Portable Automatic Gas Cutter

BJA01B19

IK-72T

Three-Dimensional 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 1
1.1 General machine safety precautions 1
1.2 Gas cutting safety precautions 3

2. Locations of safety labels 5

3. Outline of machine 6
3.1 Features of machine 6
3.2 Name and function of each section 6
3.3 Specifications 7

4. Preparation for operation 7
4.1 Contents of package 7
4.2 Machine assembly 7
4.3 Preparation for operation 8

5. Cutting operation 11
5.1 Safety measures prior to operation 11
5.2 Ignition and flame adjustment 11
5.3 Cutting and piercing method 12
5.4 Procedures for starting cutting and extinguishing flame 12
5.5 Safety measures against backfire and flashback 12
5.6 Cutting operation 13

6 Maintenance and inspection 13
6.1 Daily inspection 13
6.2 3-month or 1000-hr inspection 13

7. Trouble shooting 14

8. Wiring diagram 17

9. Assembly drawing 17

10. Parts list 18
10.1 Main and driving units 18
10.2 Distribution and holder units 20
10.3 Rail unit 22

11. Cutting Data 24

1 Safety information

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 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 travel 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 used.
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. When mounting the machine on the rail ,correctly engage the clutch to stop it falling.
8. **When operating the clutch in the direction of the space between the machine and the heat shield, be careful not to get your hand caught between them.**

9. Be sure to attach a device to prevent the rail from falling.
10. Correctly fix the rail.
11. To prevent the horizontal bar, and torch holder from falling, fix them with pan head screws(SP-5×16) on the torch slide holder and support.
12. Be sure to hold the handle when carrying the machine.

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 cabtyre cord 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) 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 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.

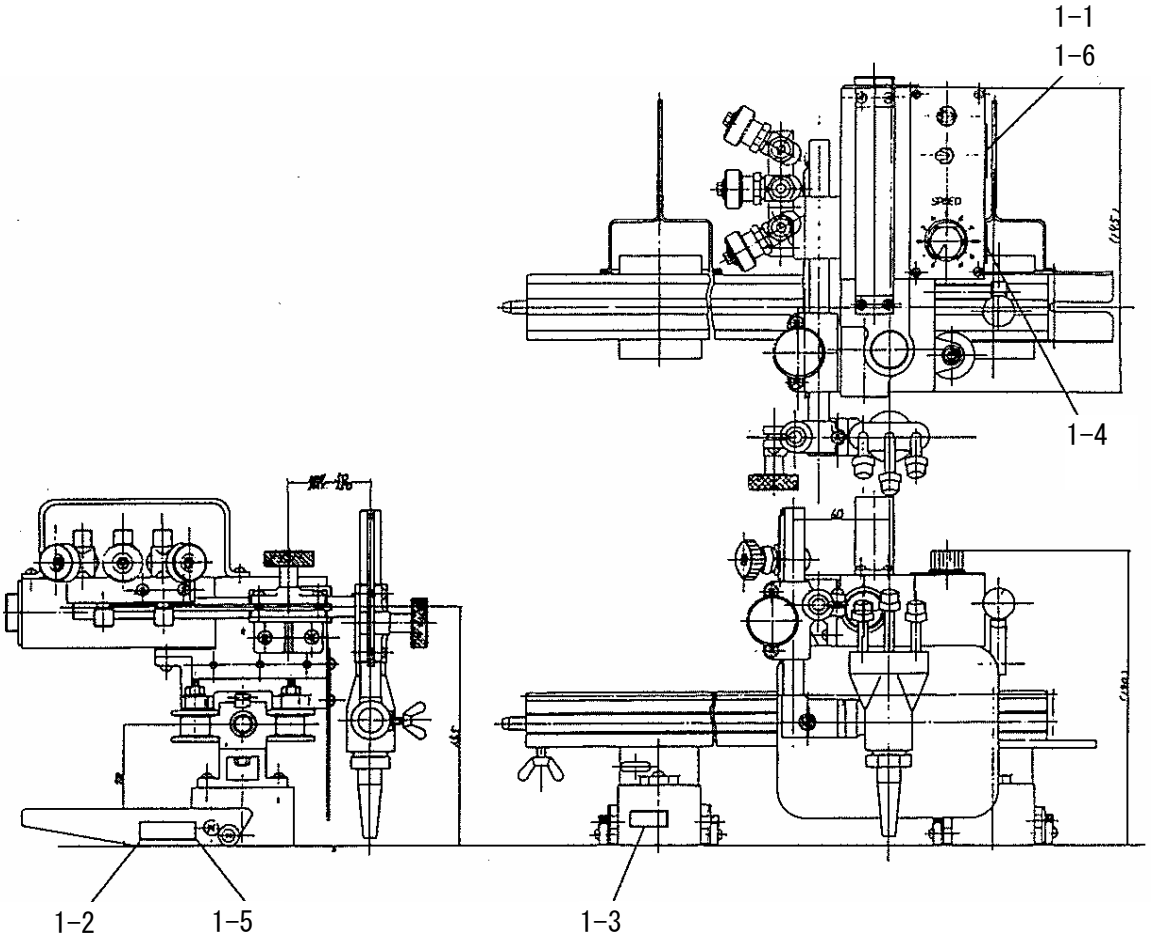
1.2.6 Safety precautions for skin burns

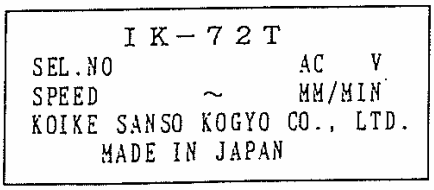
Observe the safety precautions to prevent skin burns. Ignoring heat, spatter, and sparks during operation could cause a fire or burned skin.

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.





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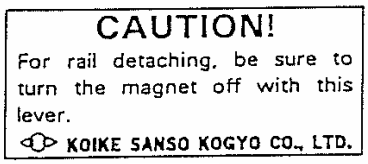

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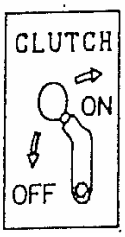

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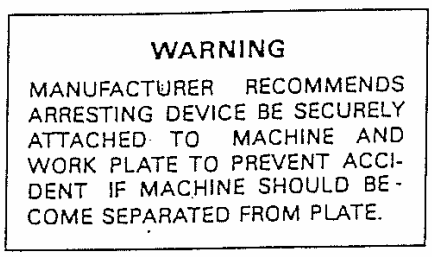

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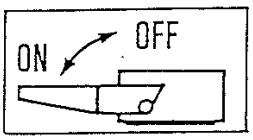

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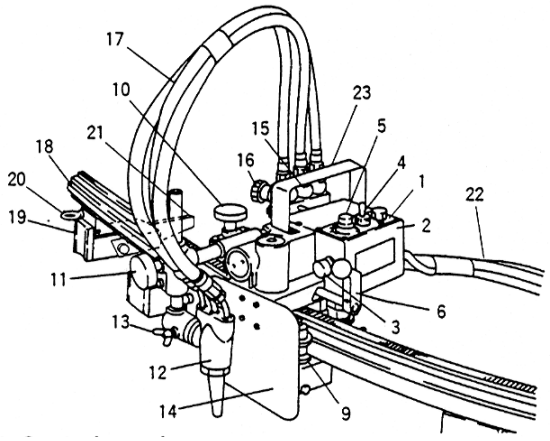
3 Outline of machine

3.1 Features of machine

The IK-72T (three-dimensional cutter) is a portable automatic gas cutter designed and manufactured to ensure high-precision cutting of three-dimensional structures (especially three-dimensional curves) which are conventionally cut by mechanical cutters. Three kinds of rails – 1D, 2D, and 3D – increase the range of operation and greatly help to rationalize and reduce the cutting work.

3.2 Name and function of each section



1. Control panel

The switch and speed adjuster control the machine operation.

2. Body

3. Fuse

4. Switch

When the switch is inclined in the direction of the arrow, the machine begins to travel in that direction.

5. Speed adjuster

Turn the dial clockwise, and the machine travels faster.

6. Clutch lever

Incline the clutch lever to the right to disengage the clutch (OFF) and to the left to engage it (ON).

7. Driving pinion

Engaged with the rail rack, the driving pinion turns to move the machine.

8. Gear box

The motions of the motor, gears, etc. permit the machine to travel smoothly.

9. Side roller

When combined with the rail, the side roller permits the machine to travel smoothly.

10. Torch slide handle

This handle adjusts the lateral position of the torch.

11. Torch up / down handle

This handle adjusts the vertical position of the torch.

12. Torch

13. Bevel setting screw

14. Heat shield

The shield protects the machine from the heating flame.

15. Gas distributor

The gas distributor controls the flow rate of preheating oxygen, fuel gas and cutting oxygen to generate the optimal flame.

16. Valve

17. Hose

The hose connects the gas distributor and the torch. Three hoses for preheating oxygen (blue), fuel gas (red), and cutting oxygen (blue), respectively, comprise one set.

18. Rubber rail

There are three kinds of rails –1D (straight AL rail), 2D (two-dimensional rubber rail), and 3D (three-dimensional rubber rail). Use them correctly according to the shape of the steel parts.

19. Magnet

The magnet fixes the rail to the steel plate. The lever makes it easy to switch the magnet on and off.

20. Eye bolt for chain

21. Lever

The lever is used for attaching and detaching the rail.

22. Primary hose

23. Handle

Hold the handle when carrying the machine.

3.3 Specifications

Weight :	11 Kg (incl. rail)
Body:	4.5 Kg
Rail:	6.5 Kg
Machine size :	190 x 195 x 140 mm
Rail size :	30H x 42W x 1500L (mm, extendable rail) ・1D (straight AL rail with 4 magnets) 30H x 42W x 1000L ・2D (two-dimensional rubber rail with 5 magnets) ・3D (three-dimensional rubber rail with 5 magnets)
Power source :	±10%
Speed control :	Dial operation
Cutting speed :	150–700 mm/min
Drive :	Rack and pinion method
Cutting thickness :	6–30 mm (by standard accessories cutting tip)
Bevel angle :	0–45 degree
Tip :	102 (for acetylene) or 106 (for propane) #0,1,2 one each
Gas :	Oxygen, Acetylene gas or LPG gas
Minimum radius of curve :	2,000 mm (for three-dimensional rail) 2,500 mm (for two-dimensional rail)

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
- Gas distributor 1 set
- Torch holder 1 set
- Torch 1 pc
- Hose
  - Distribution hose (3pcs set: 450L biased bend) 1 set
  - Primary hose (2pcs set: 1450L biased bend) 1 set
- Power cable (3P x 5M) 1 set
- Tip 102 or 106 #0,1,2 one each 1 pc each
- Tip cleaner 1 set
- Screw driver 1 pc
- Spanner (A,B,C) 1 set
- Fuse (1A) 2 pcs

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.
3. Attach the primary hoses to the gas distributor.
   - Oxygen hose M12 x P1.5
   - Gas hose M12 x P1.5 (Left hand thread)

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.

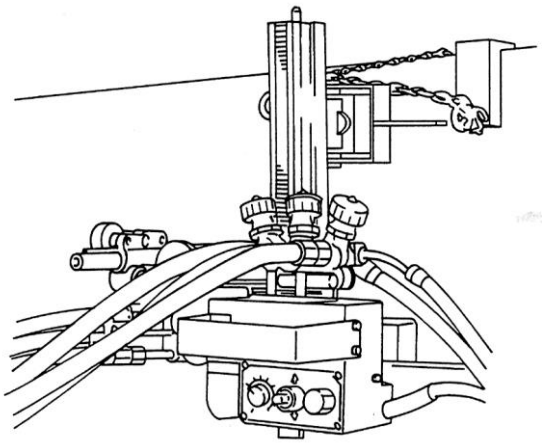
4.3.3 Connecting the tip

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 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 Attaching the rail

1. Attach the rail to the steel plate.
2. Be careful not to get your hands caught between the magnet removal lever and the steel plate when attaching the rail to the steel plate.

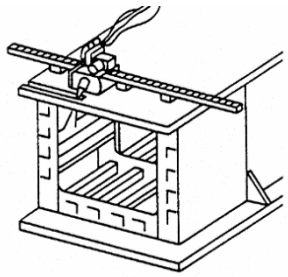
■Attaching the safety bracket



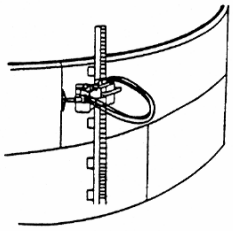
- During upward or vertical cutting, there is a danger that the rail may fall with the machine depending on workpiece thickness, condition of the adsorption surface, heat effects, vibration, etc. Be sure to fasten the hook bolts securely and safety fittings on both ends of the rail with ropes or others. Do not operate under unsecured situation without fall-prevention measures.
- If the magnet is not completely attached to the workpiece due to the condition of the workpiece affected by rust, paint, deflection, etc., or if the magnetic force get weak by rise of temperature, the rail may falls with the machine. Remove all obstacles attached on the magnets before use to avoid dropping the magnetic force and any cutting failure.

Rail may fall with machine depending on the operating conditions such as workpiece thickness, condition of absorption surface, thermal effect and others. Especially, since the surface of 1D rail is flat, the magnetic force may get weak depending on the condition of the workpiece such as rust, paint, deflection and others.

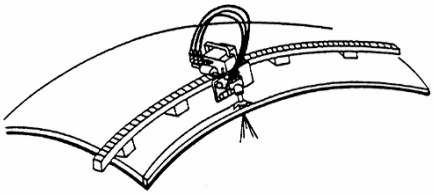
- **1D rail (straight AL rail)**
  Used for cutting straight surfaces.
  e.g. Straight cutting of ceilings or walls



- **2D rail (two-dimensional rubber rail)**
  Used for cutting two-dimensional curved surfaces.
  e.g. Two-dimensional curved surfaces of tanks, etc.



- **3D rail (three-dimensional rubber rail)**
  Used for cutting three-dimensional curved surfaces.
  e.g. Three-dimensional curved surfaces of ships, etc.

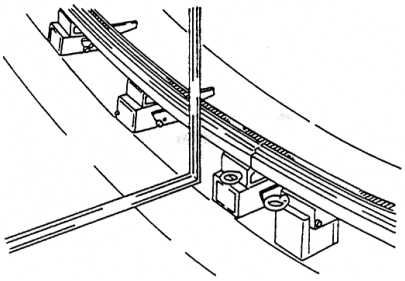


■Mounting the rail

Never hit the rail rack or the running surface with a hammer when aligning the tip with a marking line. Dents on the rack or the running surface may result in irregular running such as knocking.

- **1D rail (straight AL rail)**
  This rail is used for cutting flat plate. Four permanent magnets with detaching levers are provided on this rail. Lift the lever, and while one side is being lifted, align then lower the lever for adhesion. Confirm alignment with the cutting line with jigs and then attach the rail.

- **2D rail (two-dimensional rubber rail)**
  This rail is used for cutting two-dimensional curved surfaces. Five permanent magnets with detaching levers are provided on this rail. Lift the lever, and while one side is being lifted, align then lower the lever for adhesion. The alignment procedure is the same as that for the 1D rail.

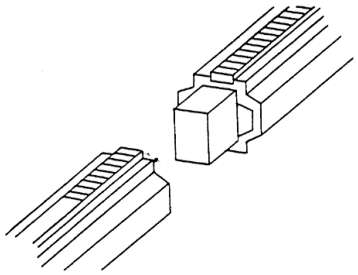


- **3D rail (three-dimensional rubber rail)**
  This rail is used for cutting three-dimensional curved surfaces. Five permanent magnets with detaching levers are provided on this rail. Lift the lever, and while one side is being lifted, align then lower the lever for adhesion. The alignment procedure is the same as that for the 1D rail.

■Rail connection method

・1D rail (straight AL rail)

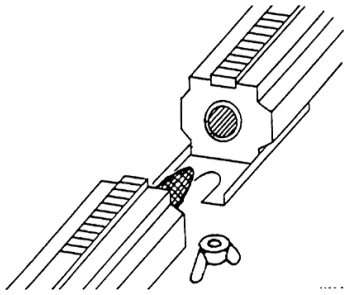
1.Turn OFF the magnet on the connection rail.
2.Align the connecting direction as shown in the figure.
3.Insert the fixed rail.
4.After positioning, fix the rail with the magnet.



・2D rail (two-dimensional rubber rail)

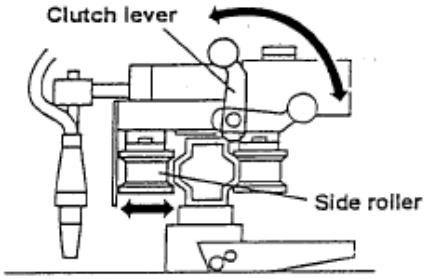
・3D rail (three-dimensional rubber rail)

1.Lift the magnet detaching lever on the connection rail to lift one side.
2.Align the connecting direction as shown in the figure.
3.Insert the fixed rail.
4.After positioning, fix the rail with the magnet.



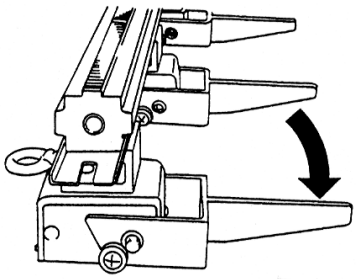
4.3.5 Mounting the body

Raise the clutch lever, and a side roller on one side will open outward. Insert the body from the rail end while the side roller is open to mount the body on the rail.



■Moving the rail

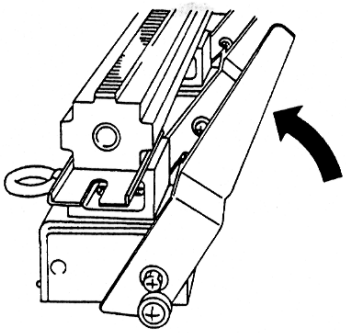
・When moving the rail, be sure to remove the body from the rail.
・Set all detaching levers on the rail fixing magnet in the OFF position.



■Detaching the rail

・Lower the detaching lever to fix the rails to the steel plate.

・To remove the rails from steel plate, lift the detaching lever.



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 degrees, 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 touch the H-lever while the machine is moving, 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 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

5.3 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 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 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 Cutting operation

1. Attach the rail to the cutting position, and align the tip with the cutting start point.
2. Bring a flame close to the tip for ignition and ensure sufficient preheating.
3. Simultaneously with opening the cutting oxygen valve, turn on the switch to start cutting.
4. While checking the cutting condition, select the optimal cutting speed with the speed adjuster.
5. After cutting, turn off the switch and close the cutting oxygen valve, preheating oxygen valve and fuel gas valve in this order.

＊ Thereafter, repeat operations from step 1.

*Rail may fall with the machine depending on the operating conditions such as workpiece thickness, condition of adsorption surface, thermal effect, etc. Especially, since 1D rail's surface is flat, the adsorption force may drop due to the condition of the work piece affected by rust, paint, deflection, and others.
Be sure to take measures such as keeping the torch away from rail, removing rust, paint, and other obstacles from the workpiece.
In case of operation on wall or at high place, be sure to securely fasten the hook bolts and safety fittings on both ends of the rail with ropes or others.

6 Maintenance and inspection

Refer to the following for inspection and maintenance of the machine and use the machine under the best operating conditions at all times.

6.1 Daily inspection

1. Clean the outside of the machine and sliding sections.
2. Remove dust from the rail, rack, and attractive surface of the magnet on the roller running surface.
3. Inspect for excessive play and abrasion in the sliding sections.
4. Inspect for gas leaks from the respective gas hose joints and valves.

6.2 3-month or 1000-hr inspection

1. Disassemble the gear case and motor gear ass'y . Clean them with cleaning oil to remove old grease inside the gear case as necessary. (Use the specified grease.)
2. Replace internal parts which are extremely abraded with new ones.

7 Troubleshooting

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

Cause	Inspection point	Correction
1) Power is not supplied	Check 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 resister 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) Speed can not 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 kΩ 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	Remove the speed reducer box to check the clutch operation.	Disassemble and clean.
2) Idle rotation of reduction gear	The reduction gear is rotating idly when the motor keeps running even if the direction changeover switch is turned on or the drive wheel is stopped by hand.	Replacement of gears (set).

(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.	①Speed control resistor is defective.	Replace with a new one.
	②Defective wiring.	Correct the wiring.
	③Defective motor.	Repair or replace the motor with a new one.
	④Defective controller.	Replace with a new one.
3) High speed is not possible.	When the supply voltage has dropped.	Check with a tester.
4) Knocking occurs.	①Abrasion of gears.	Replace .
	②Abrasion of clutch key.	Replace or repair.
	③Excessive play between shaft and drive wheel.	Replace or repair.
	④Hose or cabtyre cords hinder smooth running.	Consider during operation.
	⑤Flaws on the drive and drive wheel or adhesion of foreign material.	Replace or repair.

5) The magnet of the rail comes off from the adsorbed surface of the workpiece.

Causes	Inspection point	Correction	Remarks
Presence of an obstacle between the magnet and the adsorbed workpiece.	Adsorption surface is painted or processed.	Remove paint and processed material.	
	Adsorption surface is rusted.	Remove rust.	
	Sputter or iron scrap is stuck on the magnet.	Remove it.	
There is a gap between the magnet and adsorbed workpiece.	Adsorbed workpiece is not flat.	Consider using 2D or 3D rail not 1D rail.	
Magnet and workpiece are adsorbed obliquely.	The workpiece to be adsorbed is slightly curved.		
	Workpiece to be adsorbed get curved during cutting.		
Magnet becomes hot.	The magnet is hit by cutting flame.	Keep the magnet rail away from torch.	Refer to photo 1 and 2. Situation shown in photo 2 is recommended.
	Operated in closed space.	Heat get filled up, and cause the magnet to become hot especially in case of upward cutting. Ventilate air to avoid getting high temperature.	
Thickness of adsorbed workpiece is thin.	Thickness less than 6mm.	---------	
Rough surface of adsorbed workpiece.		It might be improved by polishing the surface.	

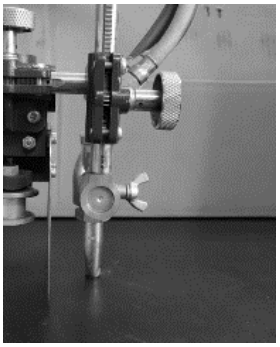


Photo1

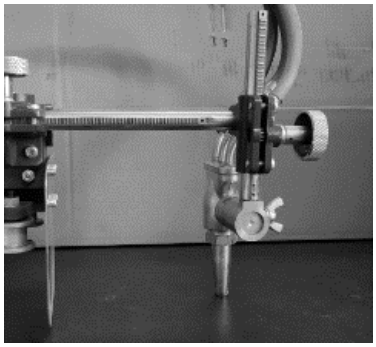


Photo2

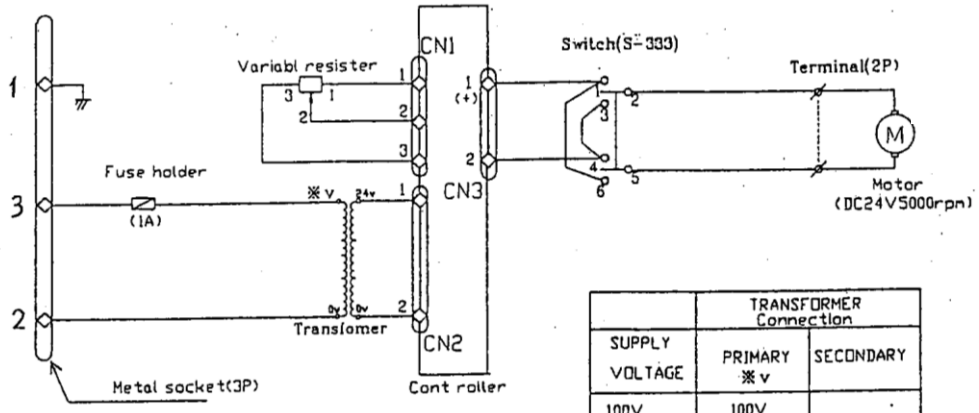
Magnets may drop the magnetic force due to heat, and the rail may fall when the magnetic force get weaker.

Use safety fittings for upward cutting and vertical cutting. Take measures to prevent falls, and do not use the product under unsecured situation.

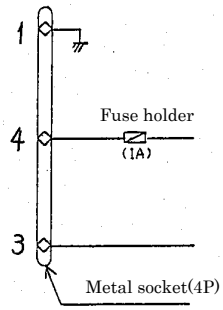
Table: Magnetic power factor of magnets

Magnet temperature	Magnetic power factor of a magnet for 1D or 2D or 3D rail
20℃	100%
50℃	About 90%
100℃	About 80%
200℃	About 50%
300℃	---

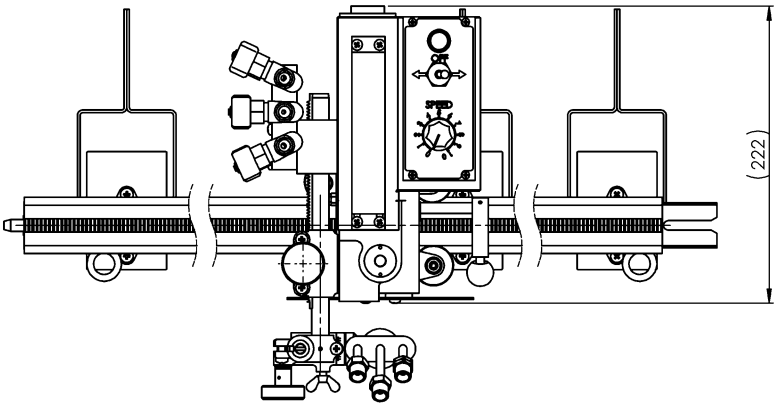
8 Wiring diagram

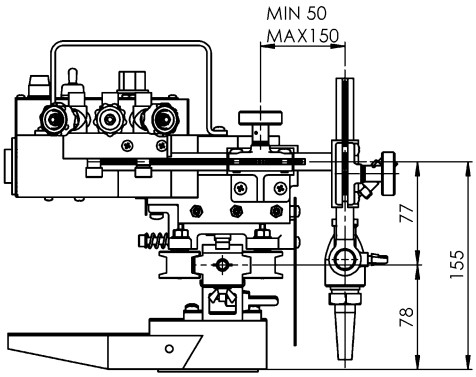


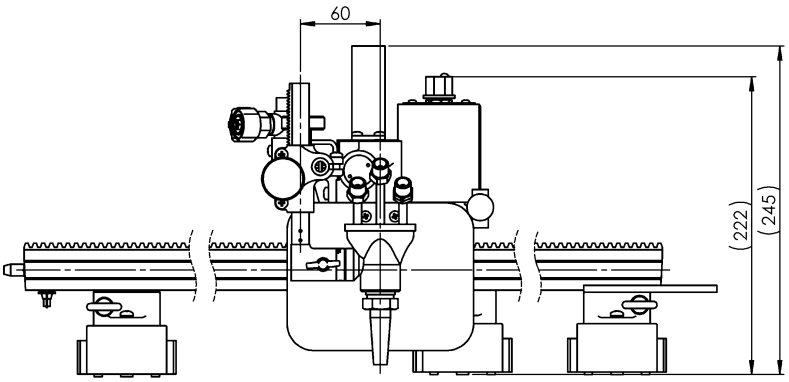
	TRANSFORMER Connection	
SUPPLY VOLTAGE	PRIMARY ※v	SECONDARY
100V	100V	24V
110V	120V	
120V	120V	
200V	220V	
220V	220V	
230V	230V	
240V	240V	
42V	42V	



9 Assembly drawing

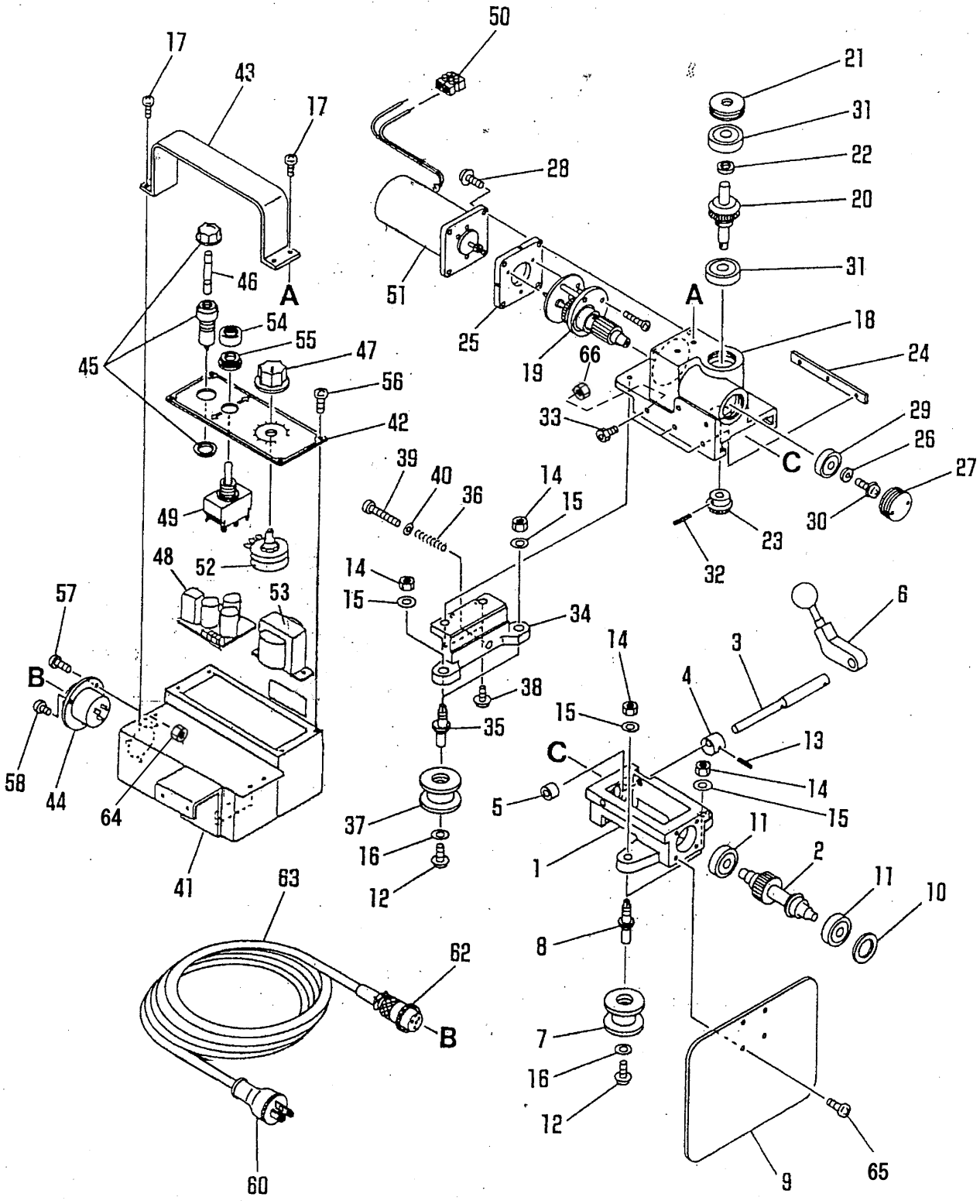






10 Parts list

10.1 Main and driving units

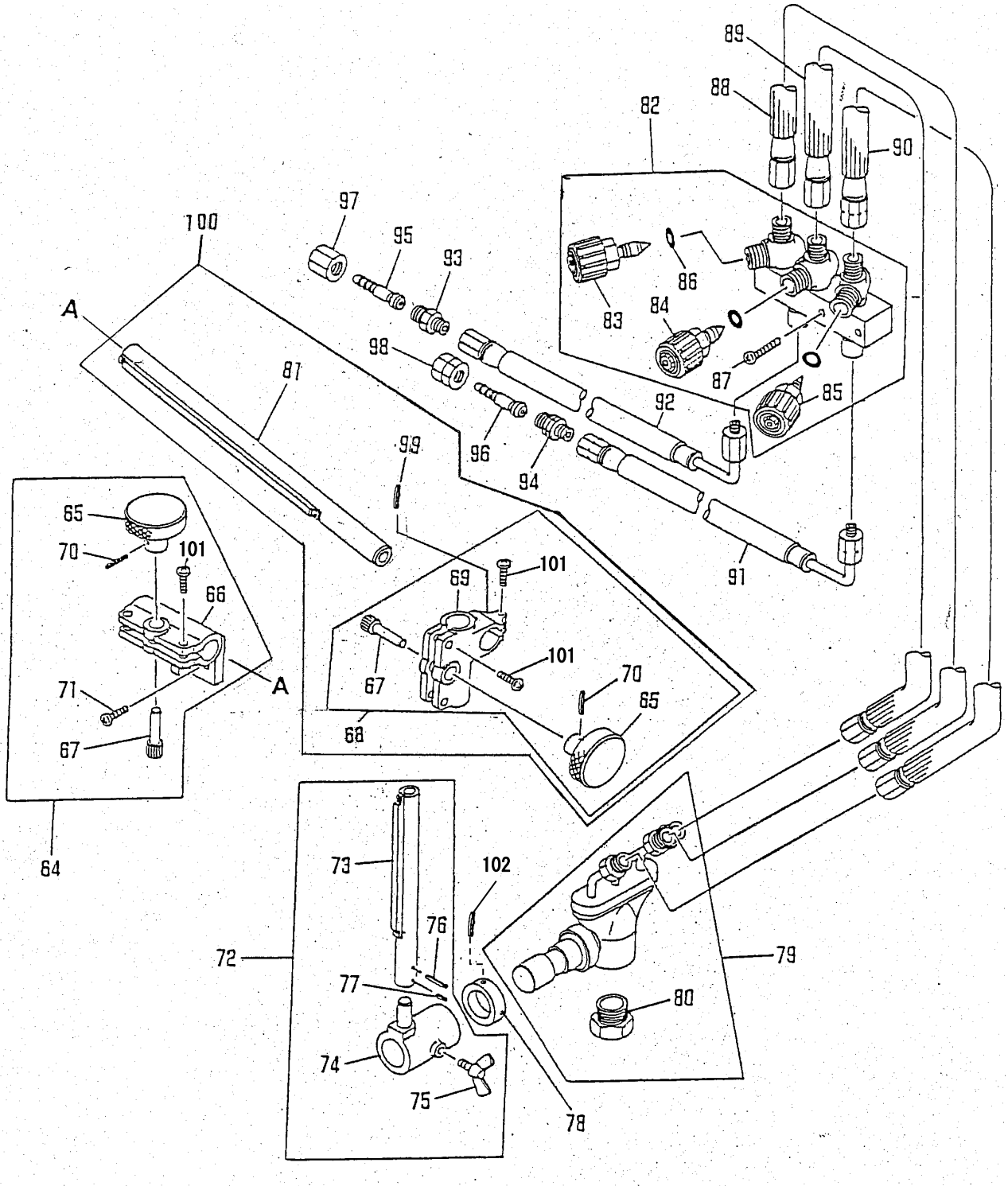


Main and driving units

ITEM NO.	PART NAME	Q'TY	STOCK NO.	REMARKS
1	Machine base	1	20542161	★
2	Drive shaft assembly	1	60031606	
3	Clutch shaft	1	60038839	※1
4	Eccentric collar	1	60031608	※1
5	Stopper	1	60031609	
6	Clutch holder assembly	1	60031610	※1
7	Side roller assembly	2	60031611	
8	Side roller shaft(A)	2	60031612	
9	Heat shield	1	60031629	
10	Liner	1	60031684	
11	Bearing	2	6A030627	627ZZ
12	Screw	4	6C520306	SP-3×6
13	Spring pin	1	6B022010	PR-2×10
14	Nut	4	6D010060	NH-6
15	Washer	4	6D500060	WF-6
16	Washer	4	6D500030	WF-3
17	Screw	4	40029400	SP-4×10with WF WS
18	Gear box	1	20542166	★
19	Gear assembly	1	61000715	
20	Worm wheel assembly	1	60031617	
21	Bearing retainer	1	60031618	
22	Collar(A)	1	60031619	
23	Bevel gear（B）	1	60031620	※1
24	Slide key	1	60031621	
25	Spacer	1	61000546	
26	Washer	1	60031015	
27	Bearing retainer	1	60031014	
28	Screw	4	6C530418	SP-4×18 with WS
29	Bearing	1	6A030627	627ZZ
30	Screw	1	6C520408	SP-4×8
31	Bearing	2	6A030628	628ZZ
32	Spring pin	1	6B022515	PR-2.5×15
33	Screw	3	6C540515	SS-5×15
34	Side roller bracket	1	20542167	★
35	Side roller shaft(B)	2	60031613	
36	Spring	2	60031676	
37	Side roller assembly	2	60031611	
38	Screw	2	6C520512	SP-5×12
39	Hexagon bolt	1	6C030535	BC-5×35
40	Washer	1	6D500050	WF-5
41	Box	1	61000588	
42	Operation panel	1	61000566	
43	Grip	1	60038832	
44	Metal socket	1	6N100062	NCS-254-R
	Metal socket	1	6N100061	NCS-253-R
45	Fuse holder	1	64000019	F-7150
46	Fuse	1	60030707	1A
47	Grip	1	60031249	K-2901D
48	Controller	1	69000130	
49	Switch	1	60035226	S-333
50	Terminal	1	60031666	2P
51	Motor(with pinion)	1	61007884	DC24V 5000RPM
52	Variable resister	1	60030745	50KΩ
53	Transformer	1	61000472	100V-220V
	Transformer	1	61000672	230V-240V
	Transformer	1	61000473	42V
54	Cap for dust protector	1	60032431	
55	Nut for dust protector	1	60032480	
56	Screw	4	40029432	SP-3×6 with WS WF
57	Screw	1	6C510310	SM-3×10
58	Screw	2	6C510306	SM-3×6
60	Rubber plug	1	60030280	ME2538
	DIN plug	1	64000183	
62	Metal plug	1	6N100057	NCS-254-P
	Metal plug	1	6N100056	NCS-253-P
63	Cabtyre cord A'ssy(4p)	1	61004265	
	Cabtyre cord A'ssy(3p)	1	61004264	
	Cabtyre cord A'ssy(4p)	1	61004271	DIN type
	Cabtyre cord A'ssy(3p)	1	61004272	No plug type
	Cabtyre cord A'ssy(4p) CEtype	1	61005384	KE only DIN type
	Cabtyre cord A'ssy(3p) CEtype	1	61005385	KEonly No plug type
64	Nut	1	6D010060	NH-6
65	Screw	4	6C530408	SP-4X8with WS
66	Nut	3	6D010050	NH-5

※1 It is necessary to drill holes and pin-hit with the actual product matching

10.2 Distribution and holder units



Distribution and holder units

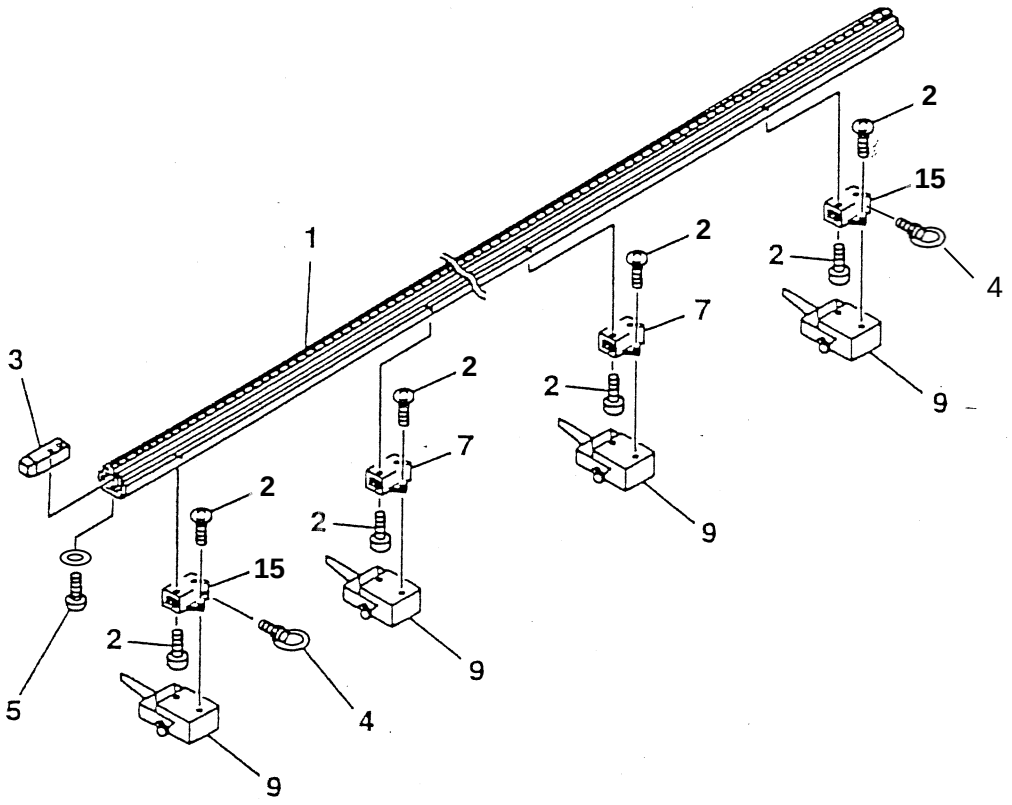
ITEM NO.	PART NAME	Q'TY	STOCK NO.	REMARKS
64	Cross feed holder ass'y	1	60031632	
65	Handle	2	60031628	※1
66	Cross feed base	1	20542168	With bush ※1★
67	Pinion	2	60031627	
68	Vertical slide holder ass'y	1	60032789	※1
69	Vertical slide base	1	60031665	※1
70	Spring pin	2	6B022010	PR-2×10
71	Screw	2	6C520516	SP-5×16
72	Torch holder ass'y	1	60031641	
73	Vertical bar ass'y	1	60031625	With rack
74	Torch holder base	1	20542170	※1★
75	Wing bolt	1	6C120512	BS-5×12
76	Spring pin	1	6B022015	PR-2×15
77	Spring pin	1	6B022013	PR-2×13
78	Graduation ring	1	60030993	
79	Torch	1	60010301	Except USA. KE
	Torch	1	60010302	USA only
	Torch	1	60010303	KE only
80	Tip fixing nut	1	60005020	
81	Cross feed bar ass'y	1	60031626	With rack ※1
82	Distributor	1	60031630	Except USA, KE
	Distributor	1	60031631	USA only
	Distributor	1	60013110	KE only
83	Valve for jet oxygen	1	60015351	Except KE
	Valve for jet oxygen	1	60015352	KE only
84	Valve for preheat oxygen	1	60015355	Except KE
	Valve for preheat oxygen	1	60015358	KE only
85	Valve for gas	1	60015356	
86	O-ring	3	60005026	
87	Screw	2	6C520425	SP-4x25
88	Hose for jet oxygen	1	60030305	Except USA
	Hose for jet oxygen	1	60030304	USA only

ITEM NO.	PART NAME	Q'TY	STOCK NO.	REMARKS
89	Hose for preheat oxygen	1	60030305	Except USA, KE
	Hose for preheat oxygen	1	60030304	USA only
90	Hose for gas（Red）	1	60030307	Except USA
	Hose for gas	1	60030308	USA only
	Hose for gas（Orange）	(1)	61001810	
91	Hose for gas（Red）	1	60031110	Except USA
	Hose for gas	1	60031111	USA only
	Hose for gas（Orange）	(1)	61001817	Except USA
92	Hose for oxygen	1	60031107	USA only
	Hose for oxygen	1	60031108	Except USA
93	Connection nipple for oxygen	1	60031001	Except USA
	Connection nipple for oxygen	1	60031002	USA only
94	Connection nipple for gas	1	60031003	Except USA
	Connection nipple for gas	1	60031004	USA only
95	Hose connector (OX)	1	60015003	Except USA
	Hose connector (OX)	1	60015040	KE only
96	Hose connector (GAS)	1	60015004	Except USA
	Hose connector (GAS)	1	60015062	KE only
97	Nut for oxygen	1	60015001	Except USA
	Nut for oxygen	1	60015056	KE only
98	Nut for gas	1	60015002	Except USA
	Nut for gas	1	60015054	KE only
99	Spring pin	1	6B022520	PR-2.5×20
100	Vertical slide holder with Cross feed bar	1	61004666	
101	Screw	5	6C520515	SP-5X15
102	Screw	1	6C560304	SS-3X4

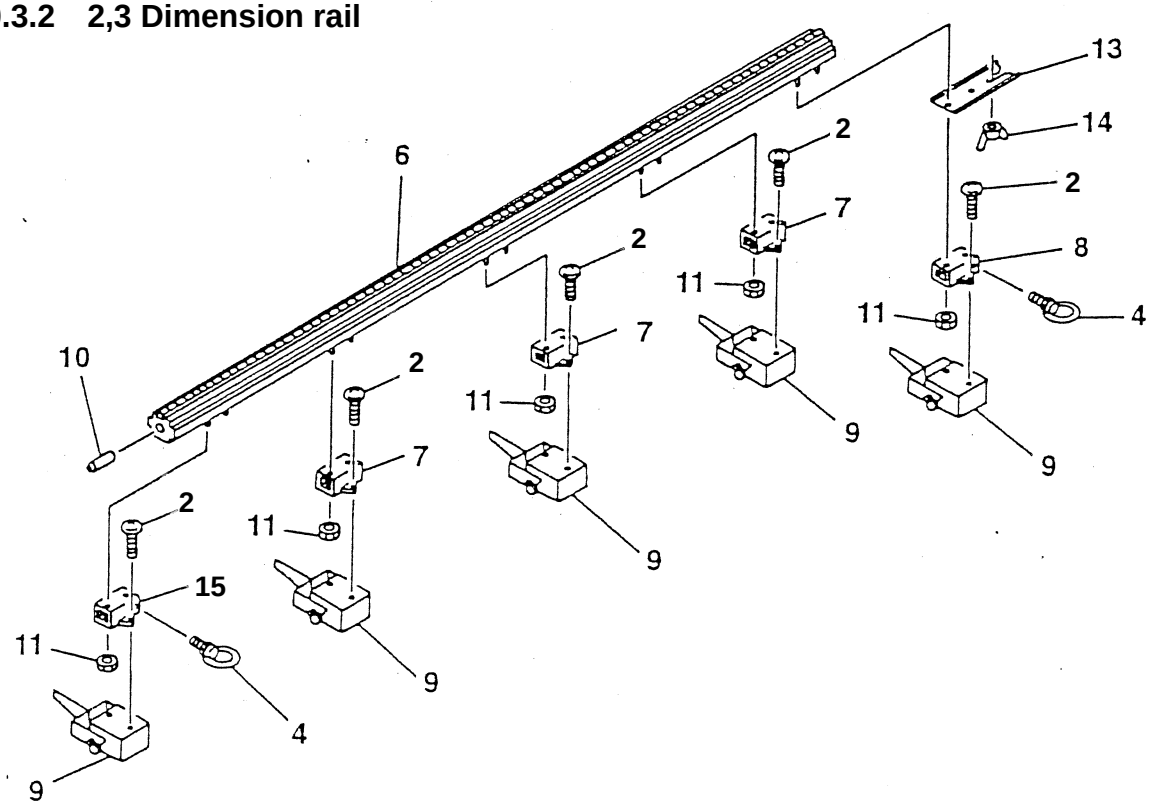
※1 It is necessary to drill holes and pin-hit with the actual product matching

10.3 Rail unit

10.3.1 Straight rail



10.3.2 2,3 Dimension rail



Rail unit

ITEM No.	PART NAME	QTY	STOCK No.	REMARKS
1	Straight rail	1	60038801	With Rack
2	Screw	16	6C530515	M5x15 with WS 1D only
2	Screw	10	6C530515	M5x15 with WS 2D 3D only
3	Connector	1	60031694	1D only
4	Hook bolt	2	60031654	
5	Screw	2	6C520620	SP-6x20 1D only
	Washer	2	6D590060	M6 1D only
6	2-dimension rail	1	60033137	Rail only
	3-dimension rail	1	60033142	Rail only
7	Magnet holder(A-1)	2	60031657	1D only
7	Magnet holder(A-1)	3	60031657	2D,3D only
8	Magnet holder(B)	1	60031658	2D,3D only
9	Magnet	4	60031682	120kg 1D
9	Magnet	5	60031682	120kg 2D ,3D
10	Coupling pin	1	61006439	2D,3D only with Spring pin
11	Nut	10	6D010050	2D,3D only NH-5
	Washer	10	6D510050	2D,3D only WS-5
13	Coupling board	1	60031659	2D,3D only
14	Wing nut	1	6D080060	NB-6 2D,3D only
	Washer	1	6D500060	WF-6 2D,3D only
15	Magnet holder(A-2)	2	60031683	1D only
15	Magnet holder(A-2)	1	60031683	2D,3D only

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

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	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

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

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	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

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＞

IK-72T
(Three-Dimensional Cutter)
OPERATION MANUAL

Date of issue:	Sep.1995
2nd	Jun.2007
3rd	May.2008
4th	Nov.2008
5th	Oct.2009
6th	Aug.2010
7th	Dec.2010
8th	Jan.2012
9th	Oct.2012
10th	Jan.2013
11th	May.2013
12th	Nov.2013
13th	Jun.2015
14th	Jun.2018
15th	Feb.2019
16th	May.2020
17th	Jul.2021
18th	Sep.2023
18th	Feb.2026

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