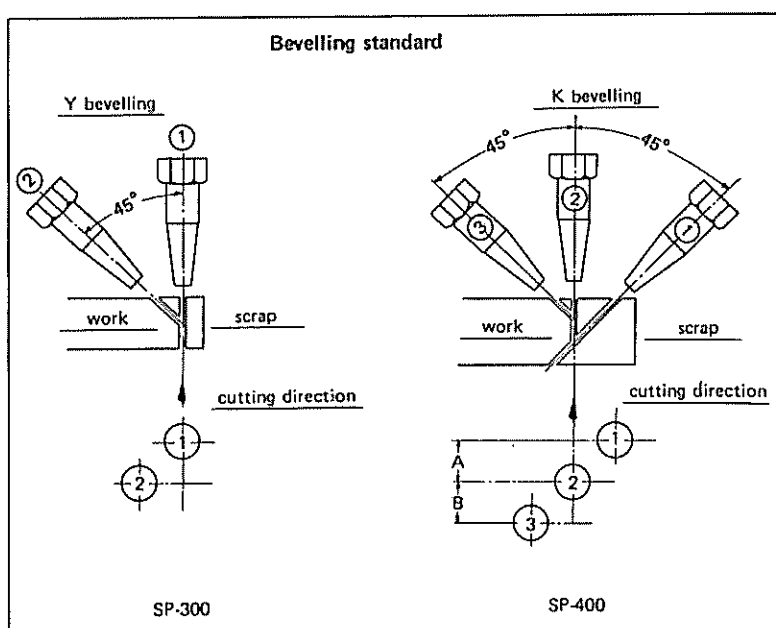
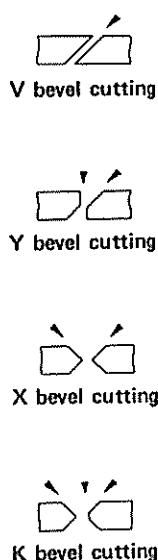
5.6.1 Straight cutting

The use of a high-accuracy plate rail ensures correct straight cutting. Plate rails are of a connection type, and connection of several rails will permit straight cutting of objects of any length.

5.6.2 In bevel cutting

The torch inclination indicator is graduated 5° increments from 0° ~ 60°a

When selecting a tip for bevel cutting, compute the cutting condition as indicated.



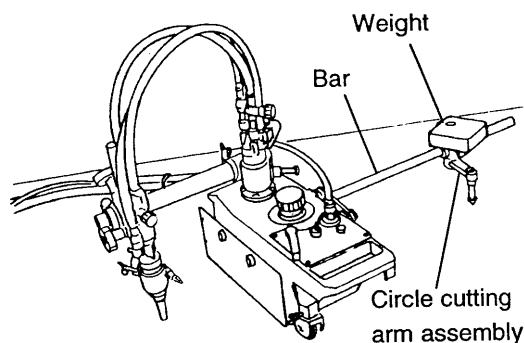
5.6.3 In circle cutting

The machine is set up differently in two configurations as shown in the photograph to the left. Set up for circle cutting is as follows:

● For circle cutting attachment

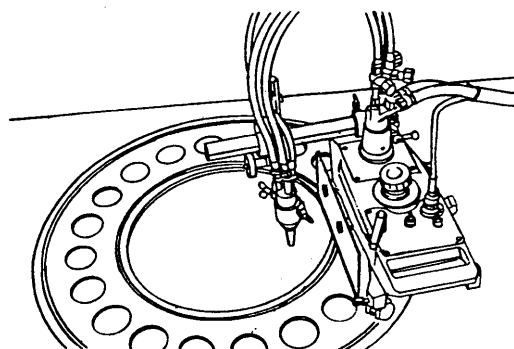
1. Remove the shield plate, and free the idle wheel by removing the fixing washer.
2. Attach the radius bar to the right side of the machine.
3. Attach the pivot pin and the balance weight to the radius bar.
4. Free the guide wheel and pull the machine so that it describes a natural arc, and tighten the guide wheel in its natural position.
5. Cutting capacity: $\phi 600 \sim \phi 2200$

※ Cutting range varies depending on cutting diameter and cutting plate thickness. Please inquire in detail.



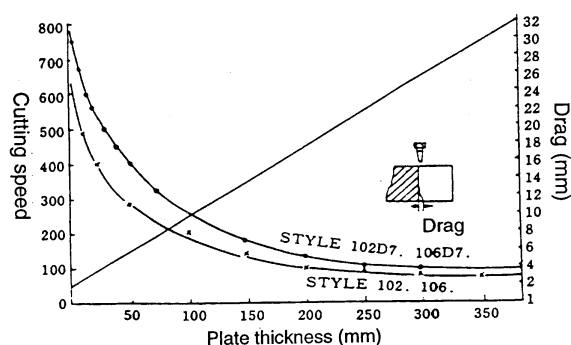
● For circle rail

1. Align the idle wheel to the inside groove of the track, and the guide wheel to the outside groove.
2. Free the guide wheel and tighten it in its natural position.
3. According to circle size, the torch can be located at both sides of the machine.
4. Cutting performance may be improved by forward travelling.
5. Cutting capacity: $\phi 100 \sim \phi 360$, $\phi 770 \sim \phi 1150$
 ※ In the range of $\phi 100$ to $\phi 300$, the cutting range varies depending on the cutting diameter and the thickness of the cut plate. Please check the optional information on the separate yen circle rail.



5.6.4 GAS cutting condition

1. The drag must be correct.
2. The cut surface must be sufficiently smooth and the drag groove must be shallow without notches
3. The upper edge of the cut surface must be sharp.
4. Slag must be separated easily.



6 Maintenance and inspection

Disassemble the machine in the following manner:

1. Remove the double heat prevention plate.
2. Remove the bottom plate.
3. Remove the stand.
4. Remove the four screws (M6 oval countersunk head). Then the case can be separated from the speed change unit.

Conduct the following maintenance and inspection to use the machine under the best conditions.

Carry out periodic inspection and maintenance according to the following instructions.

Always keep this machine in good operation condition.

Period	Inspection and Maintenance Procedure	
Daily	1	Wipe the body with a clean cloth, and brush all dirt from the rack and pinion of the pipe arm (S/N 60030300:pipe arm)
	2	Lubricate the shaft of the idle wheel with machine oil. (S/N 60030210: Idle wheel unit)
	3	Clean the outer surface of the drive wheel and idle wheel with an oily cloth. (A)
Monthly	1	Lubricate the shafts of the speed control knob and the clutch lever. (B)
	2	Measure the insulation resistance between the case and the power plug. It must read over 5MΩ.
	3	Clean the inside electric components removing the bottom cover. (C)
Every three months or 2,000 hours	1	Separate the reduction unit from the motor, and clean the gear box with cleaning oil.
	2	Replace worn parts with new ones.
	3	Wipe the motor desk and ring cone with a oily cloth.

(A) (S/N 60030243 : Drive wheel, S/N 60030244 : Idle Wheel)

(B) (S/N 60035010 : Pinion#3, S/N 60035004 : Clutch handle)

(C) (S/N 60035002 : Bottom plate)

7 Troubleshooting

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

	Possible case	Procedure	Remedy
1	Power is off	Check power source and wire connection.	
2	Broken power cord	Check cord with tester.	Repair broken wire. Replace it if necessary.
3	Defective plug	Check soldering wires.	Perform soldering.
4	Defective power lamp		Replace
5	Defective switch	Remove connector. If tester indicates " ∞ " when it is applied to 2-1 and 5-4 with the switch put to the forward position, or when tester is applied to 2-3 and 5-6 with the switch put to the forward position, the switch is defective. (for 100~200V) Remove connector. If tester indicates " ∞ " when it is applied to 2-1 and 5-4 with 8-7 the switch put to the forward position, or when tester is applied to 2-3 and 5-6 with 8-9 the switch put to the forward position, the switch is defective. (for 200~240V, 42V)	Replace (Please refer to Wiring Diagram)
6	Defective condenser	Condenser is normal if tester applied to condenser separated from other units fluctuate a little and then immediately indicates " ∞ ". If not, condenser is defective.	Replace
7	Defective soldering	Check soldered parts.	Perform soldering again.
8	Broken lead wire	Check lead wire with tester. If tester indicates " ∞ ", lead wire is broken.	Replace
9	Defective motor	If (1) through (7) are normal, cause lies in motor.	Repair or replace.

2) Machine will not move. (motor runs.)

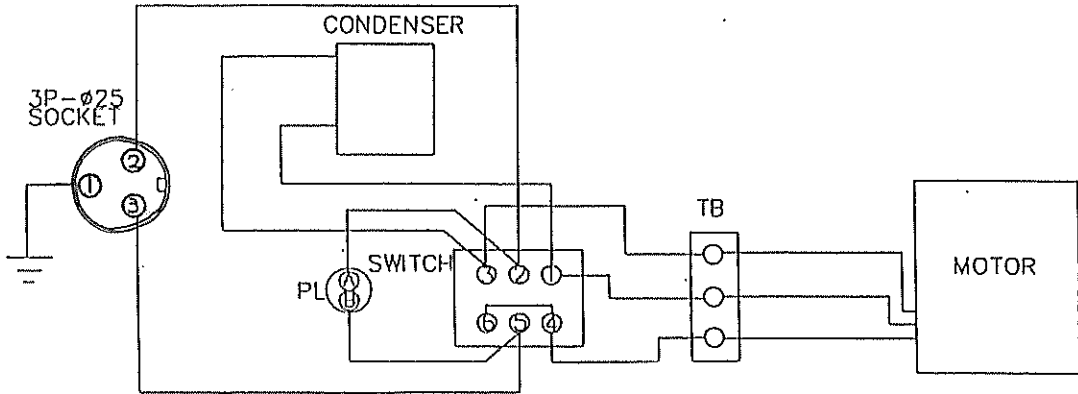
	Possible case	Procedure	Remedy
1	Clutch will not work.	Remove stand and ascertain that connecting bar is connected to lever screw.	Mount clutch properly.
2	Slippage on frictional surface.	See that pressure adjusting spring is working and that there is no oil sticking to frictional surface.	Replace if spring is defective. Remove oil, using thinner, if frictional surface is stained with oil.

3) Machine moves but it is abnormal.

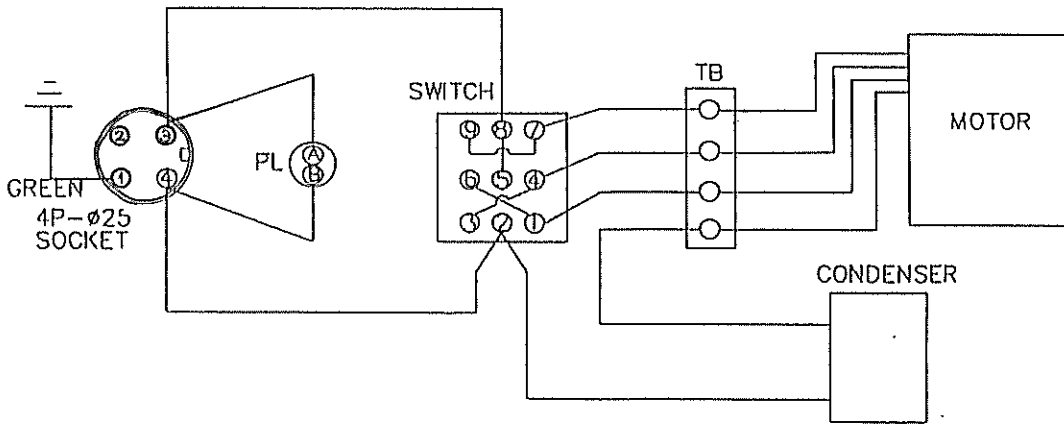
	Trouble	Possible case	Remedy
1	Speed cannot be controlled.	Pinion directly connected to handle is idle or gears or knock pin is damaged.	Repair or replace.
2	Too great noise and vibration	Gears are clogged with a foreign object.	Repair or replace.
		Wear of gears	Replace.
		Defective motor	Repair or replace.
		Wear or damage of cone	Replace.
3	Clutch will not dis-engage.	Snap ring for clutch pin is dislocated.	Replace.
4	Knocking is caused.	Wear of gears	Replace.
		Faulty clutch pin	Replace.
		Wear of clutch key groove	Replace.
		Improper contact between shaft and drive wheel	Repair or replace.
		Wear and damage of com.	Replace.
		Heat shield is in contact with rail or steel plate.	Adjust
		Foreign object or damage on rail groove	Adjust and repair.
		Hose and cabtyre cord interferes travelling.	Use care.
		Defective idle wheel unit	
		Damage or foreign object on drive wheel or idle wheel.	Repair or replace. Repair or replace.

8 Wiring diagram

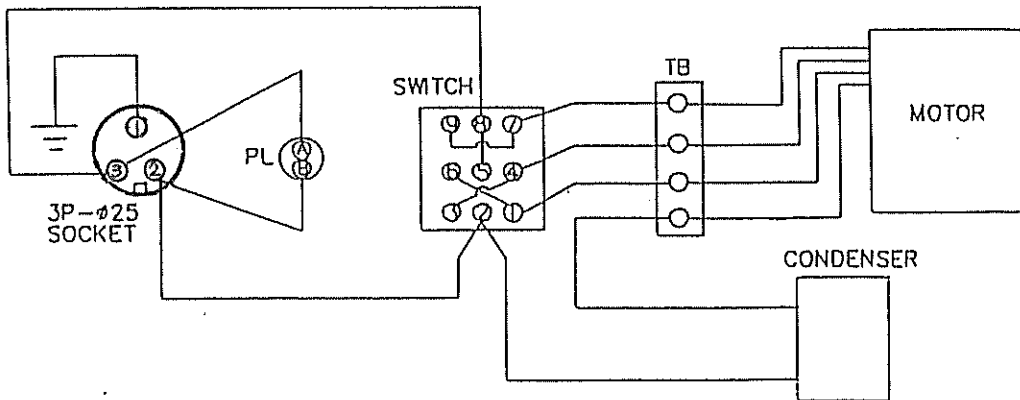
(100V-120V)



(200V-240V)

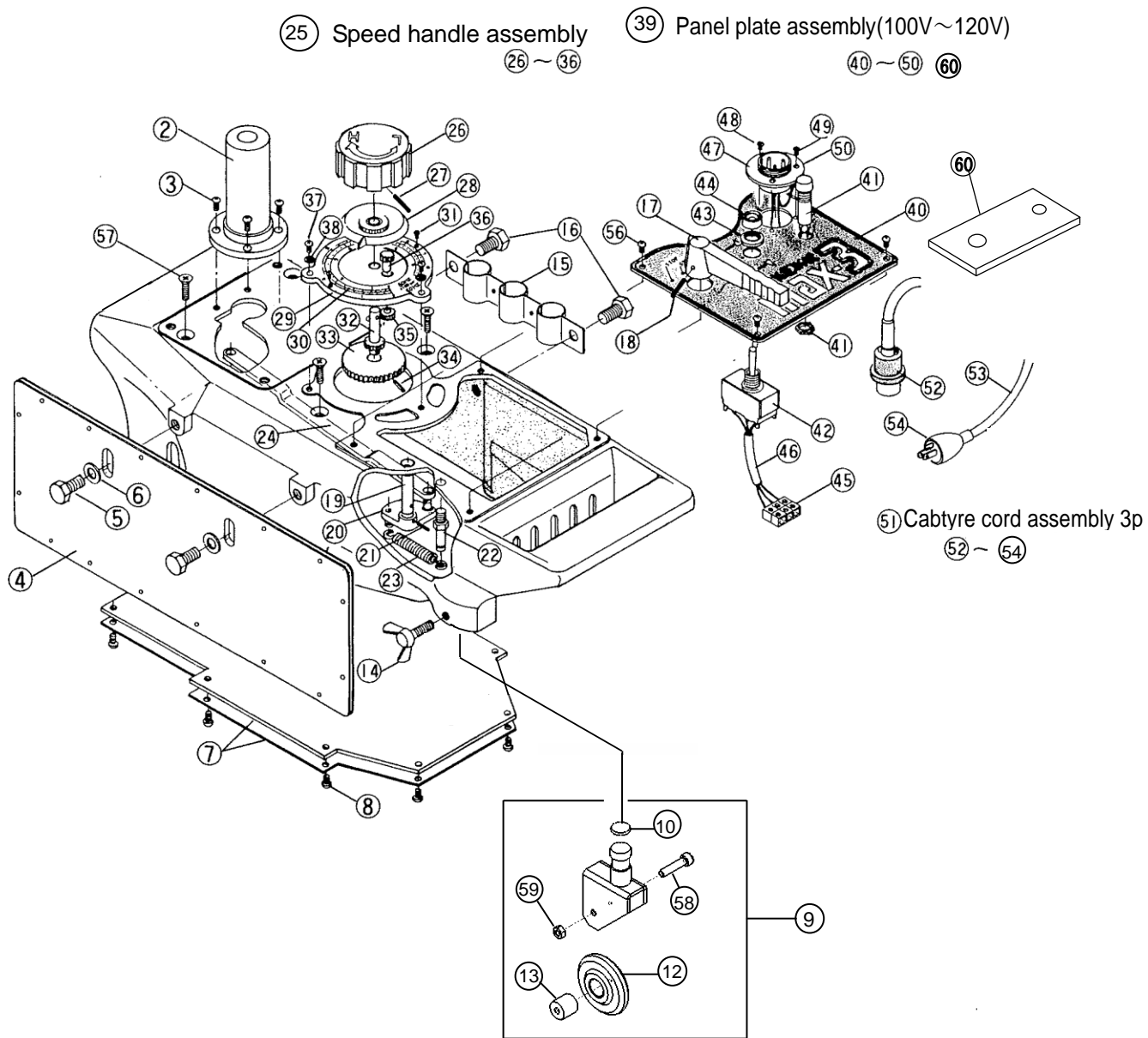


(42V)



10 Parts list

10.1 Main units

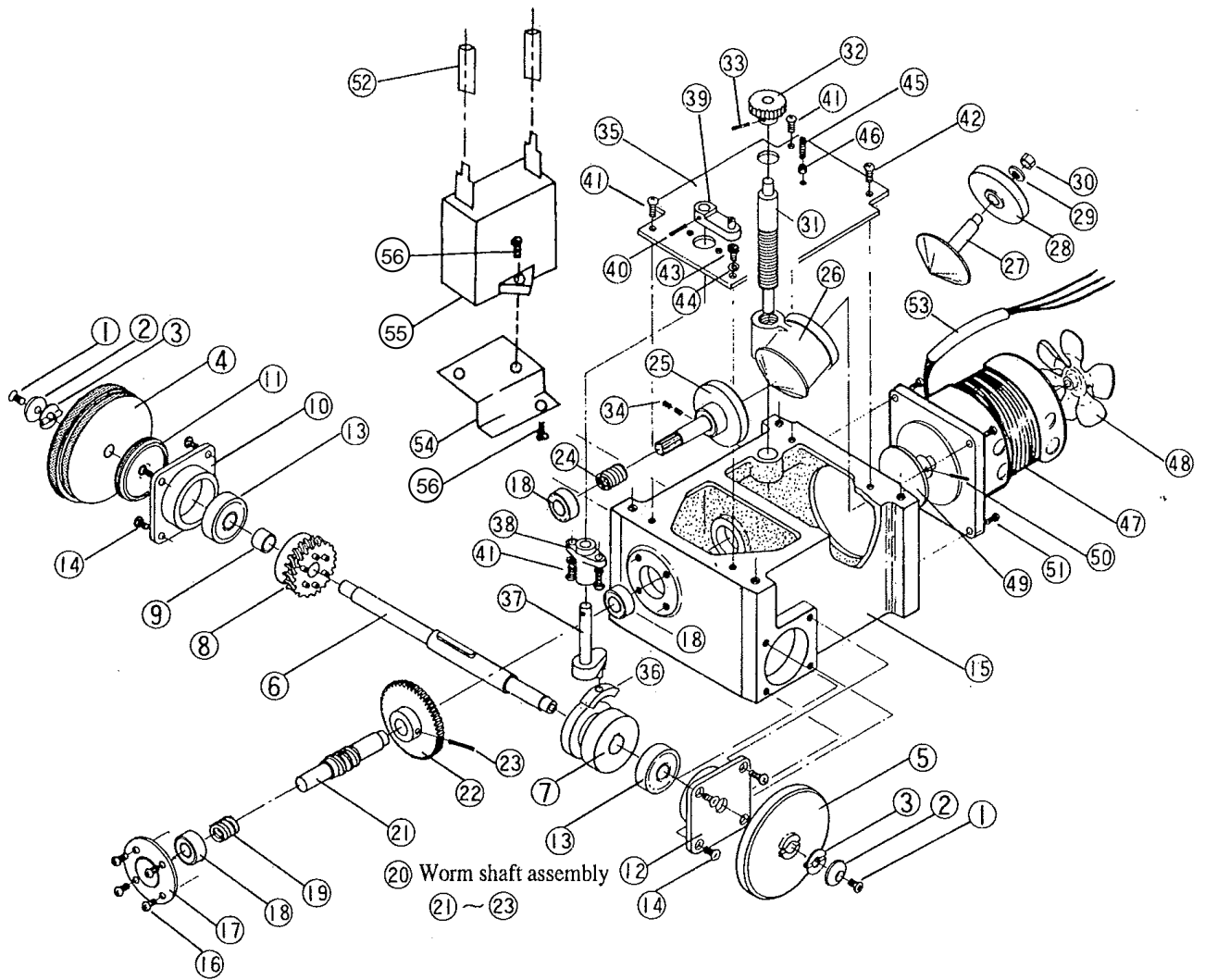


Main units

ITEM No.	PART NAME	Qty	STOCK No.	REMARKS
2	Stand	1	60030204	
3	Screw	4	6C530515	With WS SP-5x15
4	Heat shield	1	60032337	
5	Hexagon bolt	2	6C011020	BH-10x20
6	Washer	2	6D500100	WF-10
7	Bottom plate	1	60035002	
8	Screw	8	6C520410	SP-4x10
9	Idle wheel unit	1	60039350	
10	Set plate	1	60030211	
12	Roller	1	60030213	
13	Idle wheel collar	1	60039352	
14	Wing bolt	1	6C120815	BS-8x15
15	Cutting tip support	1	60035003	
16	Hexagon bolt	2	6C011015	BH-10x15
17	Clutch handle	1	60039343	
18	Spring pin	1	6B022516	PR-2.5x16
19	Shaft	1	60030218	
20	Clutch	1	60030219	
21	Spring pin	1	6B022516	PR-2.5x16
22	Spring holding screw	1	60030221	With Hexagon nut
23	Spring	1	60030222	
24	Connecting bar	1	60030220	
25	Speed handle assembly	1	60035005	Consists of Item 26~36
26	Speed handle	1	60035006	
27	Spring pin	1	6B022520	PR-2.5x20
28	Speed indication	1	60035007	
29	Transmission base	1	60035008	
30	Speed meter graduation	1	60035009	
31	Screw	3	6C520265	SP-2.6x5
32	Pinion #3	1	60035010	
33	Pinion #2	1	60035011	
34	Spring pin	1	6B022520	PR-2.5x20
35	Pinion #4	1	60035012	
36	Pinion #5	1	60035013	
37	Screw	3	6C520410	SP-4x10
38	Washer	3	6D500040	WF-4
39	Panel plate assembly (100V~120V)	1	61004276	Consists of Item 40~50
	Panel plate assembly (200V~240V)	1	61004279	Consists of Item 40~50

ITEM No.	PART NAME	QTY	STOCK No.	REMARKS
	Panel plate assembly(42V)	1	61004356	KE only
40	Panel plate	1	60035015	
	Panel plate	1	60035064	KE Only
41	Neon glow lamp	1	60035016	100V~120V
	Neon glow lamp	1	60035023	200V~250V
	Lamp	1	60035062	42V KE Only
	Lamp holder	1	64000139	KE Only
42	Switch	1	60030283	100V~120V (DS-239)
	Switch	1	60031859	200V~240V, 42V(S-33)
43	Dust protective nut	1	60035017	for DS-239
	Dust protective nut	1	60032480	For S-33
44	Dust protective cap	1	60032431	
45	Terminal	1	60031841	3P 100V~120V
	Terminal	1	60030656	4P 200V~240,42V
46	Tube	1	60035019	
47	Metal socket	1	6N100061	3P 100V~120,42V
	Metal socket	1	6N100062	4P 200V~240V
48	Screw	2	6C500306	SF-3x6 ★
49	Screw	1	6C500308	SF-3x8 ★
50	Nut	1	6D010030	NH-3
51	Cabtyre cord A'ssy (3P)	1	61004264	
	Cabtyre cord A'ssy (4P)	1	61004265	
	Cabtyre cord A'ssy (3P)	1	61004272	No plug type
	Cabtyre cord A'ssy (4P)	1	61004271	DIN type
	Cabtyre cord A'ssy (3P) CEtype	1	61005385	KE Only No plug type
	Cabtyre cord A'ssy (4P) CEtype	1	61005384	KE Only DIN type
52	Metal plug 3P	1	6N100056	
	Metal plug 4P	1	6N100057	
53	Cabtyre cord only (5M)	1	61004458	
	Cabtyre cord only (5M)	1	61005393	KE only CE type
54	Rubber plug	1	60030280	
	DIN plug	1	64000183	
56	Screw	4	6C520410	SP-4x10
57	Screw	4	6C510635	SM-6x35
58	Screw	1	6C030420	BC-4x20
59	U-nut	1	6D400003	M4
60	Insulating sheet	1	69000225	

10.2 Driving units



Driving units

ITEM No.	PART NAME	QTY	STOCK No.	REMARKS
1	Screw	2	6C510515	SM-5x15
2	Round washer	2	60030241	
3	Fixing washer	2	60030242	
4	Guide wheel	1	60030243	
5	Idle wheel	1	60030244	
6	Drive wheel shaft	1	60030245	With key
7	Clutch	1	60030246	
8	Worm wheel assembly	1	60030247	
9	Collar	1	60030248	
10	Bearing cover(C)	1	60030249	
11	Bearing retainer	1	60030250	
12	Bearing cover(A)	1	60030251	
13	Bearing	2	6A036201	6201ZZ
14	Screw	8	6C510412	SM-4x12
15	Gear box case	1	60030253	
16	Screw	4	6C520412	SP-4x12
17	Bearing cover(B)	1	60030254	
18	Bearing	3	6A030608	608ZZ
19	Spring(A)	1	60030255	
20	Worm shaft assembly	1	60030256	
21	Worm	1	60035020	
22	Spar gear	1	60032303	
23	Spring Pin	1	6B022520	PR-2.5x20
24	Spring(B)	1	60030257	
25	Ring #2	1	60030258	
26	Cone holder unit	1	60030259	
27	Cone shaft	1	60030260	
28	Ring #1	1	60030261	
29	Toothed lock washer	1	6D540060	M6
30	Hexagon nut	1	6D030060	NH-6
31	Speed adjusting shaft assembly	1	60030262	
32	Pinion gear	1	60035021	

ITEM No.	PART NAME	QTY	STOCK No.	REMARKS
33	Spring Pin	1	6B022516	PR-2.5x16
34	Enamel screw	2	6C540405	SS-4x5
35	Gear box case cover plate	1	60030264	
36	Slider	1	60030265	
37	Lever shaft	1	60030266	With enamel Screw and nut
38	Lever metal	1	60030267	
39	Lever	1	61002356	
40	Spring Pin	1	6B022516	PR-2.5x16
41	Screw	4	6C530520	SP-5x20
42	Screw	1	6C520520	SP-5x20
43	Hexagon socket head	1	6C030512	BC-5x12
44	Spring washer	1	6D510050	WS-5
45	Set screw	1	6C540525	SS-5x25
46	Hexagon nut	1	6D010050	NH-5
47	Motor with disk	1	60035031	100V~120V
	Motor with disk	1	61006838	200V~240V
	Motor with disk	1	60035034	42V
48	Motor fan with screw	1	60035022	
49	Motor disk	1	60032302	
50	Spring Pin	1	6B022514	PR-2.5x14
51	Screw	4	6C530415	SP-4x15
52	Fasten terminals	2	6R200001	★
53	Tube	1	60035019	
54	Condenser fixing plate	1	60032389	
55	Condenser	1	60035207	100V~120V
	Condenser	1	64000552	200V~240V
	Condenser	1	60035210	42V
56	Screw	2	6C570308	SP-3x8(WF,WS)

11 Cutting data

102(STANDARD SPEED) For Acetylene
Metric System

PLATE THICKNESS (mm)	TIP SIZE	CUTTING SPEED (mm/min)	OXYGEN PRESSURE (kg/cm ²) / (Mpa)		FUEL GAS PRESSURE (kg/cm ²) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PR-HEAT		
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

Inch System

PLATE THICKNESS (inches)	TIP SIZE	CUTTING SPEED (in/min)	OXYGEN P.S.I.G		FUEL GAS P.S.I.G	KERF WIDTH (inches)
			CUTTING	PR-HEAT		
1/8	00	27	20	20	2.8	0.04
1/4	0	24	30	30	2.8	0.05
3/8	0	22	30	30	2.8	0.06
1/2	1	21	40	40	2.8	0.07
3/4	2	18	45	45	3.6	0.08
1	2	17	45	45	3.6	0.08
1-1/2	3	14	45	45	3.6	0.09
2	4	12.5	45	45	4.3	0.11
2-1/2	5	11	55	55	4.3	0.12
3	5	10	55	55	4.3	0.12
4	6	8	55	55	5.7	0.14
5	6	7	55	55	5.7	0.14
6	7	6	65	65	5.7	0.16
8	7	5	65	65	5.7	0.17
10	8	3	65	65	5.7	0.23
12	8	2	65	65	5.7	0.27

102-D7(HIGH SPEED) For Acetylene

Metric System

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

Inch System

PLATE THICKNESS (inches)	TIP SIZE	CUTTING SPEED (in/min)	OXYGEN P.S.I.G		FUEL GAS P.S.I.G	KERF WIDTH (inches)
			CUTTING	PR-HEAT		
1/8	00	31.5	100	20	2.8	0.03
1/4	0	29	100	30	2.8	0.04
3/8	0	27	100	30	2.8	0.05
1/2	1	25	100	40	2.8	0.05
3/4	2	22	100	45	3.6	0.06
1	2	20	100	45	3.6	0.07
1-1/2	3	18	100	45	3.6	0.08
2	4	16	100	45	4.3	0.10
2-1/2	5	14	100	55	4.3	0.11
3	5	12.5	100	55	4.3	0.11
4	6	10	100	55	5.7	0.13
5	6	9	100	55	5.7	0.14
6	7	7	100	65	5.7	0.14
8	7	5.5	100	65	5.7	0.18
10	8	4	100	65	5.7	0.20
12	8	3	100	65	5.7	0.24

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 cutting speed. Also, when precision cutting is required, adjust all data.

106(STANDARD SPEED) For Propane
Metric System

PLATE THICKNESS (mm)	TIP SIZE	CUTTING SPEED (mm/min)	OXYGEN PRESSURE (kg/cm ²) / (Mpa)		FUEL GAS PRESSURE (kg/cm ²) / (Mpa)	KERF WIDTH (mm)
			CUTTING	PR-HEAT		
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	0.35 / 0.035	3.6
125	6	180	4.0 / 0.4	4.0 / 0.4	0.35 / 0.035	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

Inch System

PLATE THICKNESS (Inches)	TIP SIZE	CUTTING SPEED (in/min)	OXYGEN P.S.I.G		FUEL GAS P.S.I.G	KERF WIDTH (Inches)
			CUTTING	PR-HEAT		
1/8	00	27	20	20	2.8	0.04
1/4	0	24	30	30	2.8	0.05
3/8	0	22	30	30	2.8	0.06
1/2	1	21	40	40	2.8	0.07
3/4	2	18	45	45	2.8	0.08
1	2	17	45	45	2.8	0.08
1-1/2	3	14	45	45	2.8	0.09
2	4	12.5	45	45	3.6	0.11
2-1/2	5	11	55	55	4.3	0.12
3	5	10	55	55	4.3	0.12
4	6	8	55	55	5.0	0.14
5	6	7	55	55	5.0	0.14
6	7	6	65	65	5.7	0.16
8	7	5	65	65	5.7	0.17
10	8	3	65	65	5.7	0.23
12	8	2	65	65	5.7	0.27

106-D7(HIGH SPEED) For Propane
Metric System

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

Inch System

PLATE THICKNESS (Inches)	TIP SIZE	CUTTING SPEED (in/min)	OXYGEN P.S.I.G		FUEL GAS P.S.I.G	KERF WIDTH (Inches)
			CUTTING	PR-HEAT		
1/8	00	31.5	100	20	2.8	0.03
1/4	0	29	100	30	2.8	0.04
3/8	0	27	100	30	2.8	0.05
1/2	1	25	100	40	2.8	0.05
3/4	2	22	100	45	2.8	0.06
1	2	20	100	45	2.8	0.07
1-1/2	3	18	100	45	2.8	0.08
2	4	16	100	45	2.8	0.10
2-1/2	5	14	100	55	3.6	0.11
3	5	12.5	100	55	3.6	0.11
4	6	10	100	55	4.3	0.13
5	6	9	100	55	4.3	0.14
6	7	7	100	65	4.3	0.14
8	7	5.5	100	65	4.3	0.18
10	8	4	100	65	5.7	0.20
12	8	3	100	65	5.7	0.24

- 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 cutting speed. Also, when precision cutting is required, adjust all data.

<MEMO>

IK-12 max3 OPERATION MANUAL

Date of issue :Dec.2004

2nd	Sep.2005
3rd	Apr.2006
4th	Apr.2007
5th	May.2007
6th	May.2009
7th	Sep.2009
8th	Dec.2010
9th	Aug.2012
10th	Feb.2013
11th	May.2014
12th	Jun.2014
13th	Oct.2015
14th	Aug.2016
15th	Dec.2016
16th	Nov.2018
17th	Aug.2019

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