Portable Automatic Gas Cutter

BFC00B16

KHC-600D

Pipe hole 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
■WARNING 1
■CAUTION 1
■NOTICE SIGNS 1
1.1 General machine safety precautions 1
1.1.1 Machine safety 1
1.1.2 Safety clothing 1
1.1.3 Operations and handling safety precautions 2
1.1.4 Electrical system precautions 2
1.1.5 Maintenance and inspection precautions 2
1.2 Gas cutting safety precautions 3
1.2.1 Prevention of explosion 3
1.2.2 Pressure regulator safety precautions 3
1.2.3 High pressure gas cylinder safety precautions 3
1.2.4 Safety precautions for hoses 3
1.2.5 Safety precautions for fire 3
1.2.6 Safety precautions for skin burns 4
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 8
4.1 Contents of package 8
4.2 Machine assembly 8
4.3 Preparation for operation 8
4.3.1 Connecting the power cable 8
4.3.2 Connecting the gas supply hose 8
4.3.3 Connecting the tip 9
4.3.4 Mounting on pipe to be cut 9
4.3.5 Cutting speed setting 10
5. Cutting operation 11
5.1 Safety measures prior to operation 11
5.1.1 Grounding the machine 11
5.1.2 Selection of tip 11
5.1.3 Operation of running direction changeover switch 11
5.2 Ignition and flame adjustment 11
5.3 Cutting and piercing method 12
5.4 Procedures for starting cutting operation and extinguishing the flame 12
5.5 Safety measures against backfire and flashback 13
5.5.1 Prevention of backfire 13
5.5.2 Prevention of flashback 13
5.6 Option 13
5.6.1 Method of mounting the fixture for small-diameter pipe 13
5.6.2 Method of mount overhang stand 14
6. Maintenance and inspection 15

6.1 Daily inspection 15
6.2 3-6 month maintenance and inspection 15
7. Trouble shooting 15
1) The machine will not move. (The motor will not run.) 15
2) The speed can not be controlled. (The motor runs.) 16
3) The machine will not move. (The motor runs.) 16
8. Wiring diagram 17
9. Assembly drawing of KHC-600D 17
10. Parts list 18
10.1 Distribution unit 18
10.2 Drive unit 20
10.3 Torch unit 22
10.4 Stand unit 24
10.5 Electric unit 26
10.6 Small diameter kit 28
10.7 Over-hang (option) 29
11. Cutting Data 31
102 (STANDARD SPEED) for Acetylene 31
102-D7 (HIGH SPEED) for Acetylene 31
106 (STANDARD SPEED) for Propane 32
106-D7 (HIGH SPEED) for Propane 32

1 Safety information

Many accidents are caused by operation, inspection, and maintenance which disregard the basic safety rules. Carefully read, understand, and master the safety measures and precautions described in this instruction manual and on the machine before operating, inspecting, and maintaining the machine.

The safety messages are classified as indicated on the machine safety labels:

■WARNING

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

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

8. Never use the machine outdoors when the weather is wet. This will cause failure of the machine and could cause a fatal accident by electric shock.

1.1.2 Safety clothing

1.Be sure to wear protector’s gauntlets, goggles, helmet, and safety shoes during operation.

2.Avoid operating the machine with wet clothes or hands in order to prevent electric shock.

1.1.3 Operation and handling safety precautions

1. Read this instruction manual before operating the machine.
2. Mount and center the machine correctly and confirm correct motion before operation.
3. Before connecting the power plug to the outlet, make sure that the power switch is in the OFF position (or the normal/reverse changeover switch is in the stop position).
4. Prior to operating the machine, check the safety of the surroundings to avoid accidents.
5. Never move the machine while the preheat flame is on.
6. Take great care of spatters and dross when operating the machine at a high position. They may injure people below.
7. When the clutch will not engage easily, turn the pipe by hand lightly move the clutch lever to engage it.
8. Secure the horizontal bar with the stopper to prevent the bar from falling.
9. Hold the I-nut attached to the leg to carry 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 power cable of the machine.
4. **Stop operation and turn off the power in the following cases, and ask a qualified electrician to repair the machine.**

   1)Broken or abraded cables
   2)When the machine has been in contact with water, or in case of liquid damage to the machine.
   3)Abnormal machine operation despite operating the machine according to the instruction manual
   4)Machine breakdown
   5)Poor machine performance that requires repair
5. Periodically inspect the electrical system.

1.1.5 Maintenance and inspection precautions

1. Ask a qualified electrician to perform repair and inspection service.
2. Disconnect the power plug before inspecting and repairing the machine.
3. Maintain the machine periodically.

1.2 Gas cutting safety precautions

Strictly observe the safety rules and precautions to ensure the safety of gas cutting operations.
Operators and supervisors MUST keep safety in mind.

1.2.1 Prevention of explosion

1. Never cut pressurized cylinders or hermetically sealed containers.
2. Ensure sufficient ventilation for gas cutting to prevent the air from becoming stale.

1.2.2 Pressure regulator safety precautions

1. Before starting operation, check that all pressure regulators are operating correctly.
2. Ask a skilled repair engineer to perform maintenance and inspection service.
3. Do not use pressure regulators from which gas is leaking, nor malfunctioning pressure regulators.
4. Do not use pressure regulators smeared with oil or grease.

1.2.3 High Pressure gas cylinder safety precautions

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

1.2.4 Safety precautions for hoses

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

1.2.5 Safety precautions for fire

Take safety precautions to prevent fire prior to gas cutting.
Ignoring hot metal, sparks, and slag could cause a fire.

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

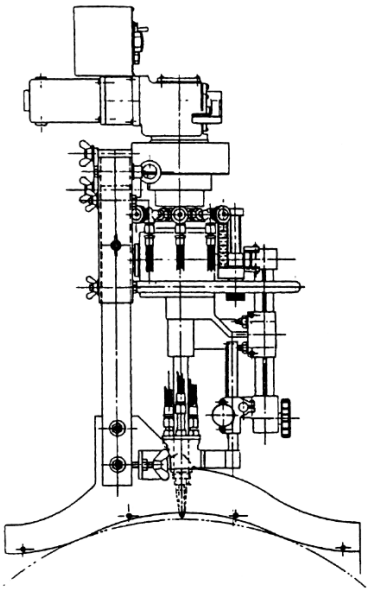
1.2.6 Safety precautions for skin burns

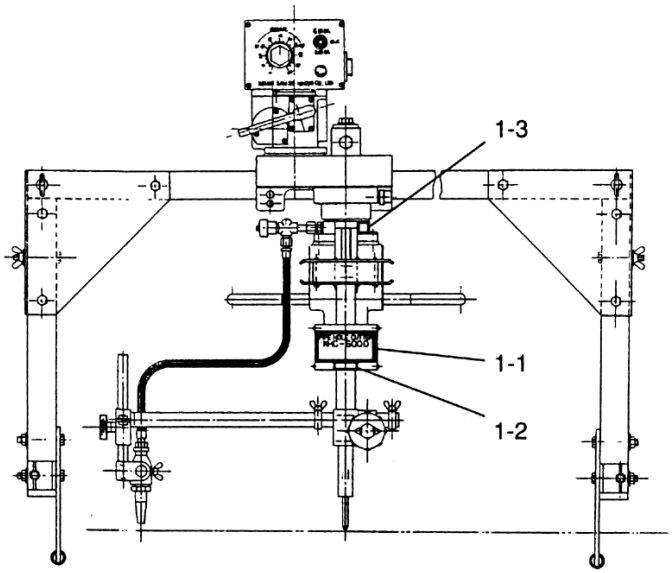
Observe the safety precautions to prevent skin burns. Ignoring heat, spatter, and sparks during operation could cause a fire or burned skin.

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

2 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.





PIPE HOLE CUTTER
KHC-600D
SERIAL NO. [redacted] VOL. A.C. [redacted] V
KOIKE SANSO KOGYO CO., LTD.
TOKYO JAPAN

1-1

NET WEIGHT [redacted] Kg

1-2

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

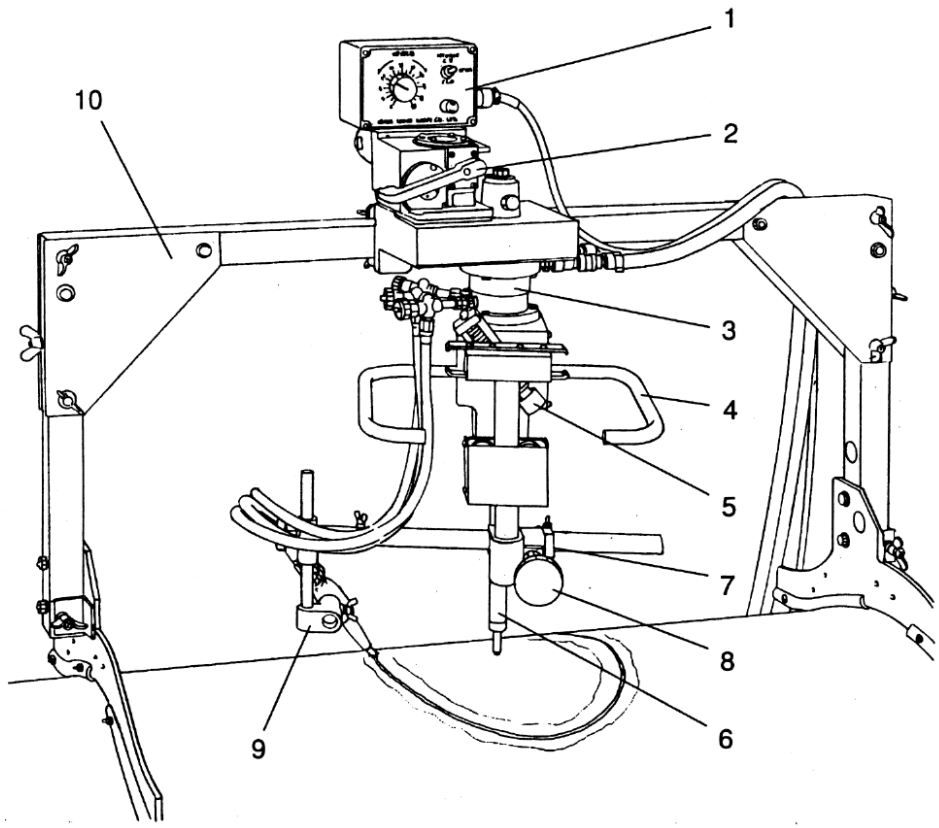
1-3

3 Outline of Machine

3.1 Features of machine

The hole cutter KHC-6000 is used to make circular holes to mount nozzles that are at right angles to a steel pipe of a high-pressure vessel or heat exchanger.
The machine can cut flat circles as well.

3.2 Name and function of each section



1. Operation box
Controls the speed and turning direction of the machine.

2. Clutch
Lift the clutch lever to disengage (OFF) the clutch and lower it to engage (ON) the clutch.

3. Distributor

4. Handle
Used to turn the drive rotary section (when the clutch is disengaged)

5. H-lever handle
This lever permits tracing movement along a steel pipe. The drive unit is so constructed that two turns of the lever corresponds to one turn of the torch. As stated later, the torch will automatically move up and down along the steel pipe according to the preset H value.

6. Center
Points at the center of a hole to be cut. During cutting and when cutting an underside bevel of a
small hole, the center shall be kept in an upper section.

7. Cutting stopper
In anticipation of cutting more than one circle with the same diameter, two cutting stoppers are
provided on the horizontal bar.

8. Horizontal adjustment handle

9. Torch holder

10. Leg
To be placed on a pipe.

3.3 Specifications

Weight:	26 kg (with leg)
Machine size:	1050 x 500 x 760mm
Power:	±10%
Speed control:	Control with dial operation
Torch rotation speed:	0.12- 1.2rpm
Cutting thickness:	5- 50mm
Bevel angle:	0 – 45°
Cutting diameter:	ϕ 80 – ϕ 600 (Bevel cut ϕ 80 – ϕ 500)
Up/down stroke:	0 - 100mm
Interface:	Ratio to branch to main pipe diameters 1:2 and above
Motor:	DC24V 15W 5000rpm
Revolving torch:	Tip revolving radius R40 - R300mm
Tip:	102 (for acetylene) or 106 (for propane)
Gas:	oxygen, acetylene gas, or LPG gas

●Accessories

Tip 102 (for acetylene) or 106 (for propane) No.0, 1, 2: l pc each

Tip cleaner:	1 set
Lighter:	1 pc
Screwdriver:	1 pc
Fuse (l A):	2 pcs
Spanner (A, B, C):	1 set
Power cable:	1 set

●Option

Small diameter kit
Over-hang

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
Distributor ---------- 1 set
Torch holder ---------- 1 set
Torch ---------- 1 pc
Hose
Distributor hose (3pcs: 600L) ---------- 1 set
Power cable (3P x 5M) ---------- 1 pc
Tip 102 (for acetylene) or 106 (for propane) #0,1,2 ---------- 1 pc each
Tip cleaner ---------- 1 set
Screw driver ---------- 1 pc
Spanner (A,B,C) ---------- 1 set
Fuse (lA) ---------- 2 pcs
Lighter ---------- 1 pc

4.2 Machine assembly

1.Take out the main unit and the leg of the machine from the box.
2. Place the leg on the pipe, mount the main unit on the rectangular pipe, and secure it with the wing nut from above the supporting plate.
3. Check that the torch holder, gas distributor, torch, etc. are in position.
4. Attach the primary hose to the gas distributor.
Ox hose (Oxygen)
Gas hose (Acetylene or LPG)

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 power cable side into the socket on the machine side, check that 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 that there is no gas leak.

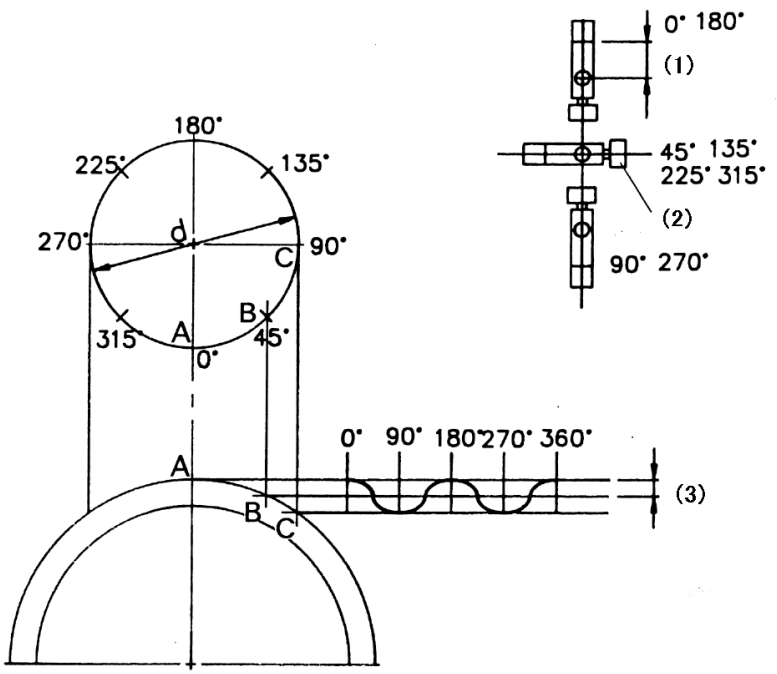
4.3.3 Connecting the tip

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 be tightened still more. And then it makes difficult to remove the tip.
   - In addition, avoid damaging the taper of the tip since this may cause backfire.

4.3.4 Mounting on pipe to be cut

1. Mark a center line in the longitudinal direction, as well as the center and radius of a cutting circle, on the side of a steel pipe to be cut.
2. Set the hole cutter (KHG-600D) in alignment with the center line and the center of the cutting hole.
3. Set the torch in the specified hole cutting position by means of the radius setting handle, and secure the cutting stopper.
4. Simple H-lever setting method
   1) Disengage the clutch (OFF) and bring the torch to point A (0 degrees).
      Set the lever at 0.
   2) Move the torch to point B (45 degrees) and set the distance between the tip and steel pipe by means of the torch up/down handle.
   3) Move the torch to point C (90 degrees) and set the torch height again by the H-lever adjustment handle.

   ∗ Rough height adjustment is completed. Turn the torch once to check to see if the torch height is constant.



(1) H setting
(2) H-lever
Adjustment handle

(3) H-lever setting

5. Turn the torch so that it will be in the highest position (H-lever to be perpendicular), and stop it.
6. Set the torch above the axis of the steel pipe, and engage (ON) the clutch lever.
7. Turn ON the operation switch for idling, and check that the H-value setting is correct.

4.3.5 Cutting speed setting

・Adjust the setting of cut speed to become a specified turn number in the light of a list shown below.

A number of turn **r.p.m.**

Plate thickness (mm)	5	5～10	10～15	15～30	30～40	40～50	50～
Cutting speed (mm/min)	660	550 ～660	490 ～550	400 ～490	350 ～400	320 ～350	200 ～320
Cutting dia. ϕ 80					1.4	1.3	0.79
ϕ 90				1.4	1.2	1.1	0.71
ϕ 100				1.3	1.1	1.0	0.64
ϕ 200	1.0	0.87	0.79	0.64	0.56	0.51	0.32
ϕ 300	0.70	0.58	0.52	0.42	0.37	0.34	0.21
ϕ 400	0.52	0.44	0.39	0.32	0.28	0.25	0.16
ϕ 500	0.42	0.35	0.31	0.25	0.22	0.2	0.13
ϕ 600	0.35	0.29	0.26	0.21	0.18	0.17	0.10

・When the cutting diameter is 80-100, move the center to the upper position and secure it with wing bolt.

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 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 hand may be caught.

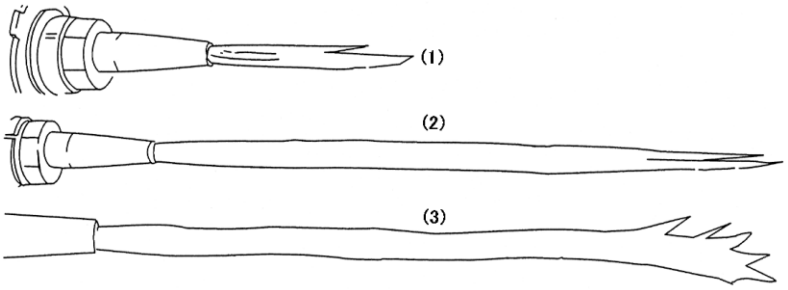
5.2 Ignition and flame adjustment

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. Neutral flame ensures good quality cut surfaces. (Oxygen flame may be used for bevel cutting.)
   Oxygen flame causes short cutting-oxygen current, allowing slugs to adhere, melting the upper edge of the cutting surface, and causing adverse effects on the cut surface. Similar defects will result when the cutting oxygen pressure is too high.



(1)Oxidizing Flame

(2)Neutral Flame

(3)Carbonizing Flame

5.3 Cutting and piercing method

1. Cut in from the end of steel plate.
2. Pierce steel plate before cutting.
3. Drill a hole before cutting.

■Piercing method

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

5.4 Procedures for starting cutting operation and extinguishing the flame

1. Align the tip with the cutting start point, ignite, and then adjust the flame.
2. Sufficiently preheat the cutting start point.
3. After sufficient preheating, let the cutting gas out and cut with the radius setting handle simultaneously.
4. Turn on the switch right before the machine touches the stopper, and completely cut up to the stopper position.
5. Carefully check the cutting condition, and control the cutting speed with the speed adjuster. For the cutting speed, refer the Cutting Data.
6. Extinguish the flame after cutting as follows.
   1) Turn off the motor switch (or turning direction switch).
   2) Close the cutting oxygen valve.
   3) Close the preheating oxygen valve.
   4) Close the fuel gas valve.

5.5 Safety measures against backfire and flashback

5.5.1 Prevention of backfire

Backfires may cause serious accidents or fires. Be careful to prevent such disaster. When a backfire occurs, find the cause and inspect and maintain the machine correctly before using the machine again.
The followings are causes of backfire:

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

5.5.2 Prevention of flashback

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

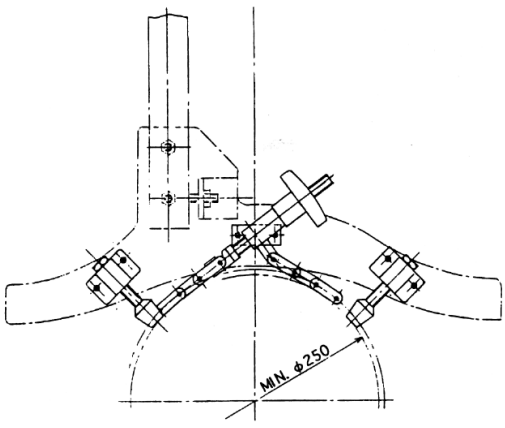
1) Close the preheating oxygen valve.
2) Close the fuel gas valve.
3) Close the cutting oxygen valve.

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

5.6 Option

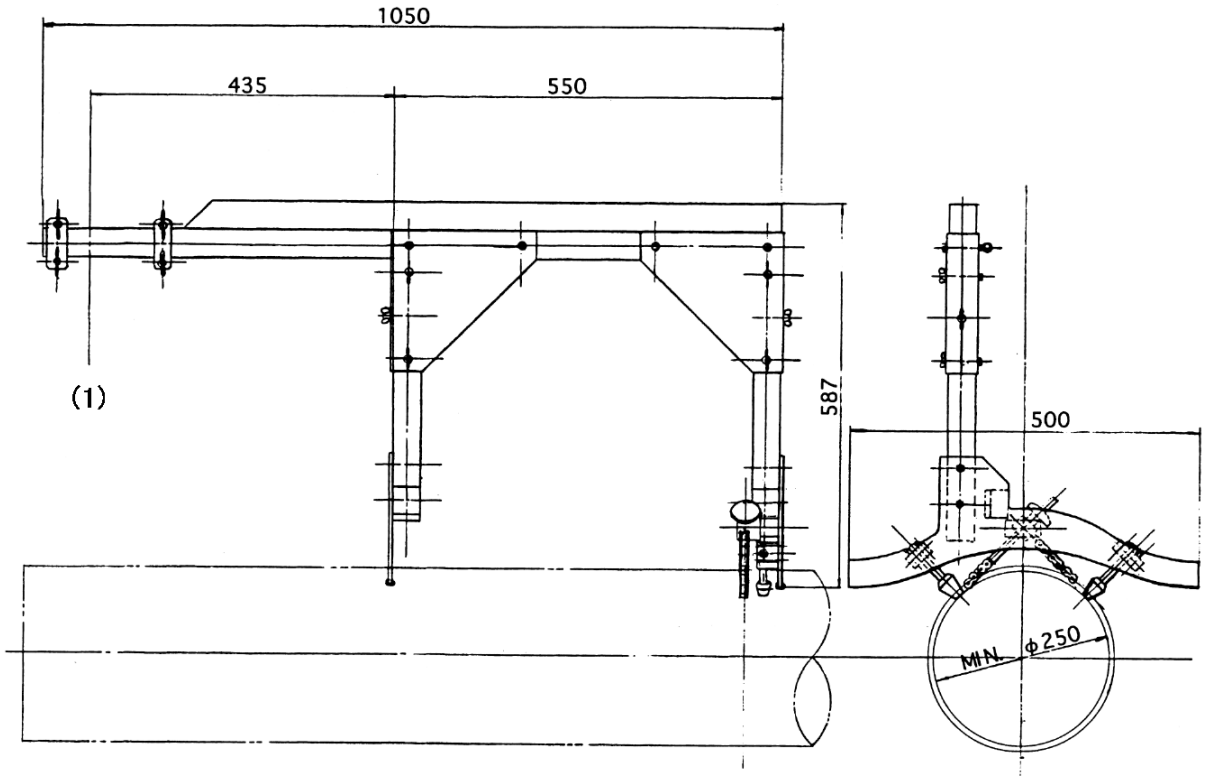
5.6.1 Method of mounting the fixture for small-diameter pipe

1. Parts assembling method
   1) Attach the bolt fixing plate to the leg.
   2) Attach the chain mounting plate and chain shaft in the same way.
   3) Attach the chain putting shaft, handle, and chain as shown in the figure.
2. Setting
   1) Determine the chain length according to the pipe diameter.
   2) Slide the chain along the pipe.
   3) Roughly position the center, and turn the handle clockwise to tension the chain to the extent that the machine can move slightly.
   4) Adjust the alignment correctly, and secure the fixture firmly again.



5.6.2 Method to mount overhang stand

1. Parts assembling dimensions
   1) Assemble the overhang stand by according to item 1, 1)-3), "Method to mount the fixture for small-diameter pipe.'
   2) Attach the main unit to the overhang stand.
2. Setting
   1) Determine the chain length according to the pipe diameter.
   2) Slide the chain along the pipe.
3) Roughly position the center, and turn the handle clockwise to tension the chain to the extent that the machine can move slightly.
4) Adjust the alignment correctly, and secure the fixture firmly again.



(1) Center of torch turning

6 Maintenance and inspection

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

6.1 Daily inspection

1. Wipe the outside of the machine with a clean cloth.
2. Remove dust and iron chips from the rack section of the cross-feed pipe.
3. Check for abnormal sound, smell, vibration, etc.
4. Check the cable connection for loosening. Is the cable heated?
5. Check the torch according to the instruction manual for the power supply.
6. Check the rotary distributor for the leakage of gas or cooling water.

6.2 3-6 month maintenance and inspection

1. Remove the lower cover from the main unit, and grease the bearing. (When the grease is dirty.)
2. Check the power cable for disconnection.
3. Check the grounding condition.
4. Check the torch lead for disconnection.
5. Remove dust from the inside of the control panel.
6. Measurement of insulation resistance.
   (When the applied voltage is 500V, check that the resistance is 5MΩ or more.)
   Note: Operation of the machine with poor insulation condition may cause an accident. Be sure to conduct periodical inspection.
7. Remove the motor base, and apply molybdenum oil to the drive gear and clutch section.
8. When the internal drive gears are abraded severely, replace them.

7 Trouble Shooting

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

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

8)Defective motor	If all the above items are normal, the motor is defective.	Repair or replace the motor with a new one.
9)Defective controller	If all the above items are normal, the controller is defective.	Replace the defective controller.

Note:

Protection of the over load.

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

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

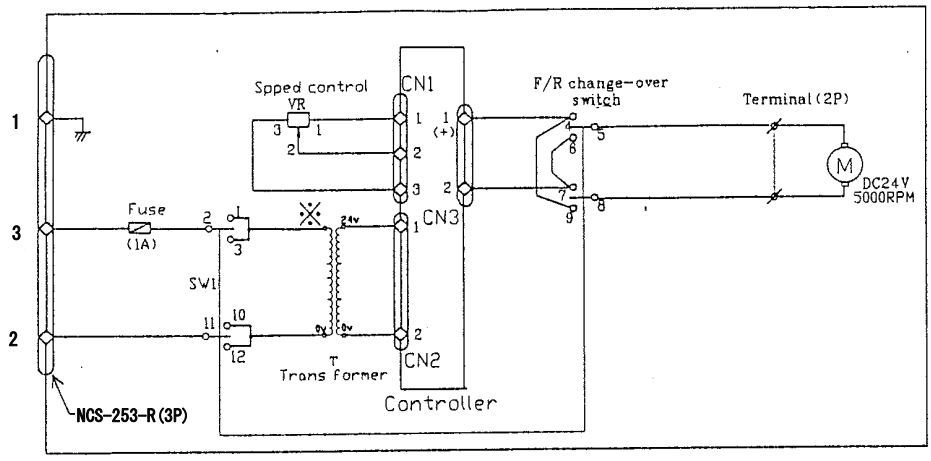
2) The speed can not be controlled. (The motor runs)

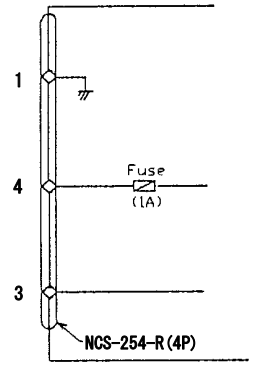
Cause	Inspection point	Correction
1)Defective speed control resistor	Remove the speed control resistor and apply the probes of a tester to resistor terminals 2 and 1 or 2 and 3. If the pointer continuously moves from 0 to 50 K ohm when the handle is turned slowly, the resistor is normal.	Replace the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

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

Item	Cause	Inspect Procedure	Procedure
1	The reduction gear is idling		Inspection
2	The clutch can not be engaged		Overhaul

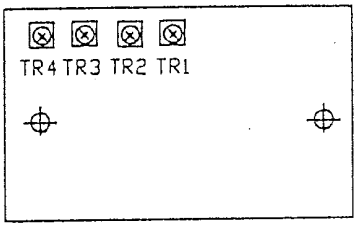
8 Wiring diagram



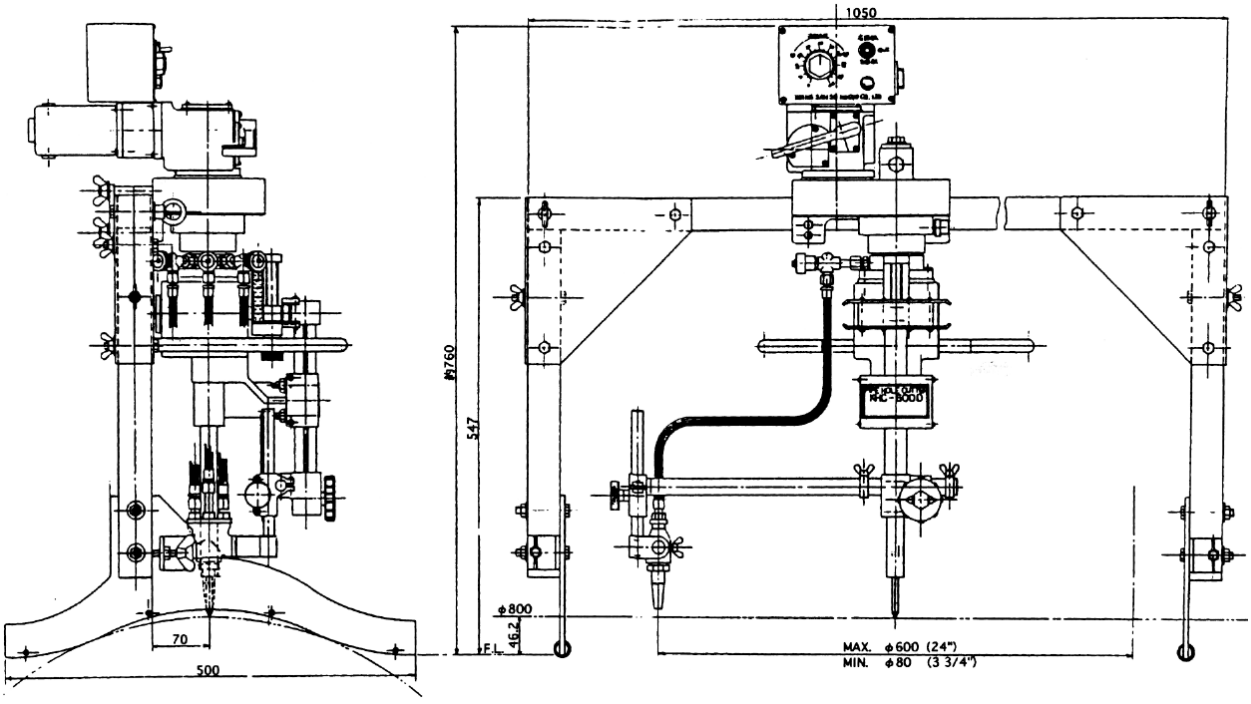


	TRANSFORMER Connection	
SUPPLY VOLTAGE	PRIMART ※v	SECONDARY
100V	100V	24V
110V	120V	
120V	120V	
200V	220V	
220V	220V	
230V	230V	
240V	240V	
42V	42V	

Controller adjust
TR1 : SPEED MAX.
TR3 : SPEED MINI.

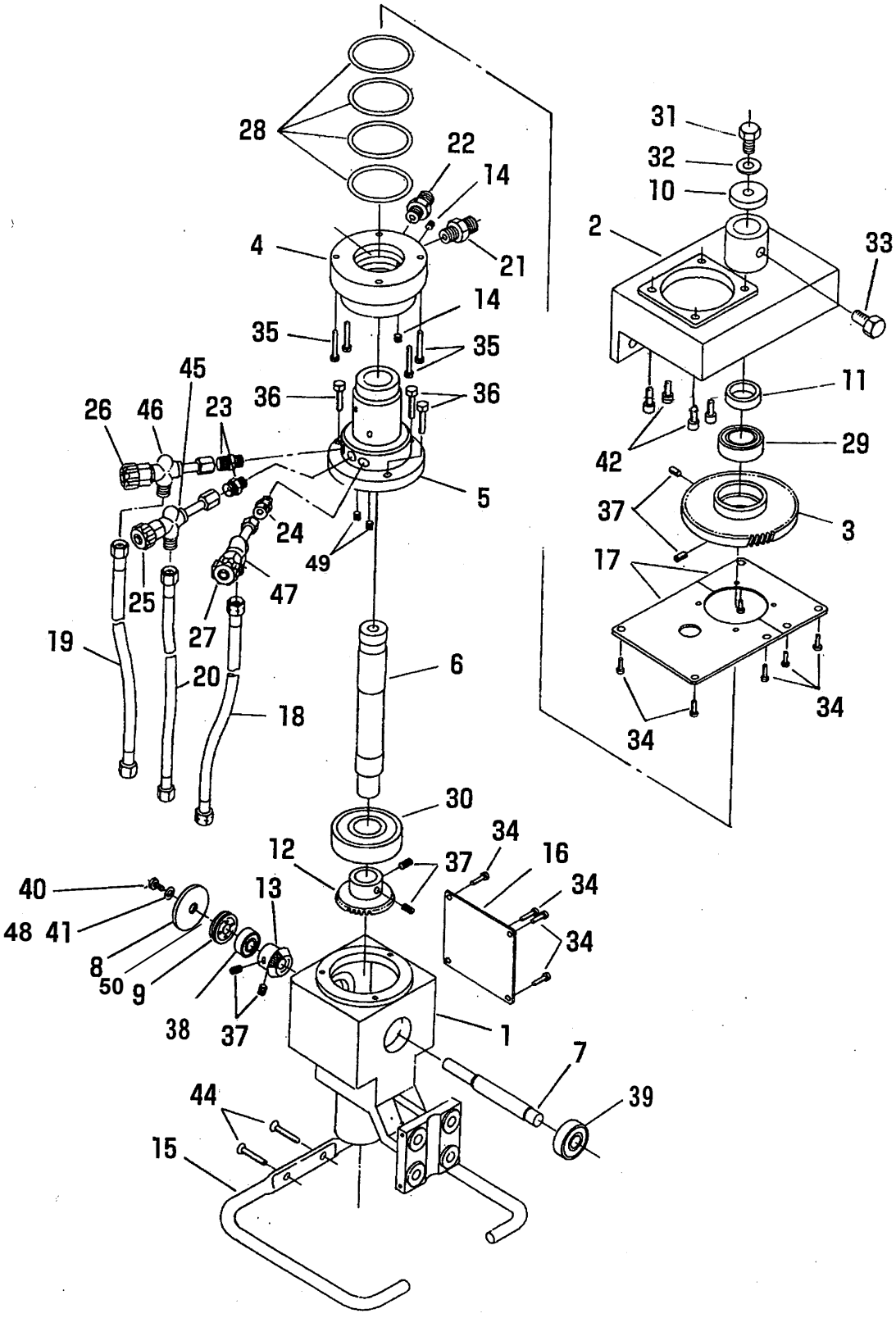


9 Assembly drawing of KHC-600D



10 Parts List

10.1 Distributor unit

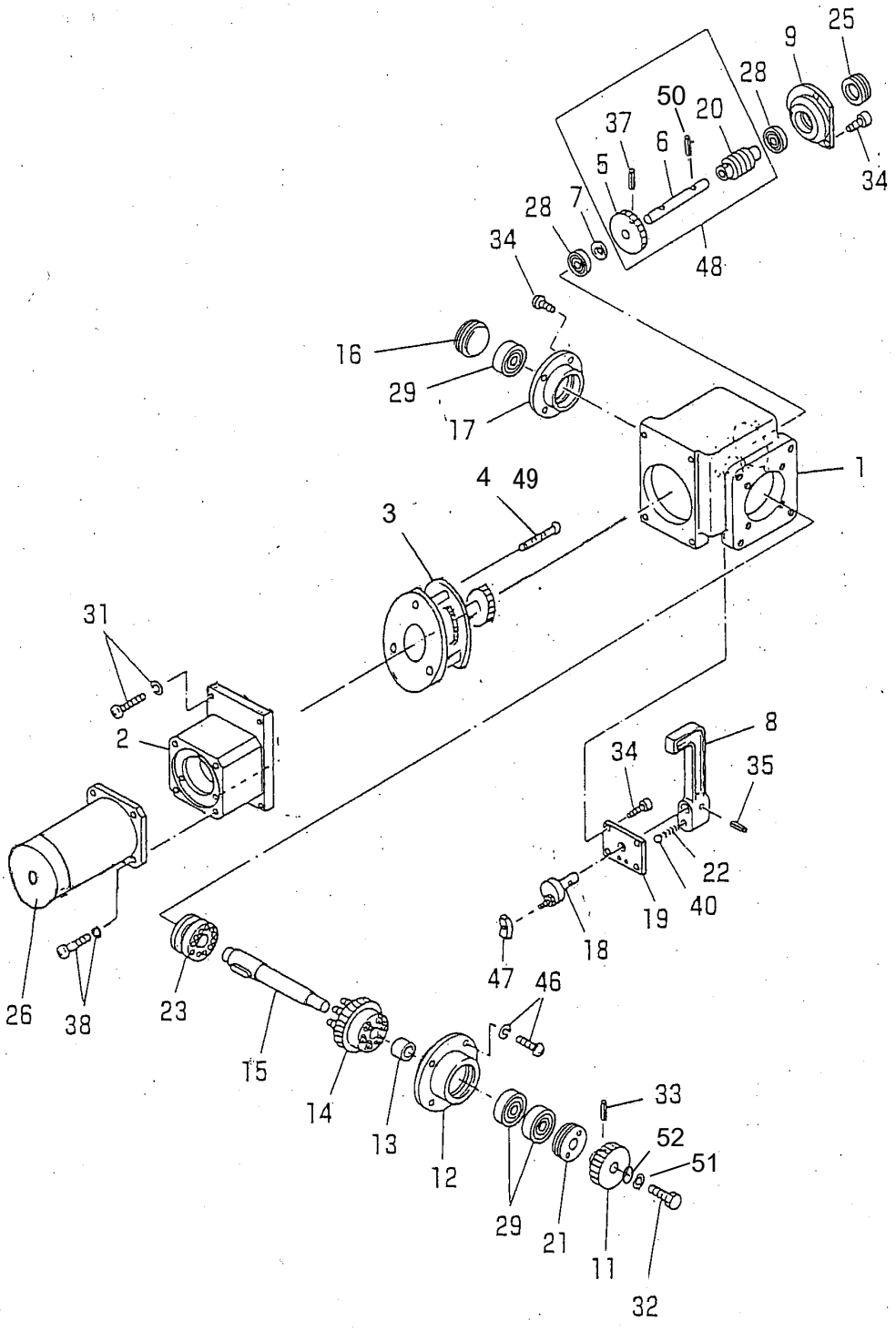


Distributor units

Item No.	Part name	Q'ty	Stock No.	Remarks
1	Gear case	1	20542264	★
2	Body case	1	20542260	★
3	Drive gear	1	60033552	
4	Distributor cover	1	20542263	★
5	Distributor	1	20543367	★
6	Set shaft	1	60033555	
7	Lever shaft	1	60033556	
8	Scale	1	60033557	
9	Bearing retainer	1	60033558	
10	Washer	1	60033559	
11	Collar	1	60033560	
12	Bevel gear (A)	1	60033561	
13	Bevel gear (B)	1	60033562	
14	Screw	2	61004889	
15	Handle	1	60033563	
16	Cover (A)	1	60033564	
17	Cover (B)	1	60033565	
18	Hose for gas (M12x600(left)) Red	1	60030307	Except USA
	Hose for gas (9/16x600(left))	1	60030308	USA only
	Hose for gas (M12x600(left)) Orange	(1)	61001810	
19	Hose for preheat oxygen (M12x600)	1	60030305	Except USA
	Hose for preheat oxygen (9/16x600)	1	60030304	USA only
20	Hose for cutting oxygen (M12x600)	1	60030305	Except USA
	Hose for cutting oxygen (9/16x600)	1	60030304	USA only
21	Nipple (NJD16-1/4)	1	60013571	Except USA
	Nipple (US9/6-14)	1	60032850	USA only
22	Nipple (NJDF16-1/4)	1	60013572	Except USA
	Nipple (US9/16-14(left))	1	60032851	USA only
23	Nipple	2	60032848	NJD12-1/8
24	Nipple	1	60032849	NJD12-1/8
25	Valve for cutting oxygen	1	60015354	Except KE
26	Valve for preheat oxygen	1	60015355	Except KE
27	Valve for gas	1	60015356	

Item No.	Part name	Q'ty	Stock No.	Remarks
28	O-ring	4	60033566	P44
29	Bearing	1	6A036905	6905ZZ
30	Bearing	1	6A036305	6305ZZ
31	Hexagon bolt	1	6C021030	BH-10×30
32	Washer	1	6D510100	WS-10
33	Hexagon bolt	1	6C021015	BH-10×15
34	Screw	10	6C570410	SP-4×10 (WS,WF)
35	Hexagon bolt	4	6C020425	BH-4×25
36	Hexagon bolt	4	6C010520	BH-5×20
37	Screw	6	6C560606	SSS-6×6
38	Bearing	1	6A036300	6300ZZ
39	Bearing	1	6A036202	6202ZZ
40	Hexagon bolt	1	6C020615	BH-6×15
41	Washer	1	6D500060	WF-6
42	Hexagon bolt	4	6C030620	BC-6×20
44	Screw	2	6C500515	SF-5x15
45	Valve body (JO)	1	60033582	Except USA
	Valve body (JO)	1	60033585	USA only
46	Valve body (PO)	1	60033583	Except USA
	Valve body (PO)	1	60033616	USA only
47	Valve body (GAS)	1	60033584	Except USA
	Valve body (GAS)		60033586	USA only
48	Washer	1	6D510060	WS-6
49	Screw	2	6C560506	SSS-5X6
50	Washer	3	5A002296-Y	WW-10

10.2 Drive unit



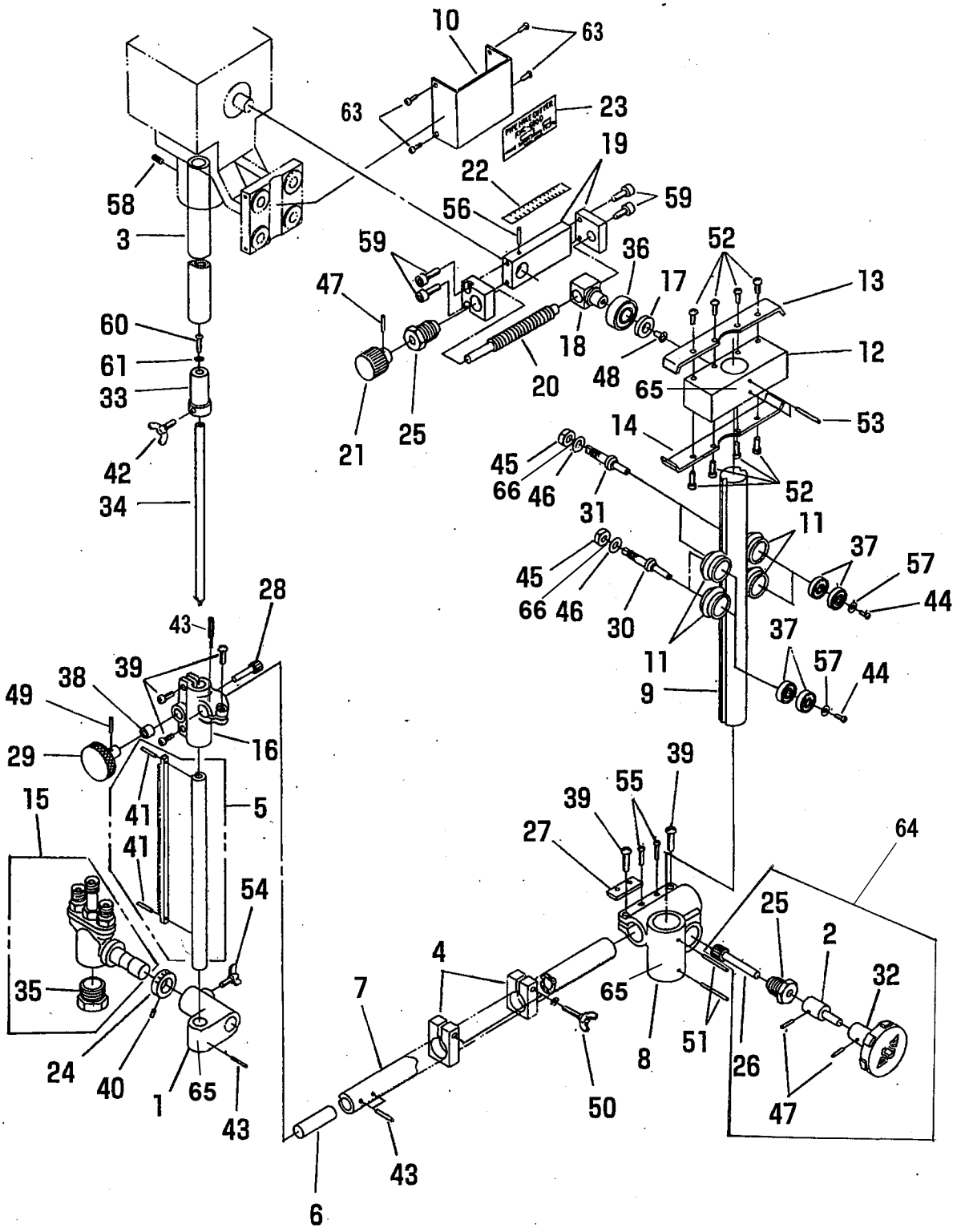
Drive units

Item No.	Part name	Q'ty	Stock No.	Remarks
1	Reduction gear box	1	20542197	★
2	Casing	1	61001162	
3	Gear Ass'y	1	61001127	
4	Screw	3	6C520323	SP-3x23 with WS
5	Gear (B)	1	60032404	
6	Gear shaft (B)	1	60032405	
7	Collar (B)	1	60032406	
8	Clutch lever	1	20542212	※1★
9	Casing (D)	1	20542201	★
11	Pinion	1	60031312	※1
12	Casing (A)	1	20542200	★
13	Collar	1	60031309	
14	Worm wheel assembly	1	60031308	
15	Drive shaft assembly	1	60031318	※1
16	Bearing retainer	1	60031306	
17	Casing (B)	1	20542198	★
18	Clutch lever shaft assembly	1	60031313	※1
19	Clutch lever metal	1	60031316	
20	No.2 worm	1	60032462	
21	Bearing retainer	1	60031279	
22	Lever spring	1	60031236	
23	Clutch	1	60031307	
25	Bearing retainer	1	60031014	
26	Motor	1	61007885	DC24V 5000R.P.M
28	Bearing	2	6A030608	608ZZ
29	Bearing	3	6A036201	6201ZZ
31	Screw	4	6C530418	SP-4x18 with WS
32	Hexagon bolt	1	6C030615	BC-6x15 with WF WF-6
33	Spring pin	1	6B024020	PR-4x20
34	Screw	11	6C530412	SP-4x12
35	Spring pin	1	6B022516	PR-2.5X16
37	Spring pin	1	6B022516	PR-2.5X16
38	Screw	4	6C530412	SP-4x12 with WS
40	Steel ball	1	60030480	TB-1/4
46	Screw	4	6C520615	SP-6x15
47	Slider	1	60030265	
48	No.2 worm assembly	1	60032511	
49	Washer	3	6D510030	WS-3
50	Spring pin	1	6B022512	PR-2.5X12
51	Washer	1	6D510060	WS-6
52	Washer	1	6D500060	WF-6

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

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

10.3 Torch unit



Torch unit

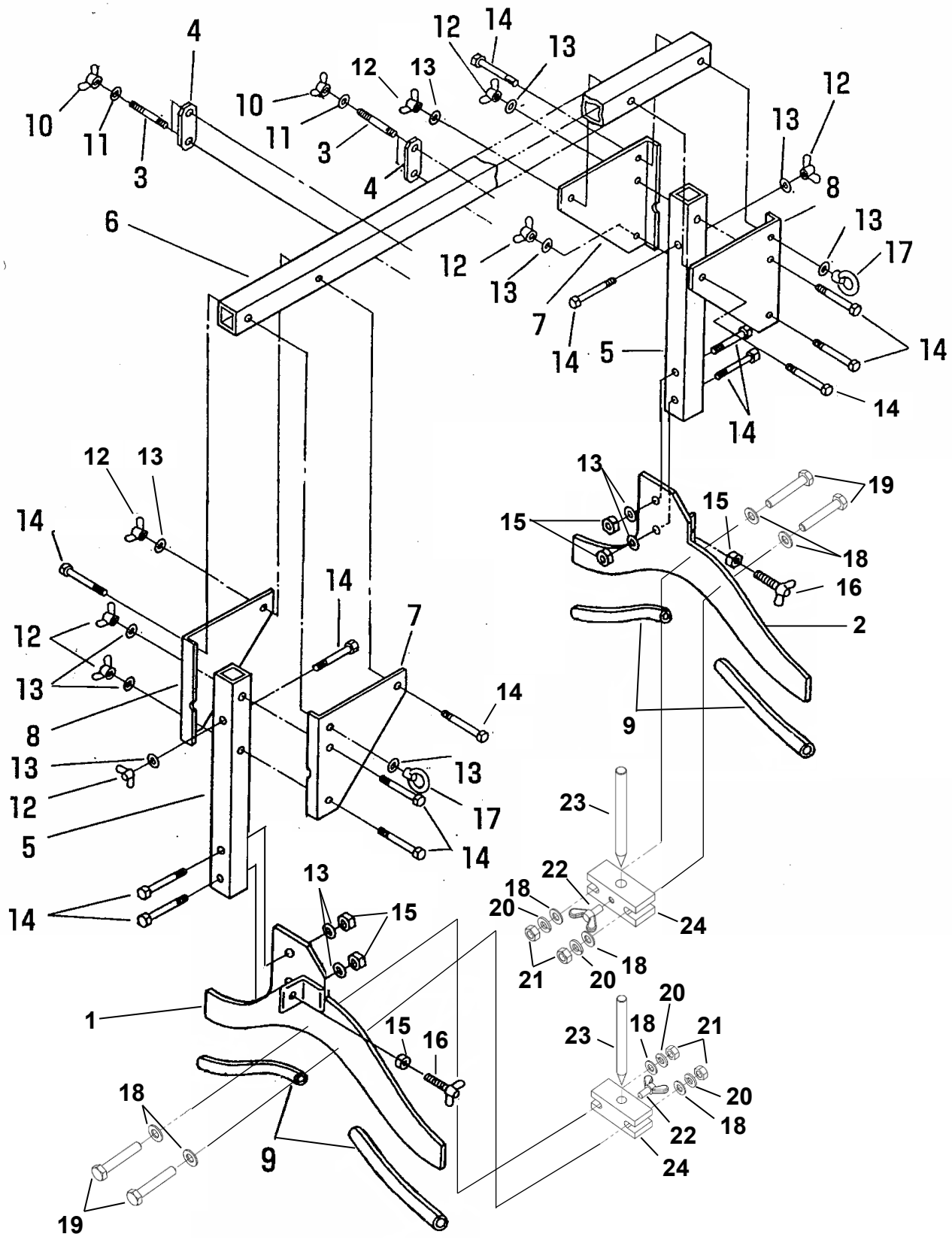
Item No.	Parts Name	Qty	Stock No.	Remarks
1	Torch holder	1	20542267	※1★
2	Shaft	1	60033569	※1
3	Center holder	1	60033570	
4	Stopper	2	60033571	
5	Holder bar assembly	1	60032762	With rack
6	Joint	1	60032764	※1
7	Cross bar	1	60032765	※1
8	Cross feed holder	1	20542265	※1★
9	Slide bar	1	60032768	※1
10	Slide bracket cover	1	60032770	
11	Guide roller	4	60032773	With bearing
12	Slide bar bracket	1	20542266	※1★
13	Bearing holder (A)	1	60032775	
14	Bearing holder (B)	1	60032776	
15	Torch	1	60010851	Except KE, USA
	Torch	1	60010852	USA only
16	Vertical slide bar	1	60031665	※1
17	Washer	1	60032777	
18	Nut	1	60032778	
19	Lever	1	20542268	★
20	Screw	1	60032781	
21	Lever handle	1	60032782	※1
22	Scale	1	60032783	
23	Name plate	1	60033572	
24	Graduation collar	1	60030906	
25	Pinion metal (A)	2	60030909	
26	Pinion (A)	1	60030910	※1
27	Key (B)	1	60030991	
28	Pinion	1	60031627	※1
29	Handle	1	60031628	D=50mm ※1
30	Roller shaft (A)	2	60033440	
31	Roller shaft (B)	2	60033443	
32	Handle	1	60030317	※1

Item No.	Parts Name	Qty	Stock No.	Remarks
33	Center bush	1	60032811	
34	Center	1	60032810	
35	Tip fixing nut	1	60005020	
36	Bearing	1	6A036001	6001ZZ
37	Bearing	8	6A030626	626ZZ
38	DU bush	1	6D700610	MB0610DU
39	Screw	5	6C520515	SP-5×15
40	Screw	1	6C540304	SS-3×4
41	Spring pin	2	6B022012	PR-2×12
42	Wing bolt	1	6C110510	BS-5×10
43	Spring pin	4	6B022520	PR-2.5×20
44	Screw	4	6C520410	SP-4×10
45	Nut	4	6D010080	NH-8
46	Washer	4	6D500080	WF-8
47	Spring pin	3	6B022515	PR-2.5×15
48	Screw	1	6C500510	SF-5×10
49	Spring pin	1	6B022012	PR-2×12
50	Wing bolt	2	6C110425	BS-4×25
51	Spring pin	2	6B024035	PR-4×35
52	Screw	8	6C520412	SP-4×12
53	Spring pin	2	6B024035	PR-4×35
54	Wing bolt	1	6C110510	BS-5×10
55	Screw	2	6C520315	SP-3×15
56	Spring pin	1	6B024028	PR-4×28
57	Washer	4	6D500040	WF-4
58	Screw	1	6C540508	SS-5×8
59	Hexagon bolt	4	6C030515	BC-5×15
60	Screw	1	6C520410	SP-4×10
61	Washer	1	6D500040	WF-4
63	Screw	4	6C570410	SP-4x10 with WS, WF
64	Handle assembly	1	60033580	
65	Screw	5	6C560404	SSS-4X4
66	Washer	4	6D510080	WS-8

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

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

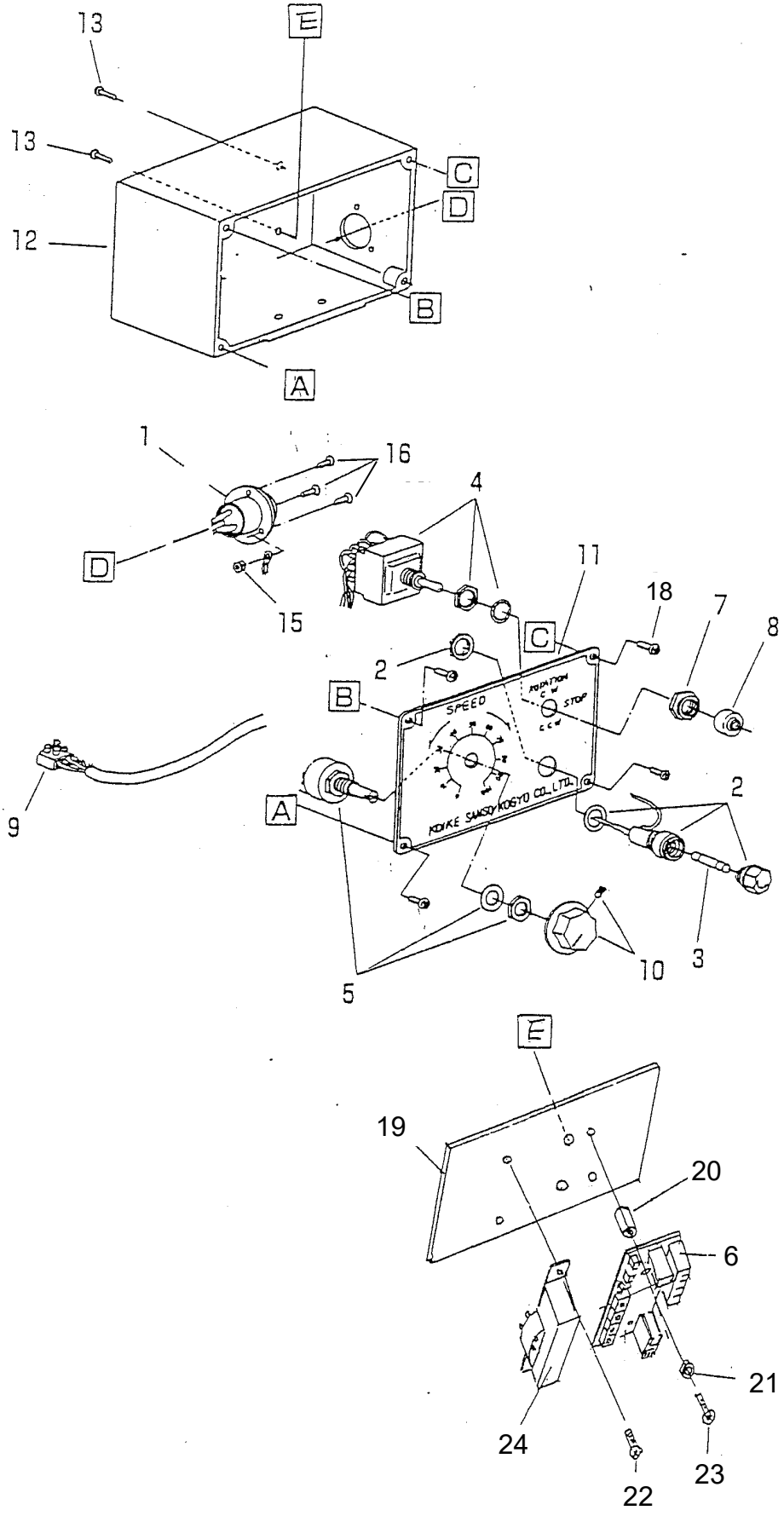
10.4 Stand unit



Stand unit

Item No.	Part name	Q'ty	Stock No.	Remarks
1	Leg (A)	1	60033573	
2	Leg (B)	1	60033574	
3	Support bar	2	60033575	
4	Support plate	2	60033576	
5	Square pipe (B)	2	60032823	
6	Square pipe (A)	1	60033577	
7	Supplementary plate (A)	2	60032824	
8	Supplementary plate (B)	2	60032825	
9	Trim	4	64000490	
10	Wing nut	4	6D090100	NB-10
11	Washer	4	6D500100	WF-10
12	Wing nut	8	6D090080	NB-8
13	Washer	14	6D500080	WF-8
	Washer	14	6D510080	WS-8
14	Bolt	14	6C010860	BH-8x60
	Washer	14	6D500080	WF-8
15	Nut	6	6D010080	NH-8
16	Wing bolt	2	6C120830	BS-8x30
17	Nut	2	6D400002	NE-8
18	Washer	8	6D500060	WF-6
19	Bolt	4	6C010635	BH-6x35
20	Washer	4	6D510060	WS-6
21	Nut	4	6D010060	NH-6
22	Wing bolt	2	6C120510	BS-5x10
23	Center pin	2	60032832	
24	Bracket	2	20542269	★

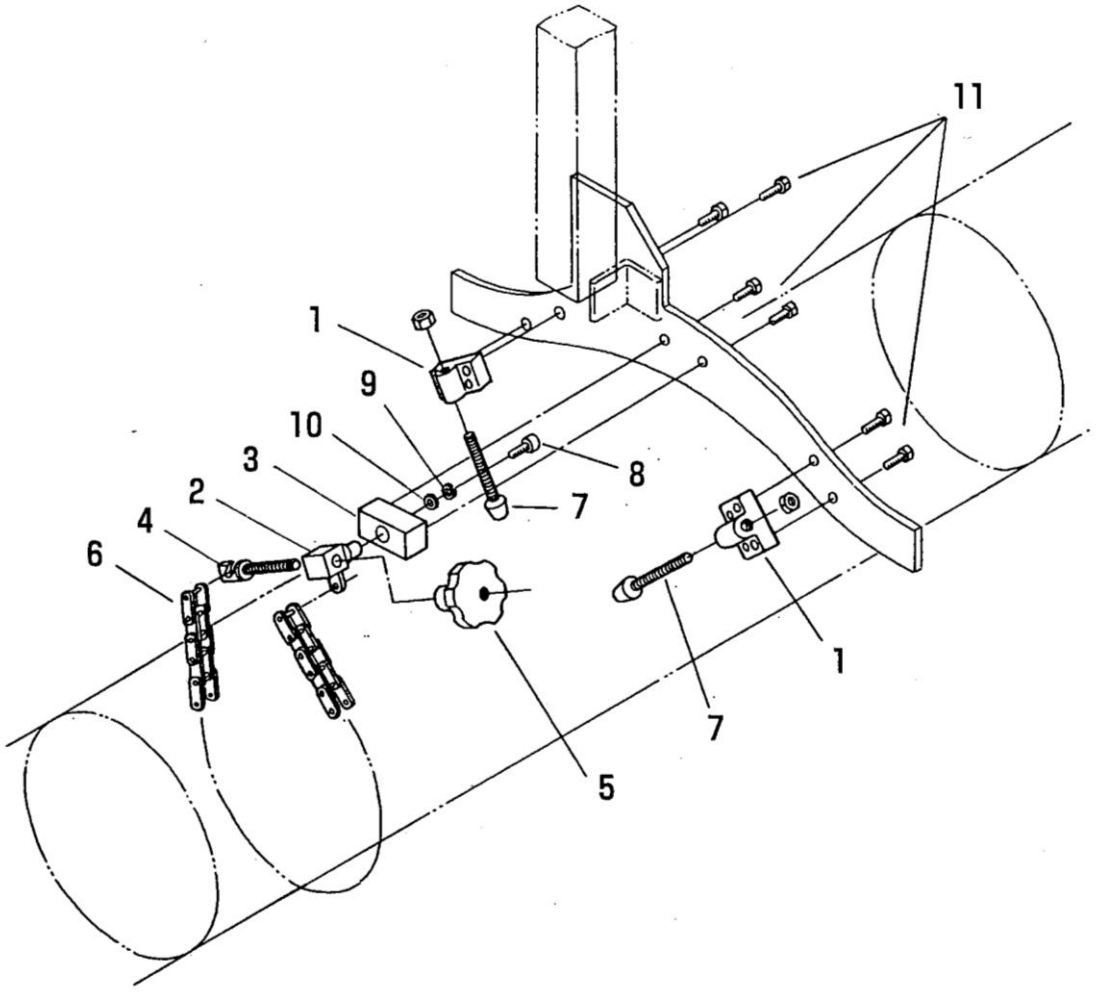
10.5 Electric unit



Electric unit

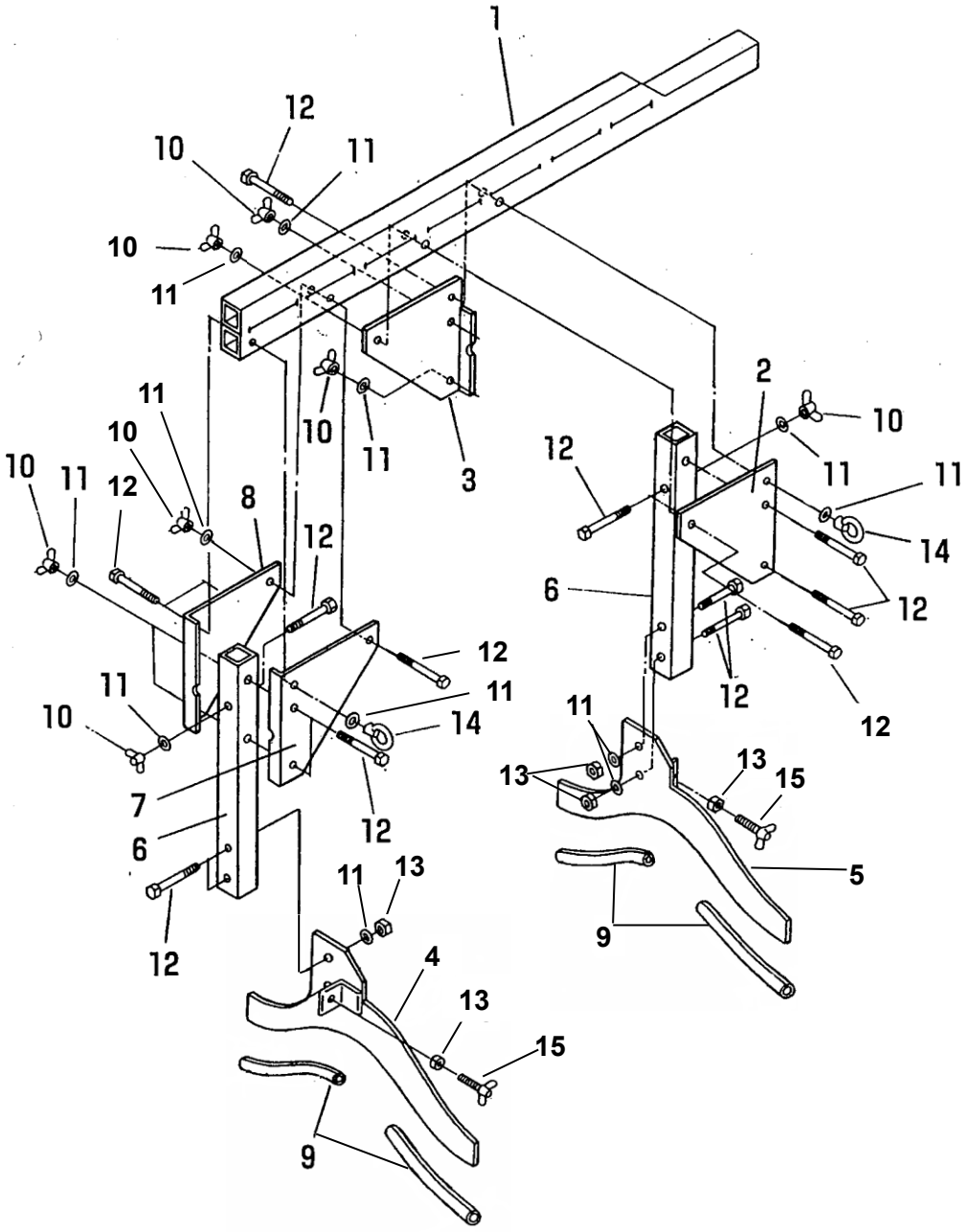
Item No.	Part name	Q'ty	Stock No.	Remarks
1	Metal socket (For 100V – 120V)	1	6N100061	NCS-253-R
	Metal socket (For 220V – 240V)	1	6N100062	NCS-254-R
2	Fuse holder	1	64000019	F-7150
3	Fuse	1	60030707	1A
4	Switch	1	60031458	S-43
5	Variable resistor	1	60030745	RV24YNB50k ohm
6	Controller	1	69000105	
7	Dust protective nut	1	60035017	
8	Dust protective cap	1	60032431	
9	Mid-terminal	1	60031666	2P
10	Speed adjuster handle	1	60030980	
11	Operation panel	1	60030936	
12	Operation box	1	20542251	★
13	Screw	2	6C530410	SP-4x10
15	Nut	1	6D010030	NH-3
16	Screw	3	6C510312	SF-3x12
18	Screw	4	6C570410	SP-4x10 with WS,WF
19	Bracket	1	61001067	
20	Spacer	2	6R020001	
21	Isolation washer	2	60036374	
22	Screw	2	20548792-Y	SP-3X5 with WS
23	Screw	2	6C520310	SP-3x10
24	Trans former	1	61000472	For 100V – 220V
	Trans former	1	61000672	For 230V – 240V
	Trans former	1	61000473	For 42V

10.6 Small diameter kit



Item No.	Parts Name	Qty	Stock No.	Remarks
1	Set plate	4	20542270	★
2	Chain shaft	1	60033591	
3	Set plate	1	60033592	
4	Hook	1	60033593	
5	Handle	1	60033594	
6	Chain	1	60033596	
7	Bolt with rubber	4	60033597	
8	Hexagon bolt	1	6C030615	BC-6x15
9	Washer	1	6D510060	WS-6
10	Washer	1	6D500060	WF-6
11	Screw	10	6C520615	SP-6x15

10.7 Over-hang (option)



Item No.	Parts Name	Qty	Stock No.	Remarks
1	Arm	1	60033598	
2	Supplementary plate (C)	1	20542271	★
3	Supplementary plate (D)	1	20542272	★
4	Leg (A)	1	60033573	
5	Leg (B)	1	60033574	
6	Square pipe (B)	2	60032823	
7	Supplementary plate (A)	1	60032824	
8	Supplementary plate (B)	1	60032825	
9	Trim	4	64000490	
10	Wing nut	8	6D080080	NB-8
11	Washer	14	6D500080	WF-8
	Washer	14	6D510080	WS-8
12	Hexagon bolt	14	6C010860	BH-8x60
	Washer	14	6D500080	WF-8
13	Nut	6	6D010080	NH-8
14	I nut	2	6D400002	NE-8
15	Wing bolt	2	6C110830	BS-8x30

11 Cutting data

102 (STANDARD SPEED) for Acetylene

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

102-D7 (HIGH SPEED) for Acetylene

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

NOTE

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

106 (STANDARD SPEED) for Propane

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

106-D7 (HIGH SPEED) for Propane

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

NOTE

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

＜MEMO＞

KHC-600D (Pipe hole Cutter)

OPERATION MANUAL

Date of issue :	Mar.1996
2nd	Aug.1998
3rd	Dec.2004
4th	Jun.2007
5th	Nov.2007
6th	Nov.2008
7th	Dec.2008
8th	Jul. 2010
9th	Jan.2014
10th	May.2014
11th	Nov.2014
12th	Jan.2015
13th	Nov.2017
14th	May.2019
15th	Aug.2019
16th	Nov.2020
17th	Dec.2023
18th	Jun.2024
19th	Mar.2026

KOIKE SANSO KOGYO CO.,LTD.

Printed in Japan