PoWer TIG Series

GeKaMac®

PoWer TIG 300 AC DC Pulse

Users Manual

Please Read and Understand This Manual
Before Operating The Welding Machine

www.gedikwelding.com

TABLE OF CONTENTS

1. SAFETY INFORMATION… 2
2. ARC WELDING SAFETY PRECAUTIONS… 2
3. GENERAL NOTICE OF OPERATION…..... 8
4. STANDARD COMPOSITION AND ACCESSORIES…..... 9
5. FUNCTION OF EQUIPMENT…..... 10
6. NECESSARY POWER SOURCE EQUIPMENT… 12
7. TRANSPORT AND INSTALLATION… 13
8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE… 15
9. WELDING PREPARATION…..... 21
10. OPERATION… 27
11. APPLIED FUNCTION…..... 56
12. MAINTENANCE AND TROUBLESHOOTING…..... 65
13. PARTS LIST…..... 73
14. SPECIFICATIONS… 76
15. SERVICE AND SUPPORT…..... 80

1. SAFETY INFORMATION

The following safety alert symbols and signal words are used throughout this manual to identify various hazards and special instructions.

⚠ **WARNING**	**WARNING gives information regarding possible personal injury or loss of life.**
⚠ **CAUTION**	**CAUTION refers to minor personal injury or possible equipment damage.**

2. ARC WELDING SAFETY PRECAUTIONS

⚠ **WARNING**
ARC WELDING can be hazardous.
1. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. Be sure to: **・Keep children away.** **・Keep pacemaker wearers away until consulting a doctor.** **2. Read and understand the summarized safety information given below and the original principal information that will be found in the PRINCIPAL SAFETY STANDARDS.** **3. Have only trained and experienced persons perform installation, operation, and maintenance of this equipment.** **4. Use only well maintained equipment. Repair or replace damaged parts at once.**
ARC WELDING is safe when precautions are taken.

2. ARC WELDING SAFETY PRECAUTIONS (continued)

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuits are electrically live whenever the output is on. The power line and internal circuits of this equipment are also live when the line disconnect switch is on. When arc welding all metal components in the torch and work circuits are electrically live.

1. **Do not touch live electrical parts.**
2. **Wear dry insulating gloves and other body protection that are free of holes.**
3. **Insulate yourself from work and ground using dry insulating mats or covers.**
4. **Be sure to disconnect the line disconnect switch before installing, changing torch parts or maintaining this equipment.**
5. **Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.**
6. **Keep all panels and covers of this equipment securely in place.**
7. **Do not use worn, damaged, undersized, or poorly spliced cables.**
8. **Do not touch electrode and any metal object if POWER switch is ON.**
9. **Do not wrap cables around your body.**
10. **Turn off POWER switch when not in use.**

ARC RAYS can burn eyes and skin: FLYING SPARKS AND HOT METAL can cause injury. NOISE can damage hearing.

Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin.
Noise from some arc welding can damage hearing.

1. **Wear face shield with a proper shade of filter (See ANSI Z 49.1 listed in PRINCIPAL SAFETY STANDARDS) to protect your face and eyes when welding or watching a welder work.**
2. **Wear approved safety goggles. Side shields recommended.**
3. **Use protective screens or barriers to protect others from flash and glare: warn others not to look at the arc.**
4. **Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.**
5. **Use approved earplugs or earmuffs if noise level is high.**
   Chipping and grinding can cause flying metal. As welds cool, they can throw off slag.
6. **Wear approved face shield or safety goggles. Side shields recommended.**
7. **Wear proper body protection to protect skin.**

2. ARC WELDING SAFETY PRECAUTIONS (continued)

WELDING can cause fire and explosion.

Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, spatter, hot base metal, and hot equipment can cause fire and explosion. Accidental contact of electrode or welding wire to metal object can cause sparks, overheating, or fire.

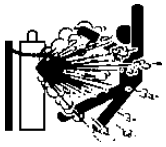
1. **Protect yourself and others from flying sparks and hot metals.**
2. **Do not weld where flying sparks can strike flammable material.**
3. **Remove all flammables within 10m (33ft) of the welding arc. If this is not possible, tightly, cover them with approved covers.**
4. **Be alert that welding sparks and hot metals from welding can easily pass through cracks and openings into adjacent areas.**
5. **Watch for fire, and keep a fire extinguisher nearby.**
6. **Be aware that welding on a ceiling, floor, bulkhead, or partition can ignite a hidden fire.**
7. **Do not weld on closed containers such as tanks or drums.**
8. **Connect base metal side cable as close to the welding area as possible to prevent the welding current from traveling along unknown paths and causing electric shock and fire hazards.**
9. **Remove stick electrode from holder or cut off welding wire at contact tip when not in use.**
10. **Do not use the welding power source for other than arc welding.**
11. **Wear oil-free protective garments such as leather gloves, a heavy shirt, cuffless trousers, boots, and a cap.**
12. **A loose cable connection can cause sparks and excessive heating.**
13. **Tighten all cable connections.**
14. **When there is an electrical connection between a work piece and the frame of wire feeder or the wire reel stand, are may be generated and cause damage by a fire if the wire contacts the frame or the work piece.**

FUMES AND GASES can be hazardous to your health.

Arc welding produce fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. **Keep your head out of the fumes. Do not breathe the fumes.**
2. **Ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.**
3. **If ventilation is poor, use an approved air-supplied respirator.**
4. **Read the Material Safety Data Sheets (MSDS) and the manufacturer's instructions on metals, consumables, coatings, and cleaners.**
5. **Do not weld or cut in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.**
6. **Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.**

2. ARC WELDING SAFETY PRECAUTIONS (continued)



CYLINDER can explode if damaged.

A shielding gas cylinder contains high-pressure gas. If damaged, a cylinder can explode.
Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

1. **Use only correct shielding gas cylinders, gas regulator, hoses, and fittings designed for the specific application; maintain them in good condition.**
2. **Protect compressed gas cylinders from excessive heat, mechanical shock, and arcs.**
3. **Keep the cylinder upright and securely chained to a stationary support or a rack to prevent falling or tipping.**
4. **Keep cylinders away from any welding or other electrical circuit.**
5. **Never touch cylinder with welding electrode.**
6. **Read and follow instructions on compressed gas cylinders, associated equipment, and the CGA publication P-1 listed in PRINCIPAL SAFETY STANDARDS.**
7. **Turn face away from valve outlet when opening cylinder valve.**
8. **Keep protective cap in place over valve except when gas cylinder is in use or connected for use.**
9. **Do not disassemble or repair the gas regulator except for the person authorized by the manufacturer of them.**

Rotating parts may cause injuries. Be sure to observe the following.

If hands, fingers, hair or clothes are put near the fan's rotating parts or wire feeder's feed roll, injuries may occur.

1. **Do not use this equipment if the case and the cover are removed.**
2. **When the case is removed for maintenance/inspection and repair, certified or experienced operators must perform the work. Erect a fence, etc. around this equipment to keep others away from it.**
3. **Do not put hands, fingers, hair or clothes near the rotating fans or wire feed roll.**

2. ARC WELDING SAFETY PRECAUTIONS (continued)

ARC WELDING work areas are potentially hazardous.

FALLING or MOVING machine can cause serious injury.

1. **When hanging the welding power source by a crane, do not use the carrying handle.**
2. **Put the welding power source and wire feeder solidly on a flat surface.**
3. **Do not pull the welding power source across a floor laid with cables and hoses.**
4. **Do not put wire feeder on the welding power source.**
5. **Do not put the welding power source and wire feeder where they will pit or fall.**

WELDING WIRE can cause puncture wounds.

1. **Do not press gun trigger until instructed to do so.**
2. **Do not point gun toward any part of the body, other people, or any metal when threading welding wire.**

This equipment uses high frequency for arc starting.

High-frequency may enter nearby units as shown below, causing electromagnetic trouble.

- **Input cables, signal cables, telephone cables**
- **Radio sets, TV sets**
- **Computers and other control equipment**
- **Industrial detectors and safety units**
- **Pacemakers, hearing-aid sets**

For preventing electromagnetic trouble,

1. **Make the cable as shortest as possible.**
2. **Install cables along the floor or the ground as close as possible.**
3. **Put the base metal side cable together with the torch side cable.**
4. **Do not use a common base metal ground with other machines.**
5. **Tightly close all of the doors and covers of this equipment and secure them.**
6. **Do not press the torch switch other than when ready to start the arc.**
7. **When electromagnetic trouble occurs, take the measures shown in this instruction manual until trouble is corrected.**
   Please contact Gedik Welding, when necessary.
8. **Pacemaker wearers must not come near this equipment during operation until consulting your doctor.**
   Operation of the pacemakers will be affected badly by high frequency.

PRINCIPAL SAFETY STANDARDS

Arc welding equipment – Installation and use, Technical Specification
IEC 62081, from International Electro technical Commission

Arc welding equipment Part 1: Welding power sources IEC 60974-1, from International Electro technical Commission

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society.

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office.

Recommended Practices for Plasma Arc Cutting, American Welding Society Standard AWS C5.2, from American Welding Society.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association.

NOTE: The codes listed above may be improved or eliminated. Always refer to the updated codes.

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3. GENERAL NOTICE OF OPERATION

3.1 Rated Duty Cycle

⚠ CAUTION
● **Use this welding power source at or under the rated duty cycle. Exceeding the rated duty cycle limitation may result in damage to the welding machine.**

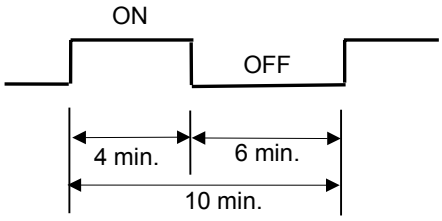
- The rated duty cycle of the welding power source is the following:

  - TIG WELDING: 40% (300 A)
  - STICK WELDING: 40% (250 A)

NOTE:

- **When using a dust-proof fan filter as standard equipment, observe the duty cycle listed above.**
- **Use of any other filter may lead to an excess of the duty cycle limitations or damage to the welding power source. Be sure to use the specified dust-proof fan filter. (Part number: 4519-031)**

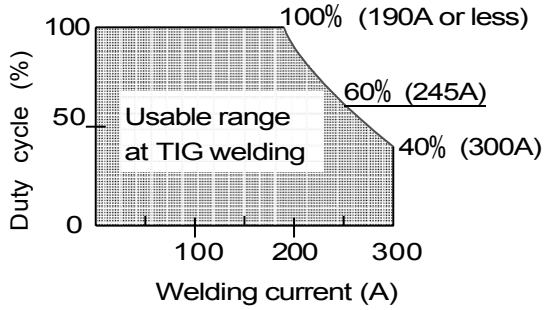
- The duty cycle of 40% means the way the machine is rested for 6 minutes after 4 minutes of continuous welding at the rated current.



Operation cycle of 40% duty cycle

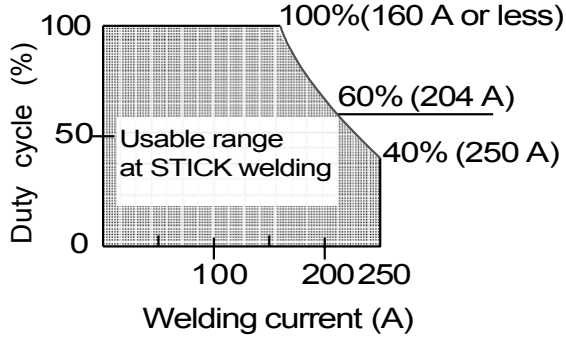
- Failure to observe duty cycle limitations may cause an excess of the tolerance of the temperature inside the welding power source. This may cause to premature welding power source failure or product damage.

- The figure shown right indicates the relation between welding current and duty cycle. Use the welding power source within its usable range, following the duty cycle for the welding current.



- The duty cycle of the welding power source is also limited by the duty cycles of accessories combined with such as welding torches. Use the welding power source within the lowest rated duty cycle of the accessories.

- Choking the filter by dust may cause decrease duty cycle. And also, it may cause damage to the welding power source. So, check the filter periodically.

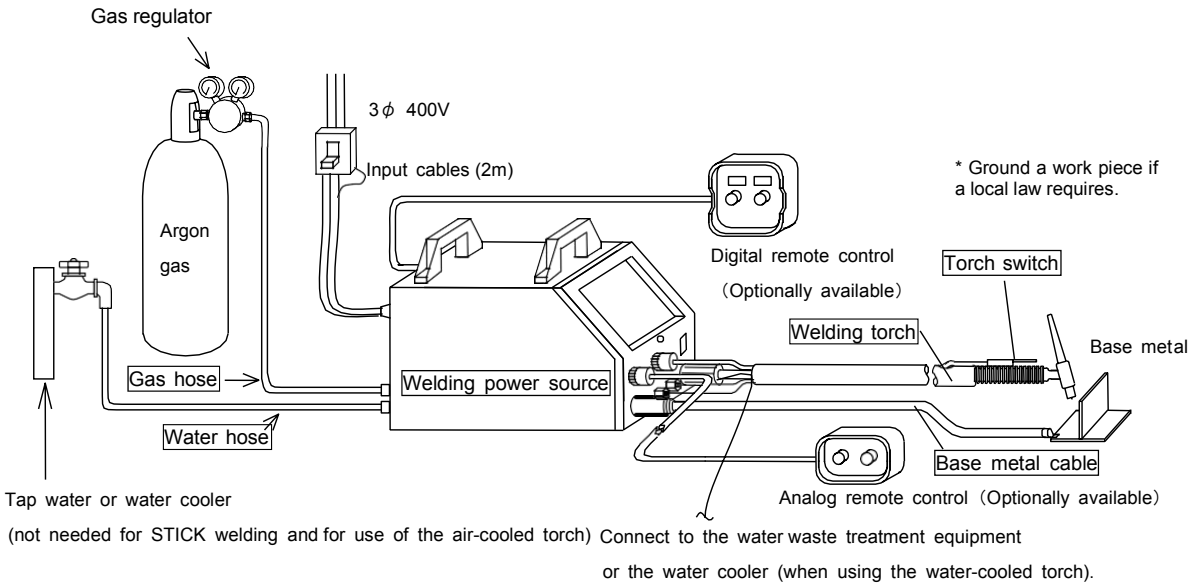


4. STANDARD COMPOSITION AND ACCESSORIES

4.1 Standard Composition

- The parts names indicated in the boxes are standard parts. They are not supplied with this welding machine. Preparation of the standard parts except the welding power source is required to use the welding power source.
- Input cable and grounding cable
  For a switch box, the 2m input and grounding cables are from the back panel of welding power source.

Input cable	AWG12 4mm^2 with 10mmϕ terminal x 3
Grounding cable	AWG12 4mm^2 with 10mmϕ terminal x 1



4.2 Accessory

Check the quantity of parts when opening the package.

Description	Specification	Q'ty	Part number	Remarks
Power Cable connector	DIX SK 50	1	4734-016	For base metal and holder cable

4.3 Other Equipment

(1) TIG Welding

- Use argon gas for welding with 99.9 % or more purity.
- Use the proper filler wire for material, plate thickness, etc.

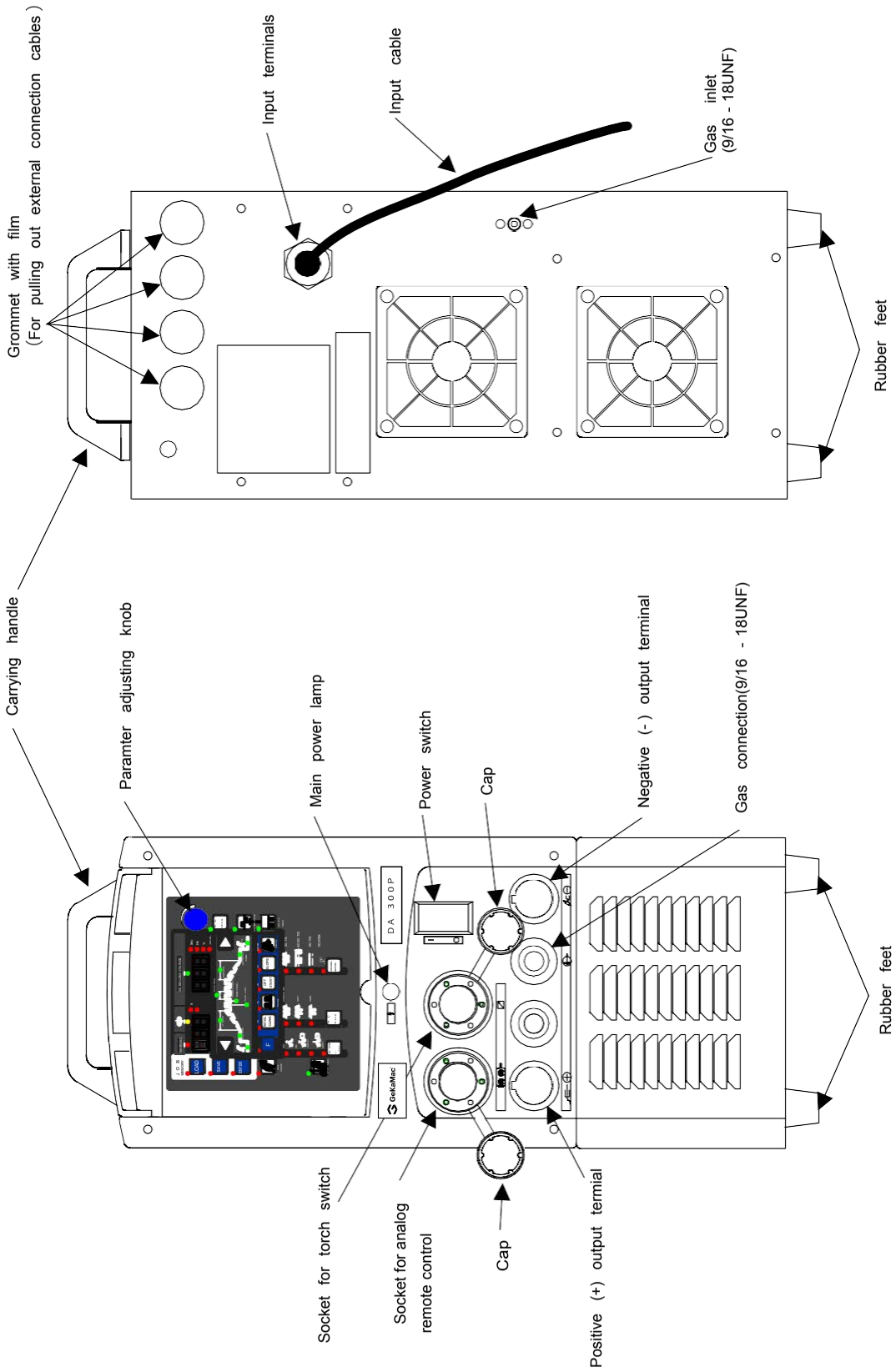
(2) STICK Welding

- Use the proper stick welding electrode for purpose of use, welding position, shape of joint, etc.

Use the electrode holder electrically insulated.

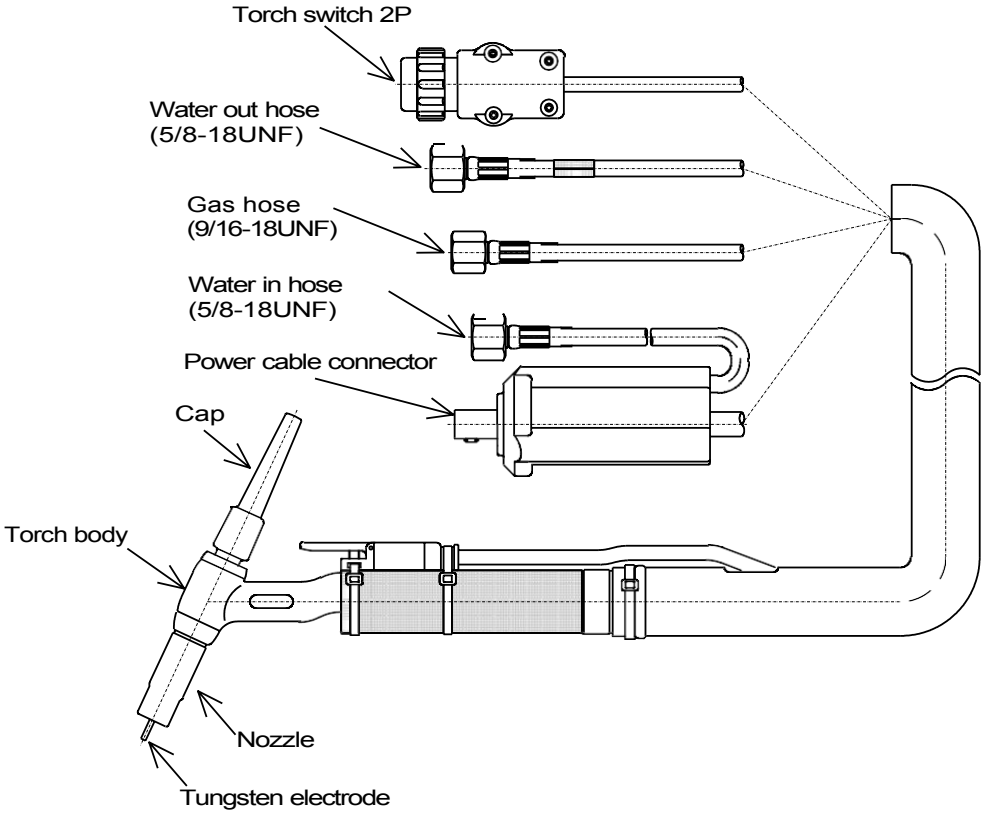
5. FUNCTION OF EQUIPMENT

5.1 Welding Power Source



5. FUNCTION OF EQUIPMENT (continued)

5.2 Welding Torch



6. NECESSARY POWER SOURCE EQUIPMENT

6.1 Welding Power Source Equipment (for commercial use)

⚠ WARNING

- **When the welding machine is used in such a humid environment as construction site, on the steel plate, or on steel structure, install a leakage breaker.**

⚠ CAUTION

- **Be sure to install a switch with fuse or a circuit breaker (for motor) to the input sides of each welding machine.**

Capacity of Necessary Power Source Utility

	AC-TIG	DC-TIG	STICK
Power supply voltage	400 V, three phase		
Tolerance range of fluctuation of power supply voltage	400V±15%		
Installed capacity	12.5kVA or more	11.9kVA or more	13.2kVA or more
Capacity of switch/circuit breaker	50 A	50 A	50 A

6.2 Precautions for Use of the Engine Generator

⚠ CAUTION

- **Use the auxiliary power of engine welder whose voltage waveform has been improved. Some of the engine welders have poor electricity, which may cause product damage. Contact an engine welder manufacturer for improvement of waveform.**

To prevent the welding power source from being damaged because of engine generator, follow the instructions below.

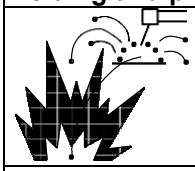
- Set the output voltage of the engine generator to the voltage range between 400 and 420V at no-load welding operation. Setting to extremely high output voltage may result in product damage.
- Use the engine generator with a damper winding of which capacity is more than twice as much as the rated input of the welding power source. Generally, the recovery time of the engine generator's voltage for load change is slower than that of the commercial input power source, and if the engine generator does not have sufficient capacity, sudden current change such as arc start will occur. This may cause abnormal decrease in output current or arc loss. Ask an engine generator manufacturer for a damper winding.
- Do not combine more than two welding machines with an engine generator. The affect of each welding machine may cause easy loss of arc.

7. TRANSPORT AND INSTALLATION

7.1 Transport

⚠ WARNING	
To prevent accidents and damage of the welding machine during transportation, observe the following.	
	● **Do not touch charging parts inside or outside the welding machine.** ● **Be sure to disconnect the line disconnect switch when carrying the welding machine.**
	● **When hanging the welding power source by a crane, cover the power source with the cover or the case and tighten eye-bolts.** ● **Lift one welding power source with two wires. Lifting the welding power source and other equipment together may cause them to drop.** ● **When carrying the welding machine with a fork lift, etc., securely make scotch-block.** ● **When hanging the welding power source by a crane, do not use the carrying handle.**

7.2 Installation

⚠ WARNING	
When installing the welding machine, follow the instructions below to avoid a fire caused by welding and physical damages by fume gas.	
	● **Do not place the welding machine near combustible materials or flammable gas.** ● **Remove combustible materials to prevent dross coming into contact with combustible objects. If that is not possible, cover them with noncombustible covers.**
	● **To avoid gas poisoning and danger of suffocation, wear a gas mask or adequately ventilate when the welding machine is used in the place regulated by a local law.** ● **To prevent disorder or poisoning caused by fume, wear a gas mask or weld at a partial exhaust facility approved by the local regulation.** ● **Adequately ventilate or wear a gas mask when using the welding machine in a tank, in a boiler or in a hold of a ship, because heavier gasses such as carbon dioxide or argon gases are settle there.** ● **When using the welding machine at a narrow space, comply with a trained supervisor's directions. And be sure to wear a gas mask or adequately ventilate.**

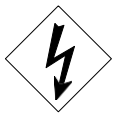
7. TRANSPORT AND INSTALLATION (continued)

7.2 Installation (continued)

⚠ CAUTION	
	To prevent electromagnetic troubles, read the following. **Also, if electromagnetic troubles occur, check the following again.**
● **Change the installation place of the welding machine.** ● **Mount an input cable in the grounded metallic conduit.** ● **Provide electromagnetic shield to the whole welding places.**	

⚠ CAUTION
Follow the instructions below when selecting an installation place of the welding power source.
● **Do not put heavy things on the welding machine.** ● **Do not cover the ventilation port of the welding machine.** ● **Do not install the welding power source in the place subject to direct sunlight or rain.** ● **Do not place the welding power source, wire feeder, torch, control unit, conduit and control cable (including the extension cable) in an area where the equipment can become wet. Place the welding machine on a strong and stable surface.** ● **Install the welding machine in the place where the ambient temperature is between -10 ˚C and +40 ˚C (+14 ˚F and +104 ˚F).** ● **Do not install the welding machine in the place where metal material such as spatter enters the welding power source.** ● **Keep the install distance of 30 cm between the welding power source and the wall or other welding power source.** ● **Install a wind shield to protect arc from wind.** ● **Fix the gas cylinder to the stand only for gas cylinder.**

8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE

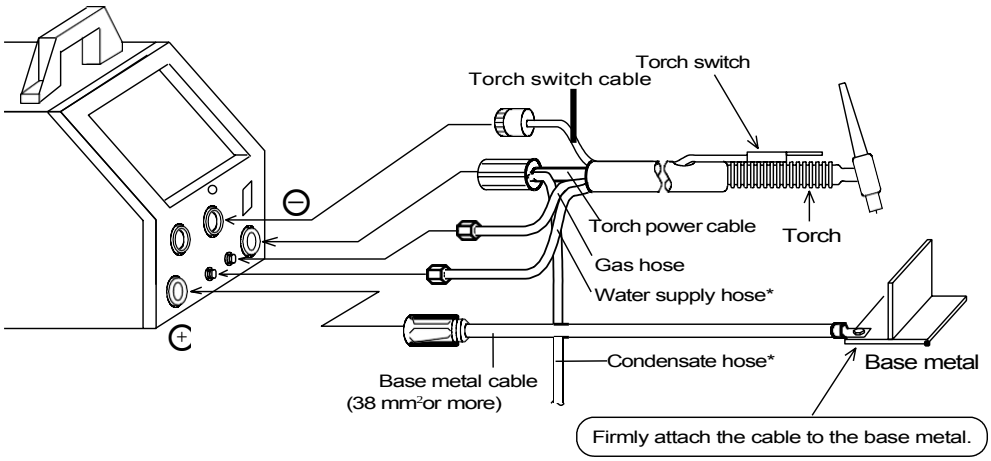
⚠ WARNING	
	**Observe the following to prevent electric shock.**
Do not touch the charged sections; otherwise, you might receive serious electric shock or get burned. ● **Do not touch the charged sections.** ● **Have a qualified electric engineer ground the case of the welding power source. Have a qualified electric engineer ground the base metal or jig electrically connected, following a local low.** ● **Connect the welding machine with all the line disconnect switches inside the switch box turned off.** ● **Do not use a cable with lack of capacity or a damaged cable.** ● **Tighten and insulate the connections of cables.** ● **Attach the case properly after connecting the cable.**	

8.1 Connecting of the Welding Power Source

⚠ CAUTION	
	To prevent electromagnetic troubles, read the following. **Also, if electromagnetic troubles occur, check the following again.**
● **Do not use an unnecessarily long cable.** ● **The welding cable is placed as closely on the floor or ground as possible.** ● **Place a base metal cable and an electrode cable as closely as possible.** ● **Do not ground the welding power source commonly with other machines.**	

8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (continued)

8.1.1 TIG WELDING (water-cooled torch)

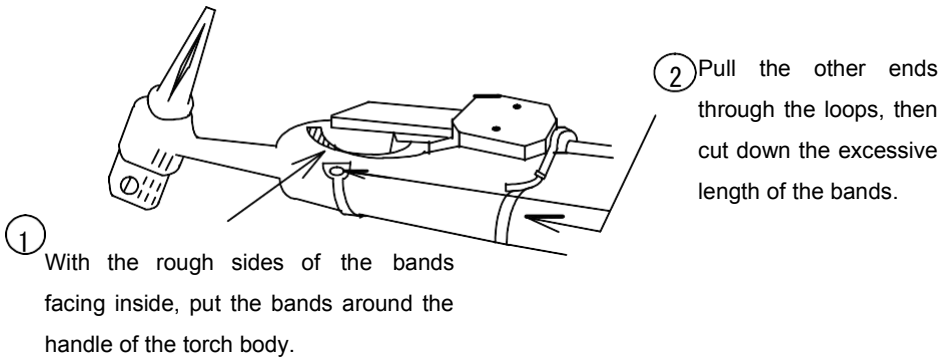


Follow the steps below to attach the cables to the output connectors of the welding power source referring to the illustrations of “Connection of the Welding Power Source“.

1. Ground the base metal (if required by local laws or codes).
2. Connect between the “base metal ⊕ ” terminal and the base metal with the base metal cable.
3. Attach the torch cable to the “torch ⊖ “ output terminal.
4. Connect the water supply hose to the cooling water connection.
5. Connect the gas hose to the gas connection.
6. Connect the torch switch or foot switch to the socket for torch switch.
7. Make drainage treatment (when using tap water).
   When using the circulation system, attach the water out hose to it.

* When using the air-cooled torch, the water hose is not necessary.

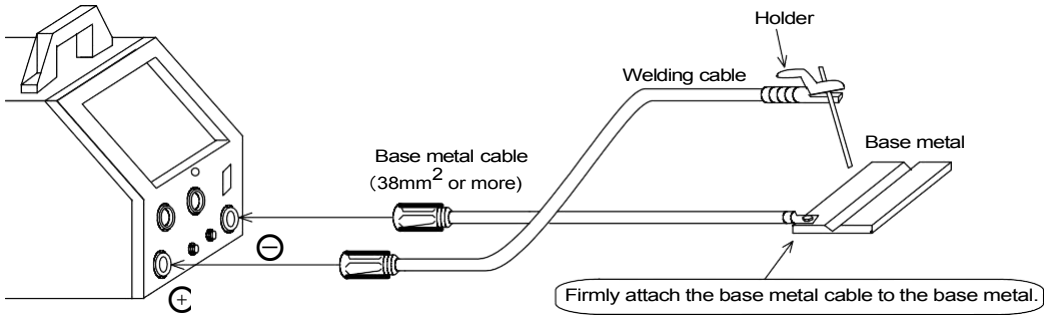
Firmly attach the torch switch to the torch with the supplied bands.



8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (continued)

8.1.2 STICK WELDING

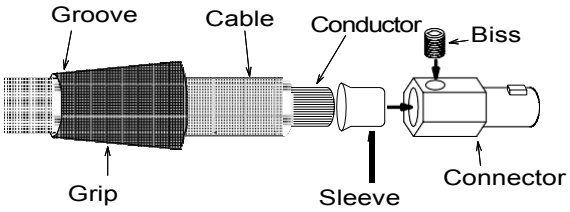
The following figure shows the cable connections for stick welding with DC electrode positive (welding stick positive, base metal negative). When using DC electrode negative, switch the holder cable with the base metal cable.



1. Ground the base metal (if required by local laws or codes).
2. Connect the base metal cable to the negative ⊖ output terminal on the welding power source.
3. Connect the holder to the positive ⊕ output terminal on the welding power source.

8.2 Connecting of the Base Metal Cable and Stick Holder Cable

When connecting the base metal cable and stick holder cable to the welding power source, attach the cable plug DIX SK 50 (supplied).



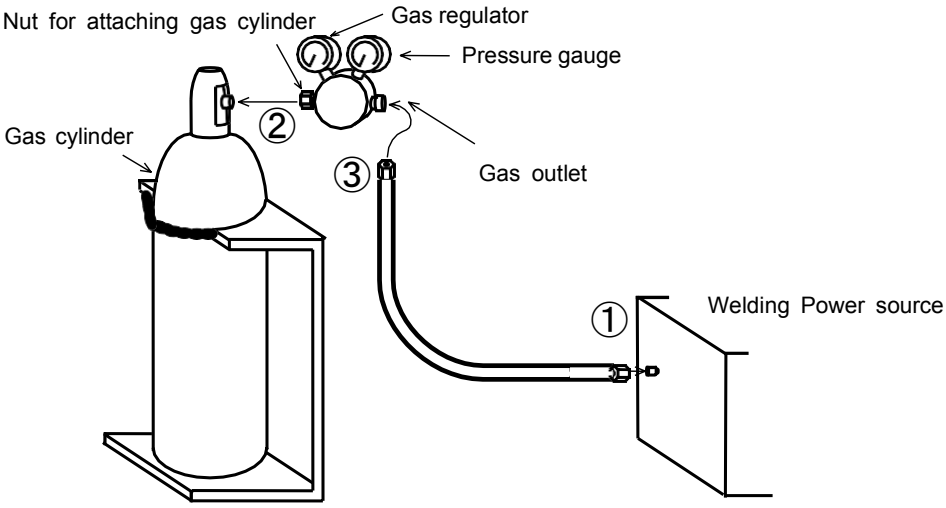
8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (continued)

8.3 Connecting of the Gas Hose

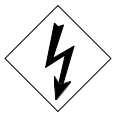
⚠ WARNING	
	● **You may suffer from danger of suffocation caused by lack of oxygen when shield gas keeps drifting in a closed place. Be sure to turn off the shield gas at the main when the welding power source is not in use.**

⚠ CAUTION
● **Be sure to connect the gas hose after fixing gas cylinder to the stand, as physical injuries may result from falling down of it.** ● **Attach a proper gas regulator to a gas cylinder. Failure to observe the demand may result in physical injuries. The gas regulator for high pressure gas must be used.**

1. Securely attach the gas hose to the gas inlet located on the rear side of the Welding power source with a monkey wrench, etc.
2. Fix the nut for attaching gas cylinder to the gas cylinder with a monkey wrench, etc.
3. Securely attach the gas hose to the gas outlet with a monkey wrench, etc.



8.4 Grounding and Connecting of Input Power Source

⚠ WARNING	
	**Observe the following to prevent electric shock.**

Do not touch the charged sections; otherwise, you might receive serious electric shock or get burned.

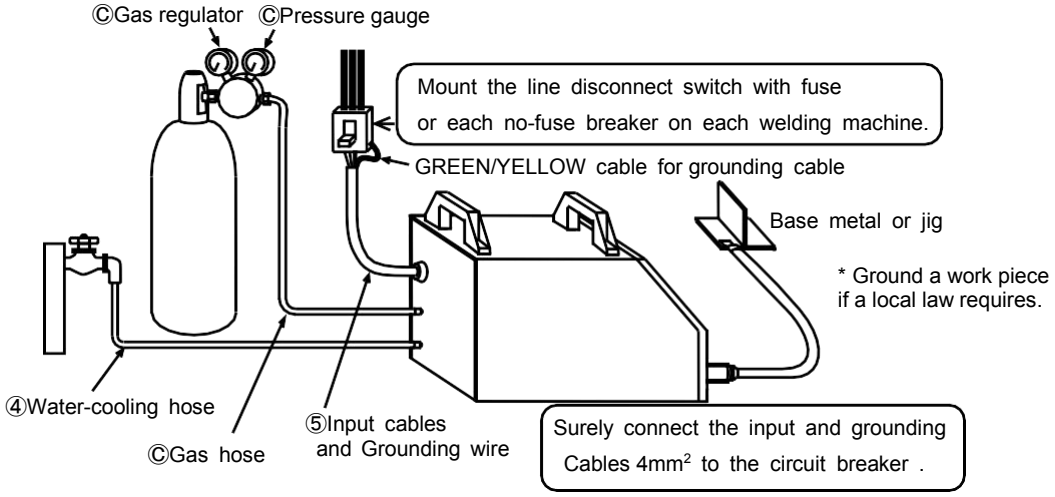
- **Do not touch the charged sections.**
- **Have a qualified electric engineer ground the case of the welding power source. Have a qualified electric engineer ground the base metal or jig electrically connected, following a local low.**
- **Connect the welding machine with all the line disconnect switches inside the switch box turned off.**
- **Attach the case properly after connecting the cable.**
- **When the welding machine is used in such a humid environment as construction site, on the steel plate, or on steel structure, install a leakage breaker.**

8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (continued)

⚠ CAUTION	
	To prevent electromagnetic troubles, read the following. **Also, if electromagnetic troubles occur, check the following again.**
● **Add a noise filter to the input cables.** ● **Do not ground the welding power source commonly with other machines.**	

⚠ CAUTION
● **Be sure to install a switch with fuse or a circuit breaker (for motor) to the input sides of each welding machine.**

The following figure shows the cable connections. When using the air-cooled torch, the water supply hose is not necessary. For STICK welding, the water/gas hoses are not necessary.

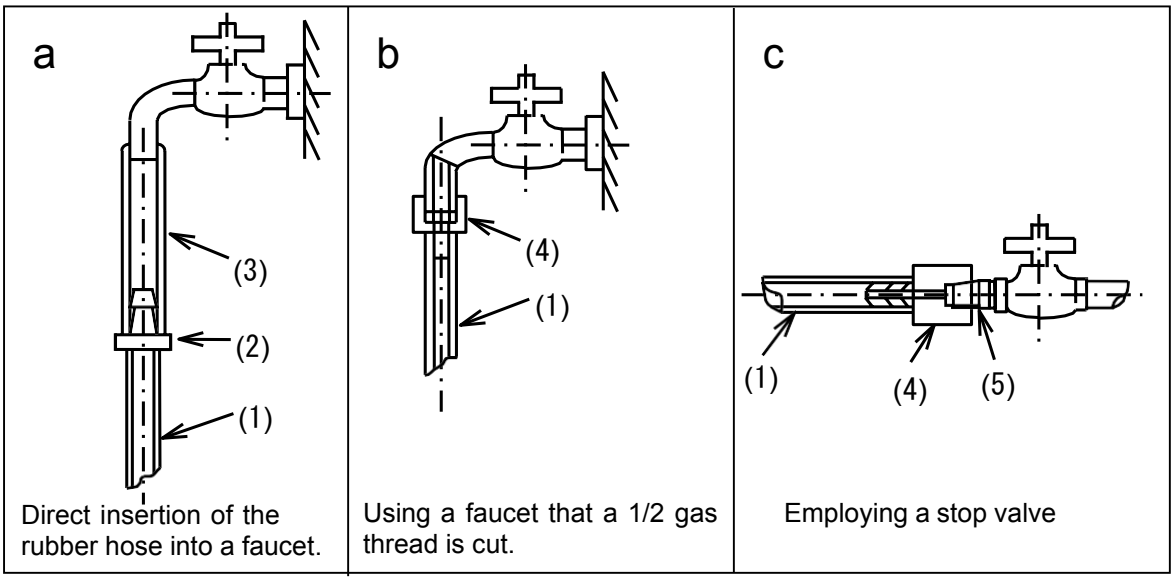


⚠ CAUTION
Be sure to ground the case of the welding power source. **Use a grounding cable of which thickness is more than 4mm².**
● **If the welding power source which is not grounded is used, voltage will be generated in the case through the capacitor between the welding power source input circuit and the case or stray capacity (electrostatic capacity naturally generated between the input circuit and the metal enclosure). If you touch the case or the base metal, you may suffer from electric shock. Be sure to ground the case of the welding power source or jig.**

8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (continued)

● Cooling Water

Connect a water-cooled hose as illustrated below.



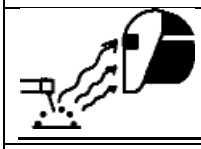
a	b	c
Direct insertion of the rubber hose into a faucet.	Using a faucet that a 1/2 gas thread is cut.	Employing a stop valve

No.	Description	Parts No.	Remarks
(1)	5-meter water supply hose	P1042L00	Tap water kit BBDW-3001
(2)	Hose connector	P1042M02	
(3)	Rubber hose (for tap water)	None	
(4)	Feed water port (for water supply hose)*	P1042M01	
(5)	Nipple (1/2)	None	Not supplied

9. WELDING PREPERATION

9.1 Preparing the Protective Equipment

⚠ CAUTION	
	Check the followings before welding.
● **The whole doors and covers of the welding machine are surely closed and fixed.** ● **The welding cable is placed as closely on the floor or ground as possible.** ● **Place a base metal cable and an electrode cable as closely as possible.** ● **Proper flow rate of shield gas is supplied. Improper flow rate may lead to bad arc start and unnecessary high frequency.**	

⚠ CAUTION	
	**Use the protective equipment to protect you and other workers from arc rays, spattering dross, and noise from welding operation.**
● **When performing or monitoring welding operation, wear an eye protector with a good light blocking effect or face shield.** ● **Wear protective glasses to protect your eyes from the spattering dross.** ● **Wear protective equipment such as protective gloves, long-sleeve clothes, leg covers, and leather apron.** ● **Install protective screens or barriers to protect the eyes of others in the work area from arc ray.** ● **Wear an ear protector when noise level is high.**	

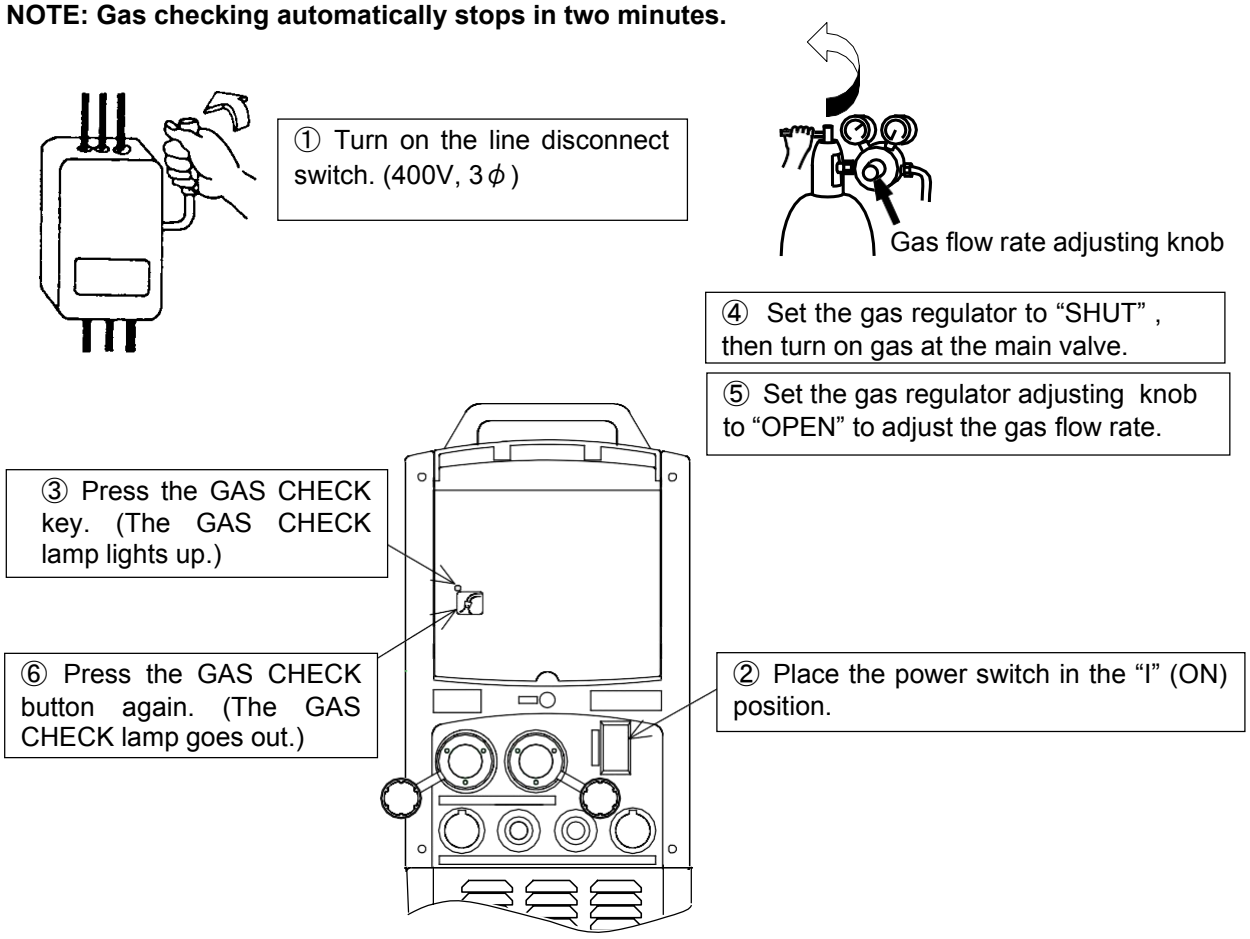
9. WELDING PREPARATION (continued)

9.2 Operating the Switches and Controlling the Gas Regulator

⚠ CAUTION

- **Keep your face away from the outlet when turning on gas at the main of the gas cylinder, as burst of high-pressure gas may result in physical injuries.**

NOTE: Gas checking automatically stops in two minutes.



9.3 Selecting the cooling method

⚠ CAUTION

- **When using the water-cooled torch, supply water-cooled torch from the outlet for cooling water on the rear panel of the welding power source. And turn torch change-over key to the "WATER COOLED" side.**
- **If cooling water is supplied directly to the torch with the welding power source bypassed, and the water-cooled torch is used with the torch selector key set at air side, it cannot be detected whether cooling water is flowing, and in case where no cooling water is flowing, the torch may be burnt.**

When using a water-cooled torch, select “WATER” by pressing the TORCH key once.

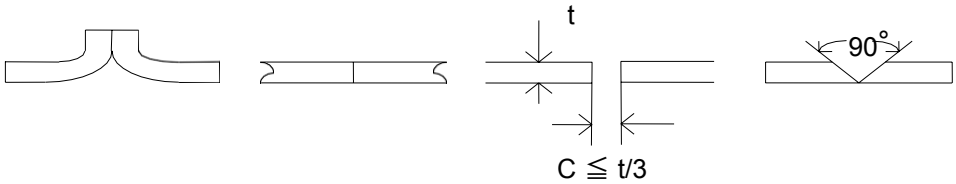
[WATER]: The TORCH lamp is on.
[AIR]: The TORCH lamp is off.

9. WELDING PREPARATION (continued)

9.4 TIG Welding Condition（for reference）

（1） TIG Welding Condition PULSE “OFF”）

Material	Plate Thickness (mm)	Electrode Dia. (mm)	Filler Wire Dia. (mm)	Current (A)	Argon Gas Flow Rate (l/min)	No. of Layer	Bevel Shape
Stainless Steel (DC, Electrode Negative)	0.6	1, 1.6	0 - 1.6	20 - 40	4	1	(a), (b)
	1.0	1, 1.6	0 - 1.6	30 - 60	4	1	(a), (b)
	1.6	1.6, 2.4	0 - 1.6	60 - 90	4	1	(b)
	2.4	1.6, 2.4	1.6 - 2.4	80 - 120	4	1	(b)
	3.2	2.4, 3.2	2.4 - 3.2	110 - 150	5	1	(b)
	4.0	2.4, 3.2	2.4 - 3.2	130 - 180	5	1	(d), (c)
	4.8	2.4, 3.2, 4	2.4 - 4.0	150 - 220	5	1	(d), (c)
	6.4	3.2, 4, 4.8	3.2 - 4.8	180 - 250	5	1 - 2	(a), (c)
Deoxidized Copper (DC, Electrode Negative)	0.6	1, 1.6	0 - 1.6	50 - 70	3 - 4	1	(a), (b)
	1.0	1.6	0 - 1.6	60 - 90	3 - 4	1	(a), (b)
	1.6	2.4	1.6 - 2.4	80 - 120	3 - 4	1	(b)
	2.4	2.4, 3.2	2.4 - 3.2	110 - 150	4	1	(b)
	3.2	3.2, 4	3.2 - 4.8	140 - 200	4 - 5	1	(c)
	4.0	3.2, 4, 4.8	4.0 - 4.8	180 - 250	4 - 5	1	(d), (c)
	4.8	4, 4.8	4.8 - 6.4	250 - 300	5 - 6	1	(d), (c)
	6.4	4, 4.8, 6.4	4.8 - 6.4	300 - 400	5 - 6	1 - 2	(d), (c)
Aluminum (AC)	1.0	1.6	0 - 1.6	50 - 60	5 – 6	1	(a), (b)
	1.6	1.6, 2.4	0 - 1.6	60 - 90	5 – 6	1	(a), (b)
	2.4	1.6, 2.4	1.6 - 2.4	80 - 110	6 - 7	1	(b)
	3.2	2.4, 3.2	2.4 – 4.0	100 - 140	6 - 7	1	(b)
	4.0	3.2, 4.0	3.2 - 4.8	140 - 180	7 - 8	1	(b)
	4.8	3.2, 4.0, 4.8	4.0 - 6.4	170 - 220	7 - 8	1	(b)
	6.4	4.0, 4.8	4.0 - 6.4	200 - 270	8 – 12	1 - 2	(d), (c)
Magnesium (AC)	1.0	1.6	0 - 1.6	30 - 40	3 – 4	1	(a)
	1.6	1.6, 2.4	1.6 - 2.4	40 - 70	4 – 5	1	(b)
	2.4	1.6, 2.4	1.6 - 2.4	60 - 90	4 – 5	1	(b)
	3.2	1.6, 2.4	2.4 – 3.2	75 - 110	5 - 6	1	(b)
	4.0	2.4, 3.2	3.2 - 4.0	90 - 120	5 – 6	1	(d), (c)
	4.8	3.2, 4.0	3.2 - 4.8	110 - 150	5 - 6	1	(d), (c)
	6.4	3.2, 4.0	4.0 – 4.8	130 - 170	6 - 7	1 - 2	(d), (c)

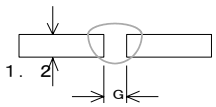
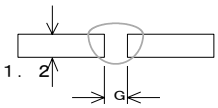
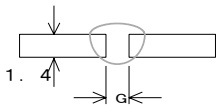
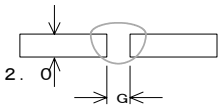


(a) (b) (c) (d)

9. WELDING PREPARATION (continued)

(2) Welding Condition of DC TIG Pulse

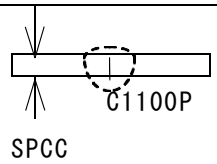
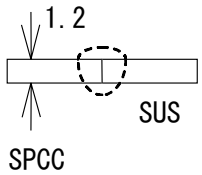
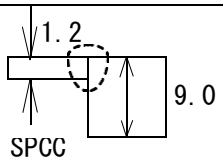
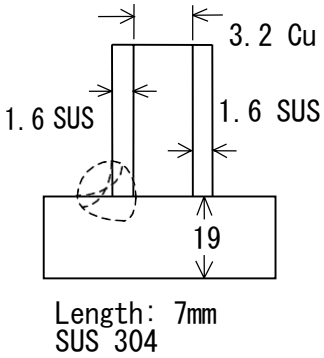
◆ Flat position and butt joint welding

Material	Joint Geometry	Gap G (mm)	Pulse Condition				Welding Speed (cm/min)	Wire Feeding Speed (cm/min)
			Pulse Current (A)	Base Current (A)	Frequency (Hz)	Pulse Width (%)		
Mild Steel spcc		0 1.2 1.6	200 150 130	50 20 20	2.5 1.5 1	50 46 50	60 30 15	60 60 40
Stainless Steel SUS304		0 1.2 1.6 2.0	150 150 130 130	50 20 20 20	3.1 1 0.8 0.8	50 35 30 30	80 17 10 83	0 40 40 40
Copper C1100P		0 1.2 1.6	280 280 280	50 50 30	3.1 2 1.5	50 50 42	80 50 25	0 75 75
Titanium TP270		0	200	100	1	30	25	0

Shield gas : Argon (10 l/min) Electrode : Thoriated Tungsten（3.2mmφ）
Filler Wire : 1.2mmφ Arc Length : 2mm

9. WELDING PREPARATION (continued)

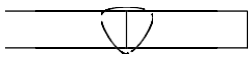
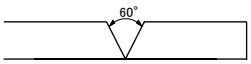
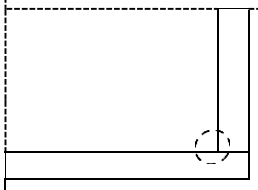
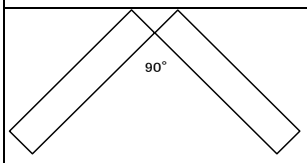
◆ Weld joints with different heat capacity

Material	Joint geometry	No. of Layer	Pulse condition				Welding Speed (cm/min.)	Filler wire Feeding Speed (cm/min.)
			Pulse Current (A)	Base Current (A)	Pulse Freq. (Hz)	Pulse Width (%)		
Copper + Mild Steel		1	250	50	0.8	20	10	60 (Cu)
Stainless Steel + Mild Steel		1	170	60	2.5	50	50	60 (SUS)
Mild Steel		1	120	50	2	50	20	30
Stainless Steel		4	160	50	1.5	46	8.5	60

Shielding Gas: Argon (10ℓ/min.) Electrode: Thoriated Tungsten (2.4mm ϕ)

Filler Wire : 1.2mmϕ Arc Length : 2 - 3mmϕ

9. WELDING PREPARATION (continued)

Material	Joint geometry	No. of Layer	Pulse condition				Welding Speed (cm/min.)	Filler wire Feeding Speed (cm/min.)
			Pulse Current (A)	Base Current (A)	Pulse Freq. (Hz)	Pulse Width (%)		
Aluminum		1.0	70	25	1	50	1.6	75
		1.5	80	40	1	50	1.6	95
		1.5	90	25	1	50	1.6	75
		1.5	85	25	1	50	1.2	95
		3.2	170	25	1	50	1.2	290
		3.0	170	25	1	50	1.6	170
		6.0	220	25	1	50	1.6	250
		6.0	180	25	1	50	1.6	250
		3.2	170	25	1	50	1.2	290
		6.0	220	25	1	50	1.6	270
		3.0	120	25	1	50	1.6	60

(4) Post-Flow Time

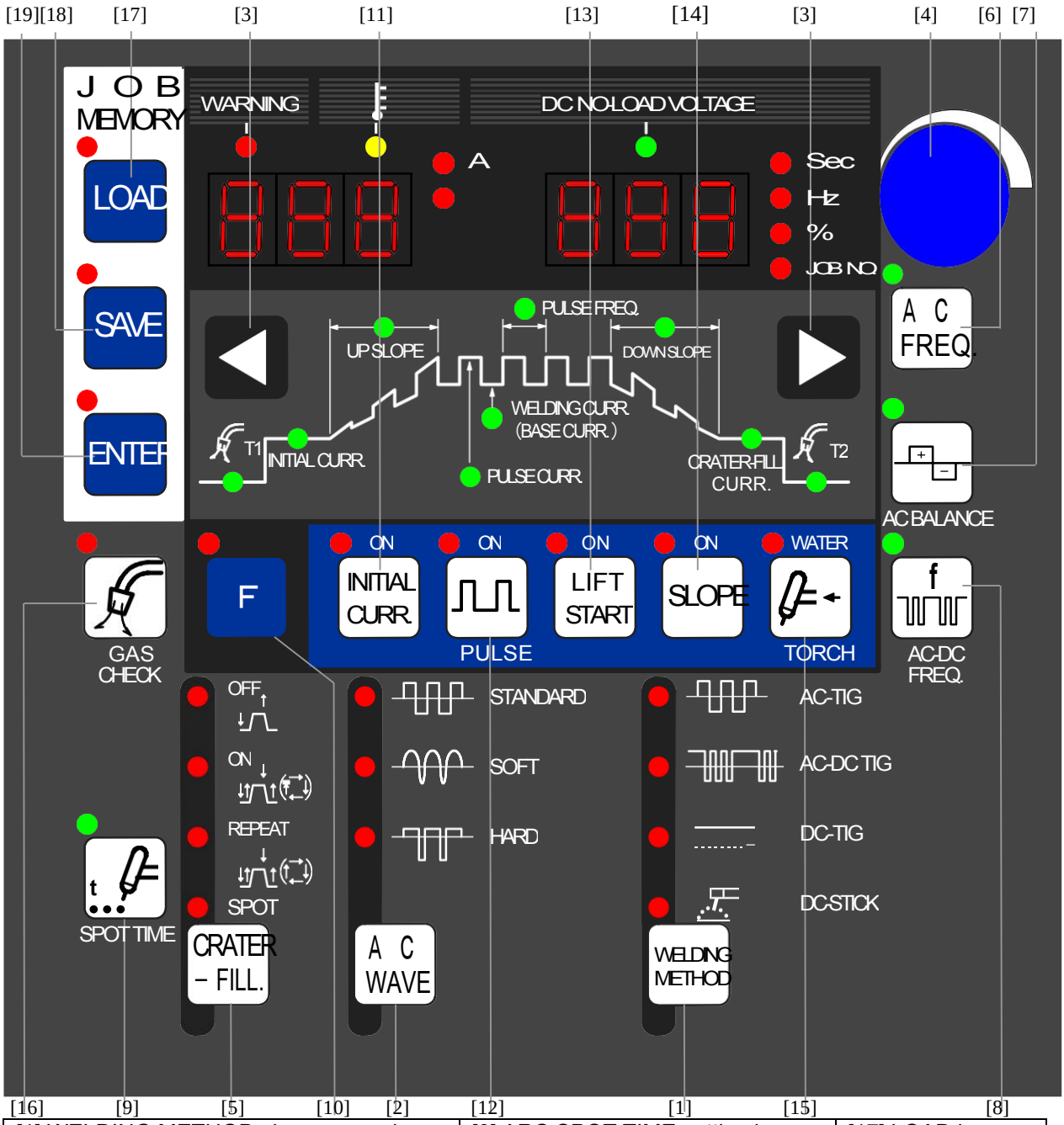
Adjust to the proper post-flow time for the electrode diameter.

Electrode Dia.(mm)	Post-Flow Time (s)
1.6	3 - 5
2.4	5 - 8
3.2	8 - 12
4.0	12 - 17
4.8	17 - 21
6.4	21 - 26

10. OPERATION

- Fully employ the “Quick Manual” on 14.2: this manual is a brief summary of the operation, etc.

10. Front panel



[1] WELDING METHOD change-over key	[9] ARC SPOT TIME setting key	[17] LOAD key
[2] AC WAVE change-over key	[10] Function selection key	[18] SAVE key
[3] Parameter selection key	[11] INITIAL CURR. selection key	[19] ENTER key
[4] Parameter adjusting knob	[12] PULSE selection key	
[5] CRATER FILL. key	[13] LIFT START key	
[6] AC FREQ. key	[14] SLOPE selection key	
[7] AC BALANCE key	[15] TORCH change-over key	
[8] AC-DC change-over frequency settup key	[16] GAS CHECK key	

10. OPERATION (continued)

⚠ WARNING	
Observe the following to prevent electric shock.	
	***Do not touch the charged sections; otherwise, you might receive serious electric shock or get burned.** ● **Do not touch the electrode while pressing the TORCH switch.** ● **Disconnect the welding power source form input power supply before replacing the electrode.** ● **Wear dry clothes and gloves during welding.**

⚠ CAUTION
● **This welding machine should be operated by persons only after reading and understanding contents of this owner's manual and having knowledge and skills for handling the welding machine safely.** ● **Use this welding power source at or under the rated duty cycle. Exceeding the rated duty cycle limitation may result in damage to the welding machine.**

⚠ CAUTION	
HF	**Observe the followings to perform TIG welding safely.**
● **Adjust the amount of shield gas with the GAS CHECK key. Using the torch switch for adjustment of shield gas may result in generating unnecessary high frequency for a long time period.** ● **Using improper electrode may cause failure of arc start, and generate useless high frequency.** ● **Improper shielding gas flow may cause failure of arc start, and generate useless high frequency.**	

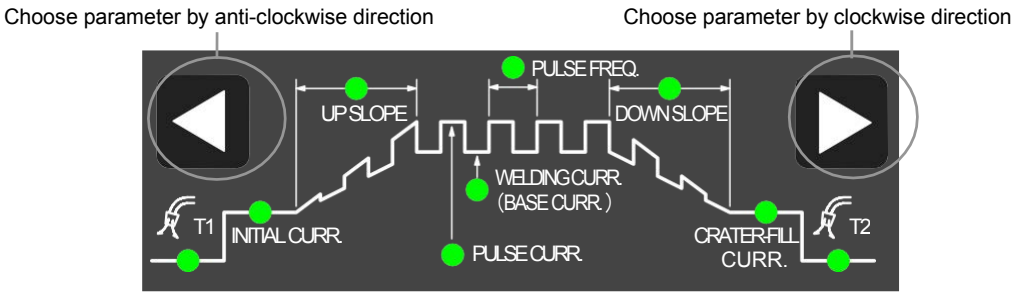
When reading the operating instructions described below, unfold page (section 14.2) so that you can read them confirming the location of the keys on the front panel.

10. 1 TIG Welding

10.1.1 DC TIG Welding

Set the welding process to DC TIG ( ), AC TIG ( ) or AC-DC TIG( ) with the WELDING METHOD key [1].

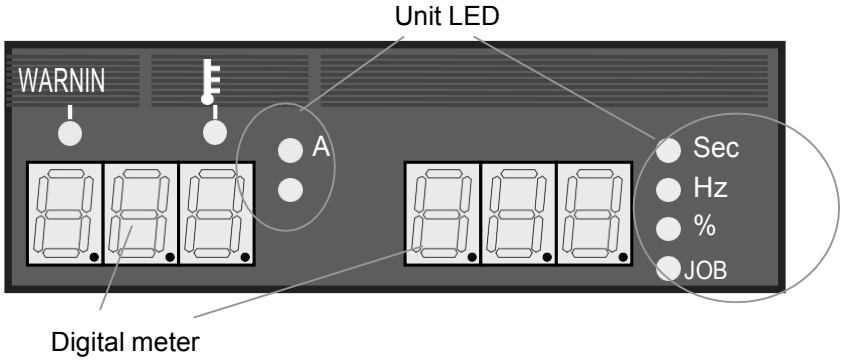
10.1.2 Parameter setting



【Part of sequence parameter setting】

10. OPERATION (continued)

The parameters listed below may be selected with the parameter selection key [3] and adjusted with the parameter adjusting knob [4]. The set value of the parameter selected appears on the digital display with the respective unit indicator LED turned ON.



【Part of Indication】

(1) Pre flow time
When the parameter “pre flow time” is selected, the set value appears on the right digital display with the unit indicator LED for “second (sec)” turned ON. In this state, the pre flow time may be adjusted in the range between 0 and 20 seconds by the use of the parameter adjusting knob [4].
For lift start mode, however, the parameter “pre flow time” may not be selected.

(2) Initial current
This parameter may be selected only if the initial current setting is “ON”. When this parameter is selected, the set value appears on the left digital display with the unit indicator LED for “ampere (A) ” turned ON. In this state, the initial current may be adjusted in the range as specified in the table shown on the following page by the use of the parameter adjusting knob [4].

(3) Upslope time
This parameter may be selected only if both initial current and slope settings are “ON”. When this parameter is selected, the set value appears on the right digital display with the unit indicator LED for “second (sec) ” turned ON. In this state, the upslope time may be adjusted in the range between 0 and 10 seconds by the use of the parameter adjusting knob [4].

(4) Pulse current
This parameter may be selected only if the pulse setting is “ON”. When this parameter is selected, the set value appears on the left digital display with the unit indicator LED for “ampere (A) ” turned ON. In this state, the pulse current may be adjusted in the range as specified in the table shown on the following page by the use of the parameter adjusting knob [4].

(5) Welding current (or Base current)
When this parameter is selected, the set value appears on the left digital display with the unit indicator LED for “ampere (A) ” turned ON. In this state, the welding current may be adjusted in the range as specified in the table shown on the following page by the use of the parameter adjusting knob [4].
If the pulse setting is “ON”, the base current may be set and adjusted in the range same as that for the welding current.

10. OPERATION (continued)

(6) Pulse frequency
This parameter may be selected only if the pulse setting is “ON”. When this parameter is selected, the set value appears on the right digital display with the unit indicator LED for “hertz (Hz) ” turned ON. In this state, the pulse frequency may be adjusted in the range between 0.1 and 500 Hz by the use of the parameter adjusting knob [4].

(7) Down slope time
This parameter may be selected only if the crater setting is “ON”, “REPEAT” or “ARC SPOT” and the slope setting is “ON”. When this parameter is selected, the set value appears on the right digital display with the unit indicator LED for “second (sec) ” turned ON. In this state, the down slope time may be adjusted in the range between 0 and 10 seconds by the use of the parameter adjusting knob [4].

(8) Crater current
This parameter may be selected only if the crater setting is “ON”, “ON (REPEAT)” or “ARC SPOT”. When this parameter is selected, the set value appears on the left digital display with the unit indicator LED for “ampere (A) ” turned ON. In this state, the crater current may be adjusted in the range as specified in the table below by the use of the parameter adjusting knob [4].

(9) Post flow time
When the parameter “post flow time” is selected, the set value appears on the right digital display with the unit indicator LED for “second (sec)” turned ON. In this state, the post flow time may be adjusted in the range between 0 and 30 seconds by the use of the parameter adjusting knob [4].
For suitable electrode diameter and post-flow time, see Section 9.4, “TIG Welding Condition”.

- Setting Current range

	Welding method	AC wave form	PoWer TIG 300 AC / DC Pulse
Output Current Setting Range	DC TIG		4A - 300A
	AC TIG AC-DC TIG	STANDARD HARD	10A - 300A
		SOFT	10A - 200A

10. OPERATION (continued)

10.1.3 AC TIG Welding

The AC TIG welding process is such that the polarity of electrode plus (+) from which cleaning action is obtained and that of electrode minus (-) in which electrode consumption is small are inverted alternately to take advantage of the feature of both polarities. This type of welding is suitable mainly for aluminum welding.

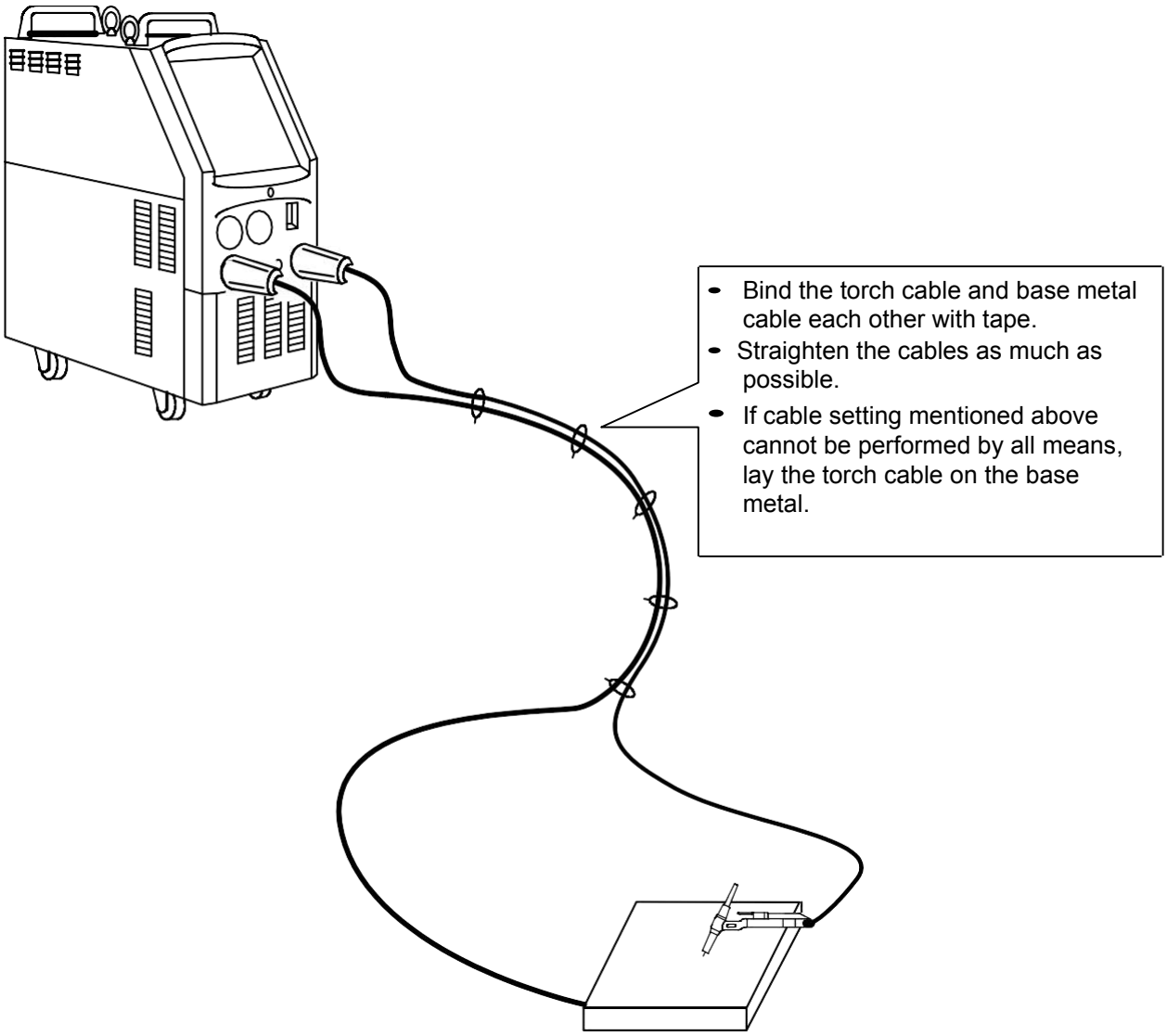
10.1.4 AC-DC TIG Welding

The AC-DC TIG welding process is such that the alternating current period during which cleaning action is obtained and the direct current period during which deep penetration is obtained are outputted alternately in a cyclical manner. This type of welding is suitable mainly for automatic welding of aluminium.

10.1.5 Notice of using AC TIG mode

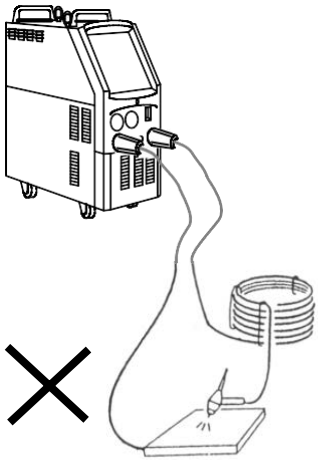
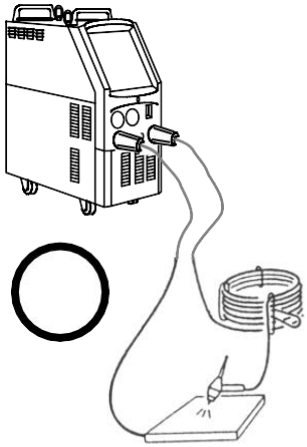
When using AC TIG mode, observe the followings not to damage the welding power source

1. Use proper extension cable and use as short cable as possible.
2. When using the extension cable, refer to following figure.

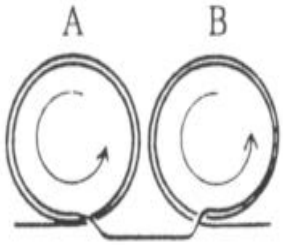
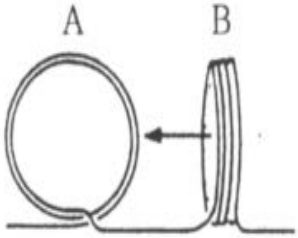
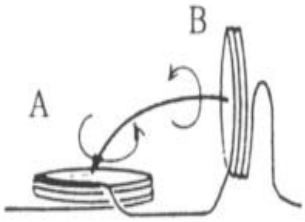


10. OPERATION (continued)

3. If too long torch side cable is used reluctantly, wind it according to following figure of "Good example".

Bad example	Good example
- Do not wind the excess part of cable in the same direction. 	- Refer to the figure below "winding method of excess cable", and make two windings in opposite direction each other and pile up one on another. 

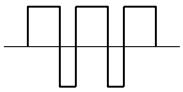
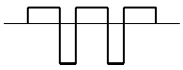
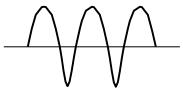
Winding method of excess cable

	1	2	3
Top view			
Side view			
Explanation	Separate the excess cable into A and B. Wind it respectively as followings. ・Same winding direction. ・Same turns of winding. - Same diameter of Windings.	Place B over A in the opposite direction.	After placing B over A, bind the winding cable not to be loose.

10. OPERATION (continued)

10.1.6 AC Waveform

In the case of AC TIG and AC-DC TIG welding, the following three output current waveforms can be selected with the AC waveform selection key (Ⓒ). Use these current waveforms while taking advantage of the respective features.
Also, the AC frequency and cleaning width are stored in memory for each AC waveform.

Mode	Output current wave-form		Characteristic
STANDARD		Rectangular pulse wave-form which peak value of straight and reverse polarity current are equal.	Welding operation can be carried out in a wide range from thin to thick plates. Also, since stable welding operation can be performed in the whole current area, this waveform can be utilized most generally.
HARD		Rectangular pulse wave-form which peak value of straight polarity current is different from reverse polarity current.	Such centralized arc as in DC TIG welding is obtained. This waveform is effective for fillet welding of a thin plate and for the 1st layer of bevel or the like. Among these three modes, electrode consumption is the smallest in this mode, but an arc sound becomes larger.
SOFT		Sine wave-form which peak values of straight and reverse polarity current are equal.	Soft arc is obtained. This mode is effective for thin plate butt welding, etc. Also, the arc sound level is low. Maximum welding current is 200A.

* CAUTION
If the welding current exceeds 200A in the hard mode, the bead width is larger than the cleaning width, thus ceasing to place a favorable bead. Accordingly, the hard mode is suitable for the case when the welding current is smaller than 200A.

10.1.7 AC Frequency

When the initial conditions, main conditions or crater filler conditions are being selected, press the AC frequency setup key (⑥), and the LED in the left upper part lights up, the set point is displayed on the right-side digital meter, then the “Hz” LED lights up. On the left-side digital meter, the standard value is flashing on the display. In this condition, it is possible to set up the AC frequency in AC TIG and AC-DC TIG welding, using the parameter adjusting knob (④). The setup range is 50Hz to 200Hz.
By pressing the AC frequency setup key again or the parameter selection key (Ⓒ), the system display screen returns to the parameter item in which the parameter was adjusted to the value of one step ago.
If the AC frequency is made high, the arc concentration will increase and if it is lowered, the arc spread is on the increase. Also, even when AC frequency is changed, the depth of penetration remains unchanged – constant.
In the condition that the AC waveform is “Standard” and “Soft”, the standard value for AC frequency is 70Hz, while the standard value becomes 100Hz in “Hard”.

10. OPERATION (continued)

10.1.8 Cleaning Width Setup ( )

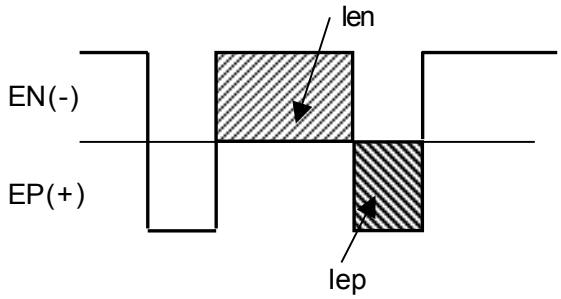
By pressing the AC BALANCE key (Ⓒ) when the initial conditions, main conditions or crater filler conditions are being selected, the left-upper LED lights up and the set point is displayed on the right-side digital meter. (At this time, all unit LEDs are going out.) In this condition, it is possible to set up the intensity of arc cleaning action indispensable to AC TIG welding of aluminium or the like with the parameter adjusting knob (④). The setup range is 0 to ±20.
By pressing the AC BALANCE key again or parameter selection key (Ⓒ), the parameter item in which the parameter was adjusted to the value of one step ago is selected.

For the cleaning width set point, with “0” as standard, the cleaning width becomes small in the minus direction, whose set point is “-20” max., and in the plus direction, the cleaning width becomes large, whose set point is “20” max.

The relationship between the cleaning width setup and welded results & electrode consumption extent or degree is as shown in the table below.

Minus Direction	Cleaning Width Setup	Plus Direction
Small	Cleaning width	Large
Deep	Penetration	Shallow
Less	Electrode consumption	Much
Low	EP ratio	High

“EN” refers to the period in which the base metal is positive in polarity (+) and the torch is negative in polarity (-), and “EP” refers to the period in which the base metal is negative in polarity (-) and the torch is positive in polarity (+).



The EP ratio is such that the current ratio of EP polarity at one cycle of alternating current is expressed in “percent”, which is defined by the following equation:

$$\text{EP ratio} = \frac{I_{ep}}{} \times 100\%$$

By adjusting this cleaning width, the EP ratio changes by 1% in relation to the manipulated variable “1”. The EP ratio standard value (when the center position is “0”) differs among AC waveforms, and the maximum and minimum values that can be set up as EP ratio also differ. The value indicated on the digital meter can also be used as EP ratio in cleaning width setup. For details, see “10.1.17 – Internal Function”.

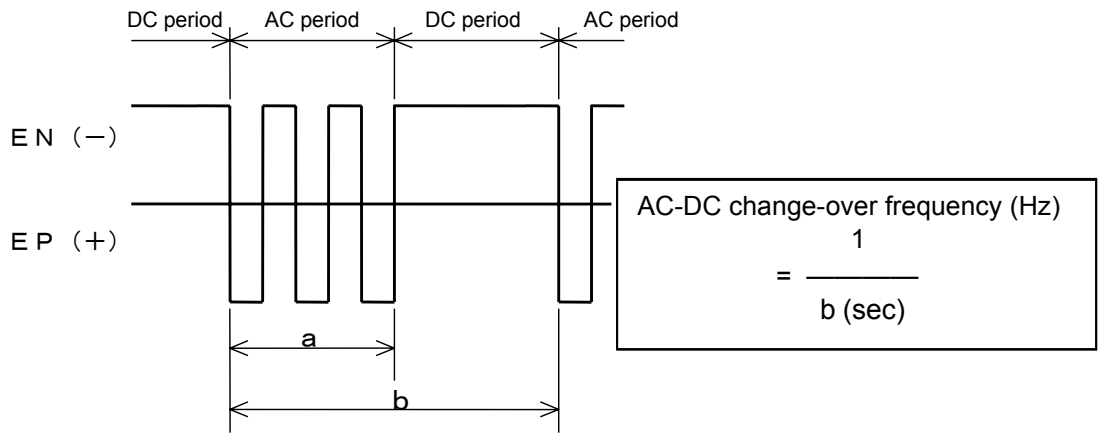
The AC waveform, standard EP ratio and settable maximum and minimum values are as shown in the table below.

AC Wave form	Standard Value	Maximum Value	Minimum Value
STANDARD	30%	50%	10%
SOFT	30%	50%	10%
HARD	20%	30%	5%

10. OPERATION (continued)

10.1.9 AC-DC Change-over Frequency Setup (f)

When the initial conditions, main conditions or crater filler conditions are being selected, press the AC-DC change-over frequency setup key (⑧), and the LED in the left upper part lights up, the set point is displayed on the right-side digital meter, then the “Hz” LED lights up. In this condition, it is possible to set up the AC-DC change-over frequency in AC-DC TIG welding, using the parameter adjusting knob (④). The setup range is 0.1Hz to 50Hz.
By pressing the AC-DC change-over frequency setup key again or the parameter selection key (Ⓒ), the system display screen returns to the parameter item in which the parameter was adjusted to the value of one step ago.



The relationship between AC-DC change-over frequency setup and filler wire insertion interval is as shown in the table below.

When frequency is low	AC−DC Change−over Frequency Setup	When this frequency is high
The insertion interval is long.	Filler wire insertion interval	The insertion interval is short.
The ripple spacing becomes wide.	Bead ripple	The ripple spacing becomes narrow.
For low-speed welding	Welding speed	For high−speed welding

(1) Manual insertion
In case where the AC-DC change-over frequency is 0.5Hz to 2Hz, insert a filler wire in synchronism with AC period. Since the arc sound becomes large during AC period and it becomes small during DC period, insert this filler wire with changes in arc sound as a guide.

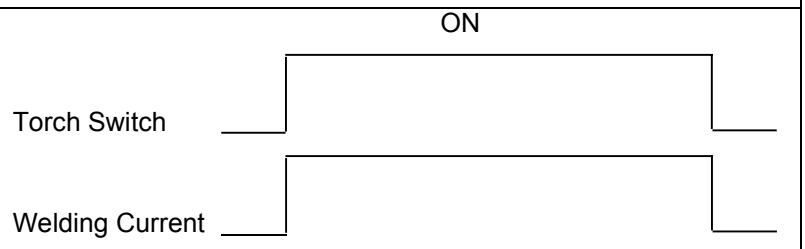
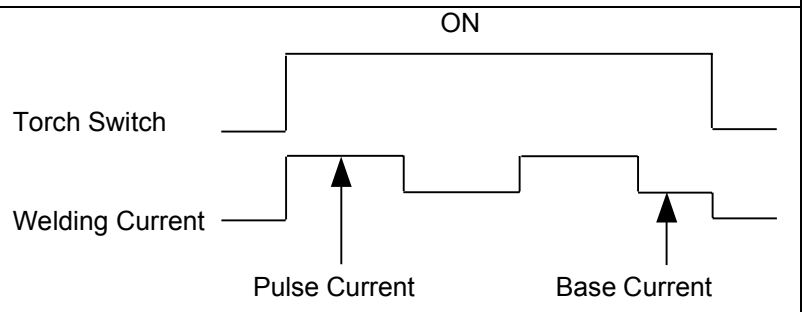
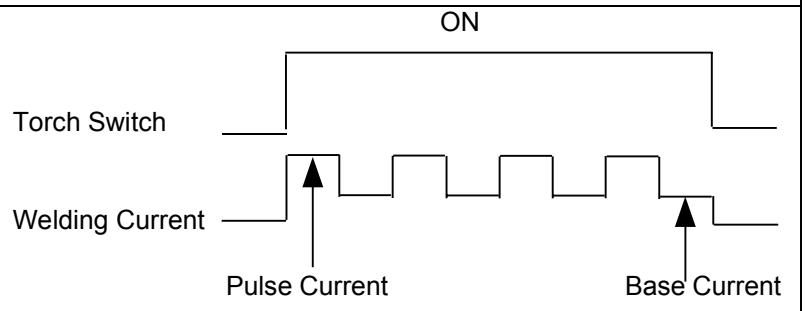
(2) Automatic insertion
In case where a filler wire is inserted automatically, set it so that it is fed intermittently in synchronism with the AC period.
The standard AC ratio is 70%. The AC ratio is such that the rate of AC period to one cycle of AC-DC is represented in “%”, which is defined by:
AC ratio (%) = a/b × 100
Also, this AC ratio can be changed by using the internal function. For details, refer to “10.1.17: Internal Function”.

10. OPERATION (continued)

10.1.10 Pulse setting (⎍)

Pulsing is a technique to cyclically vary the welding current for stabilized arcing, controlled penetration geometry and/or controlled heat input, where arcing may be rigidified during high current period for improved stability, and penetration geometry and heat input may be controlled with the high/low current period ratio varied.

Pulse setting “ON” and “OFF” may be selected with the PULSE selection key [12]. The LED located on the upper left corner of the selection key indicates the status of pulse setting “ON” and “OFF” when it is turned ON and OFF respectively. If the pulse setting is “ON, the parameters “pulse current” and “pulse frequency” may be selected with the parameter selection key [3]. And the welding current becomes the base current.
Further, in case where the welding process used is “AC-DC TIG”, no pulse selection key can be selected.

	Subject	Timinng Chart
Pulse OFF	- Tack welding - Repeat of short welding - Thin plate welding	
Pulse ON Low Pulse frequency (0.1Hz - 15Hz)	- Preventing bead hanging down in URANAMI welding or in fillet welding in vertical position.	
Pulse ON High Pulse frequency (15Hz - 500Hz)	- Thin plate welding	

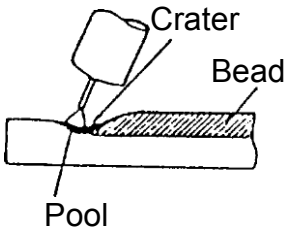
The standard pulse peak ratio is 50%, which may be adjusted with the internal function. Furthermore, in the case of DC TIG welding, the internal function also makes changing to a soft pulse possible.
See Section 10.1.17, “Internal Functions” for further details.

10. OPERATION (continued)

10.1.11 Slope setting

Slope setting “ON” and “OFF” may be selected with the SLOPE selection key [14] if the crater setting is “ON”, “REPEAT” or “arc spot”. The LED located on the upper left corner of the selection key indicates the status of slope setting “ON” and “OFF” when it is turned ON and OFF respectively. If the slope setting is “ON, the parameters “upslope time (only if the initial current setting is ON) ” and “down slope time” may be selected with the parameter selection key [3]. But if the crater setting is “OFF”, no selection may be made with the SLOPE selection key.

10.1.12 Crater setting



At the end of welding, there remains a dent called “crater”. This dent that might cause cracking or other welding defects must be minimized in size; this operation is called as “crater filler”.

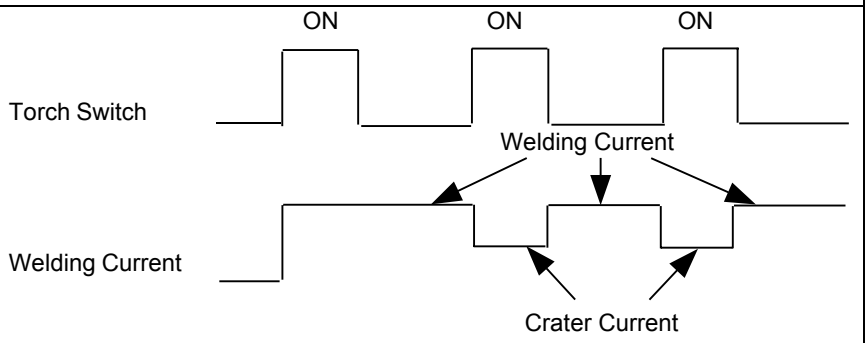
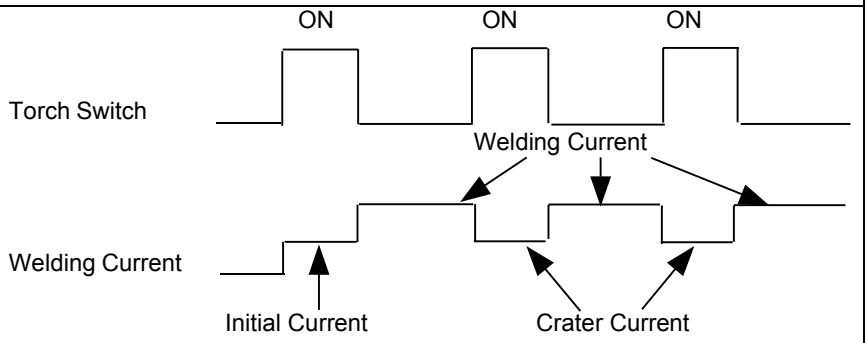
Depressing the CRATER FILL. key [5], the crater setting is selected in the sequence as shown below:

→ Crater OFF → Crater ON → Crater ON (REPEAT) → ARC SPOT

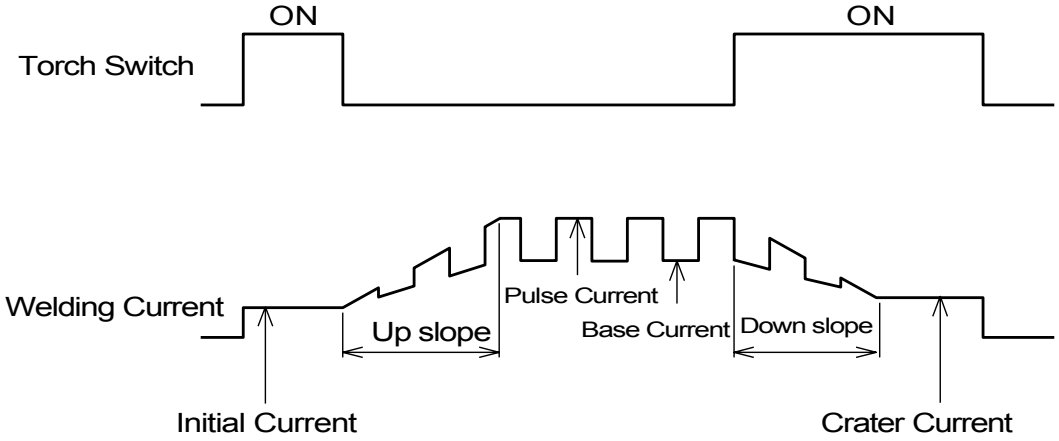
For crater-fill operation, select the setting “Crater ON” or “Crater on (REPEAT)”.

Crater	InitialCurrent	Timinnig Chart
OFF		ON Torch Switch Welding Current • The torch switch hold turned ON during weld.
ON	OFF	ON ON Torch Switch Welding Current Welding Current Crater Current
	ON	ON ON Torch Switch Welding Current Initial Current Crater Current Welding Current
	• When the torch switch is turned OFF during welding, the welding current is designed to be self-held. The torch switch must be held turned ON during initial current and crater-fill operation.	

10. OPERATION (continued)

Crater	Initial Current	Timinnig Chart
ON (REPEAT)	OFF	
	ON	
		● Even if the torch switch is turned OFF during welding, the welding current will be self-held. When the torch switch is turned ON again, it is switched to crater-fill current. During crater-fill operation, the torch switch must be held turned ON. If the torch switch is turned OFF during crater-fill operation, it is switched back to welding current again. Those switching operation will be repeated cyclically. It is therefore needed to perform it with the torch lifted up to turn OFF arcing. ● In addition to turning OFF arcing with the torch lifted, it is also possible to turn OFF arcing with the torch switch held depressed for a longer time during repetition. See Section 10.1.17, “Internal functions” for further details.

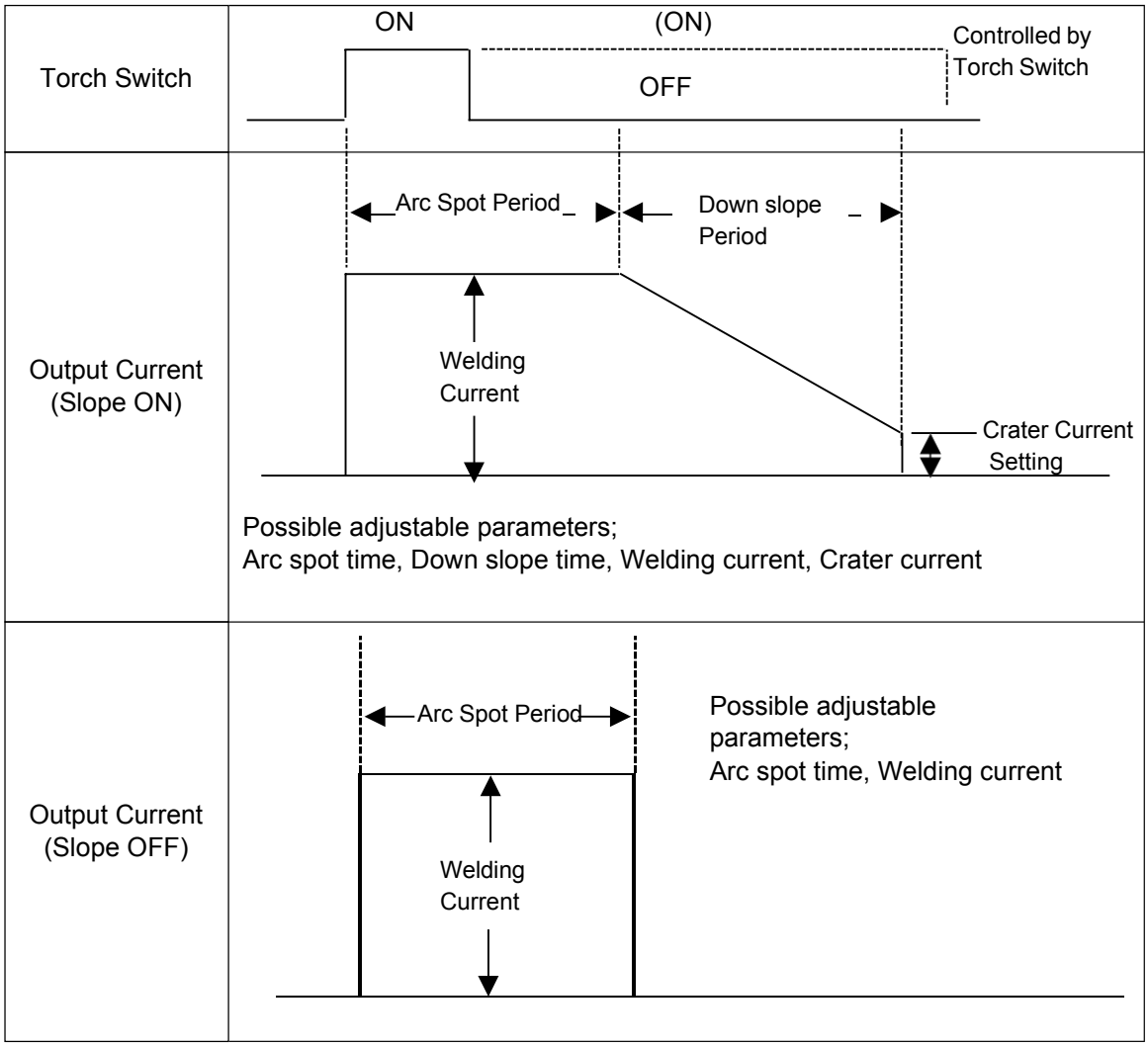
● Welding with various functions combined
With crater-fill, pulsing, and slope functions combined, it is possible to perform welding as shown below:



10. OPERATION (continued)

10.1.13 ARC SPOT setting (t..)

For arc spot processing, set the CRATER FILL. key [5] to ARC SPOT. Then, upon depression of the Arc SPOT TIME key [5], the indicator LED located on the upper left corner of the setting key turns ON and the set value appears on the right digital display with the unit indicator LED for “second (sec)” turned ON. In this state, the arc spot time may be adjusted in the range between 0.1 and 10 seconds by the use of the parameter adjusting knob [4].
Depression of the arc spot time setter key or the parameter selection key [3] will bring you back to the previous parameter setting stage last adjusted.
In the modes other than arc spot, the arc spot time key may not be selected.



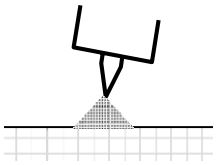
- The current once provided with the torch switch turned ON will be held supplied during arc spot period (including down slope period if the slope setting is ON) even if the torch switch is turned OFF.
- For arc spot process, it is possible to turn OFF arcing even during arc spot period if the torch switch is turned OFF.
  See Section 10.1.17, “Internal functions” for further details.

10. OPERATION (continued)

10.1.14 START setting (Lift start or High frequency start)

Start mode may be selected with LIFT START key [13]. Start mode may be indicated with the indicator LED on the upper left of the mode selection key that turns ON or OFF for “Lift start” or “High frequency start” respectively.

(1) High frequency start



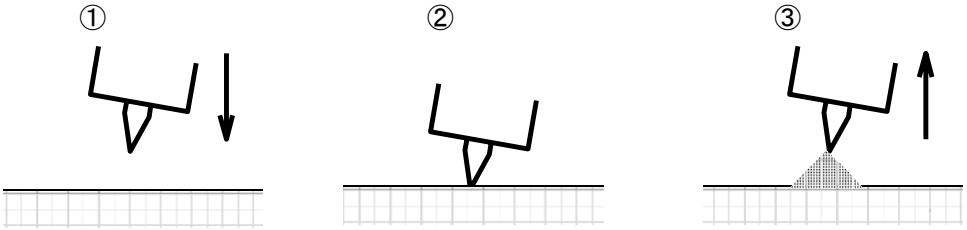
Ⓒ Depress torch switch with electrode separated from base metal.

Ⓒ Arc is generated between electrode and base metal by means of a high frequency spark.

In the event that arcing does not start within approx. 5 seconds after high frequency is generated, the high frequency and output voltage generation automatically stops. If high frequency generation stops in such way, the torch switch must be turned OFF and then it should be depressed again.
If such problem remains unsolved,
- check if the cable and the torch are properly connected, and/or
- if the electrode tip has any irregularities.

(2) Lift start

This is a method to start an arc generation by supplying current to a circuit formed with an electrode and a base metal contacted and separating the electrode from the base metal. Neither high frequency nor high voltage is generated at the start, and no electromagnetic interference is caused.



1) Depress torch switch with electrode not contacted with base metal.
2) Bring electrode in touch with base metal.
It is also possible to depress torch switch with electrode touched with base metal.
3) Draw the electrode apart from the base metal to generate arc.

Notes:

1) Even if torch switch is depressed with electrode not contacted with base metal, no-load voltage is not applied (though gas is released).

2) Frequent arc starts may cause electrode surface to be stained (whitened), due to which smooth arc start may be prevented. In such events, regrind the electrode.

3) Nonexistence of pre flow period allows immediate arc start when electrode is drawn apart from base metal. But if any defects were caused to an area to start welding, adjust the time between touching and separation of electrode and base metal as needed to provide suitable pre flow period so that the electrode and the parts to be welded may be isolated from ambient air with argon.

10. OPERATION (continued)

10.1.15 Gas check ( ) with gas-saving function.

Used to adjust gas flow rate when the gas cylinder discharge valve is opened. When the GAS CHECK key [16] is depressed once, the gas is discharged with the indicator LED on the upper left corner of the key turned ON. When this key is depressed once again, the gas discharge will discontinue with the indicator LED turned OFF.

And this is also designed to automatically stop gas discharge in two minutes after the GAS CHECK key is depressed. If the welding started during gas check period, the gas flow is to be automatically prevented when the welding is finished (after the end of post-flow period), and it is unlikely to occur that the gas continues to flow out during down period.

10.1.16 Cooling torch selection ( )

With TORCH change-over key [15], set the cooling mode for the torch to be used. The LED on the upper left of the key indicates the status of cooling mode selected, [water-cooled] or [air-cooled] when it is turned ON or OFF respectively.

If cooling water is not supplied or the water pressure is lower than specified, an error will be issued.

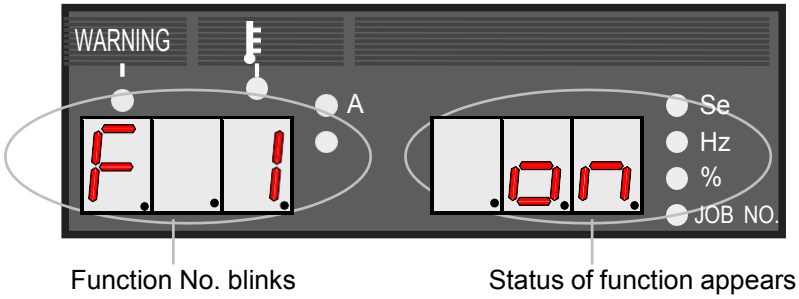
10. OPERATION (continued)

10.1.17 Internal Functions

This welding machine has various special functions that may be used by setting with F-key (Function selection key) [10].

• How to use internal functions

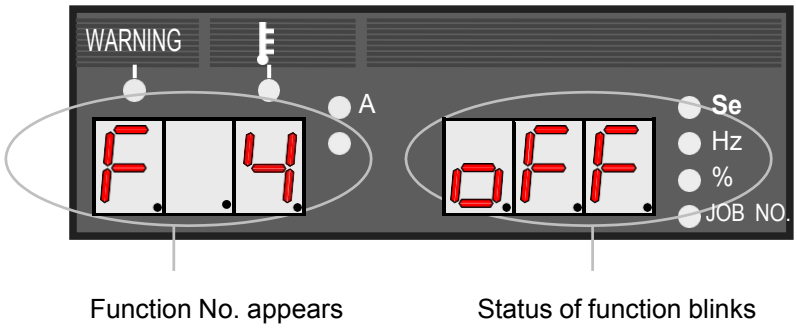
Ⓒ When Function selection key [10] is depressed, the function No. starts blinking on the left display described below and the status assigned to that function No. appears on the right display. In this state, the function No. desired may be set with the parameter adjusting knob [4].



It is possible function No. is changed by parameter adjusting knob [4].

※The example given above shows that the function [F1] is set to [ON].

Ⓒ When Function selection key [10] is depressed while the desired function No. appears on the display, the function No. will light up while its status indication will start blinking. In this state, the desired status can be selected with the parameter adjusting knob [4].



It is possible function No. is changed by parameter adjusting knob [4].

The example given above shows that the function [F4] is set to [OFF].

Ⓒ When Function selection key [10] is depressed again, the displays will go back to the state as shown above in Ⓒ while the function No. will stop blinking. To exit this function setting mode, hold Function selection key [10] depressed for a longer time.

Note:

When the function settings are changed in this mode by selecting with the parameter adjusting knob [4], they become effective immediately at once (without asking you to confirm). Therefore, it is needed to carefully check, before exiting this mode, if the status is properly assigned to those functions as desired.

10. OPERATION (continued)

The following functions can be adjusted by F selection key [10].
*Some parameters of F (function) can be memorized for each condition No. of the feeding condition memory function, and others apply to all feeding conditions (The parameter cannot be memorized for each condition No.). O or X is described to the right end of each parameter item of F function to show which is applicable to the parameter.

O: The parameter can be set for each feeding condition.
X: The parameter is common to all feeding conditions.

(1) Selecting start current level: Function No. 1 ---- X

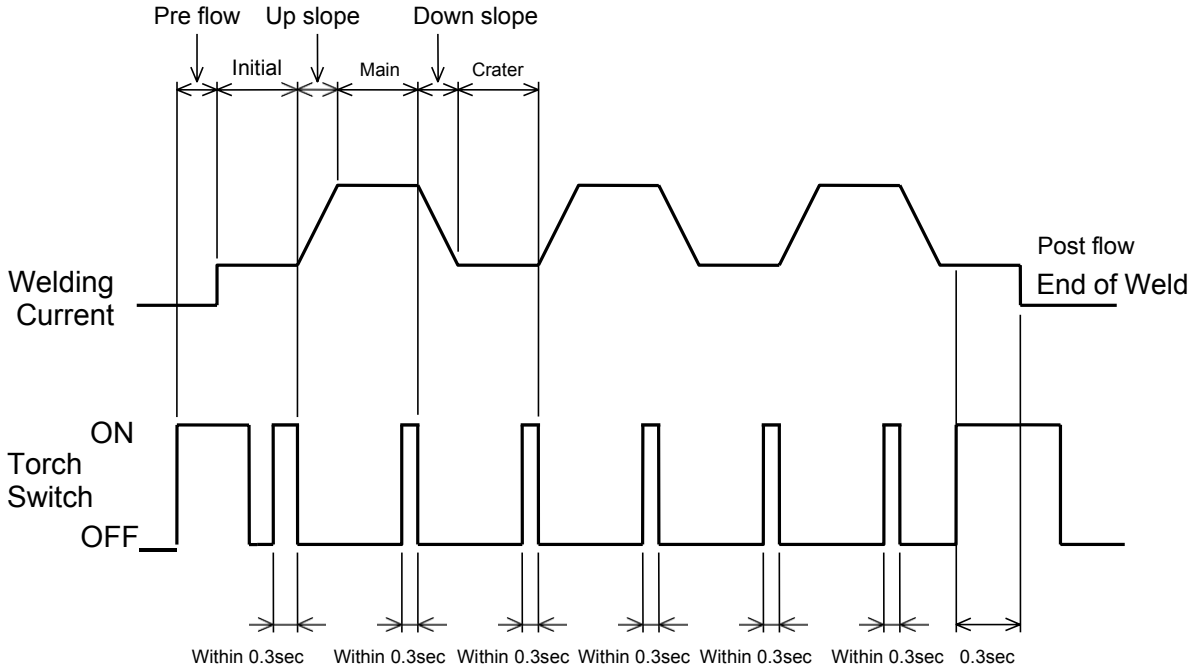
The factory setting of this function is [ON] that means [high] start current. If any holes are caused at the start of welding, the [low] start current should be selected by setting the status of Function No. 1 to [OFF].

(2) Changing sequence in arc spot mode: Function No. 2 ---------- X

It is possible to change the operation sequence so that arcing may discontinue even during arc spot process if the torch switch is turned OFF in “ARC SPOT” mode. To change the sequence in such way, the status of Function No. 2 should be set to [ON].
If this function status is set to [ON], the torch switch must be kept turned ON during arc spot process.

(3) Changing sequence in crater ON (REPEAT) mode: Function No. 3 ---------- X

It is possible to change the operation sequence so that the following welding operation may be performed by momentarily (within 0.3 sec) depressing torch switch in “crater ON (REPEAT)” mode. With torch switch undepressed, the level is self-held during initial current and crater current periods as well as welding current period. To terminate the welding, depress torch switch for longer time (not shorter than 0.3 sec). To change the sequence in such way, the status of Function No. 3 should be set to [ON].



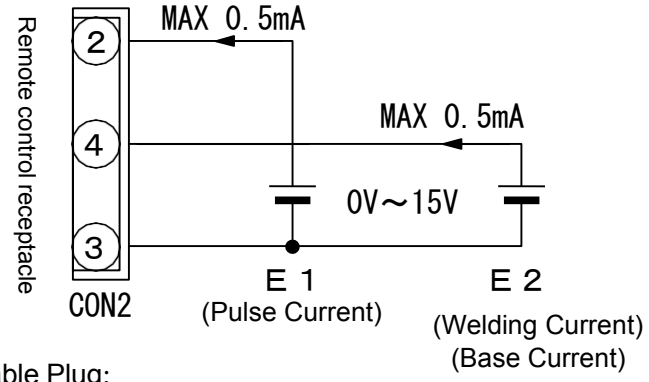
10. OPERATION (continued)

(4) Selecting AUTO or MANUAL mode: Function No. 4
X
Selecting AUTO mode allows operation stop to be cancelled with operation stop terminal short-circuited. In addition, select AUTO mode to utilize external voltage supply to feed welding current (base current) or pulse current for the operation combined with robot etc..
The factory setting of this function is “MANUAL” and the operation stop is only cancelled by turning power supply switch to OFF and then to ON.
To select [AUTO] mode, the status of Function No. 4 should be set to “ON”.

Note:

- **The set values on the front panel are effective even though external voltage supply is connected to the remote-control receptacle with [MANUAL] mode selected.**
- **When the analog remote control is connected, the set values on the remote control have the highest priority regardless of AUTO or MANUAL mode.**
- **To use Function No. 5 or No.6, [AUTO] mode must be selected.**

- To set the current and the voltage by the use of external power supplies, they must be connected as shown below. If the pulse setting is “OFF”, only the power supply E2 should be used.



Available Plug;

Spec	DPC25-4A
Part No.	4730-005

PROHIBITION

- **Supply 0V to 15V to E1 and E2. Exceeding 15V may result in damage to the control circuit of the welding power source.**

CAUTION

- **Be sure to finish setting and inputting before 100 milliseconds when starting signal is input. Inputting after starting signal is input or at starting signal may result in unstable start.**

10. OPERATION (continued)

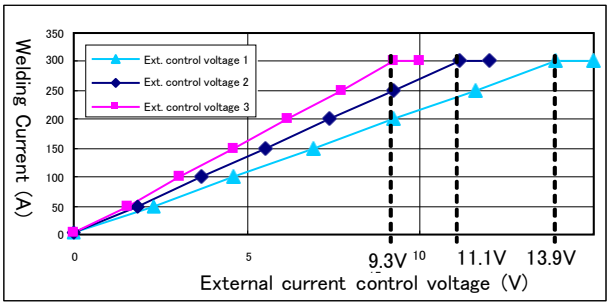
(5) External voltage (0-12V) control: Function No. 5 ---- X

When used in AUTO mode combined with INVERTER ARGO, selecting [ON] status for this function allows to use the machine with almost same conditions by slightly adjusting external control voltage (pulse current and welding current or base current).
As the factory setting of this function is [OFF], select the status [ON] for Function No. 5 to activate this function.

(6) External voltage (0-10V) control: Function No. 6 ---- X

When used in combination with robot whose maximum control voltage is 10 volts or less, this function should be utilized.
As the factory setting of this function is [OFF], select the status [ON] for Function No. 6 to activate this function.
If the status of Function No. 6 is set to [ON], the status of Function No. 5 will be automatically set to [OFF].

- The following chart shows the relationship between external current control voltage and output current.



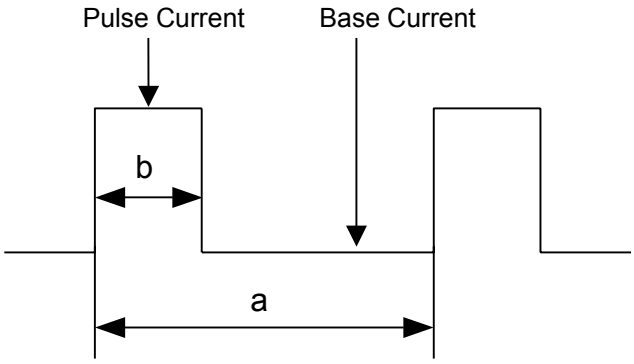
< Ext. control voltage 1 (factory setting) >
External control range is 0V(min.)-15V(max.).

< Ext. control voltage 2 (function No.5 is ON) >
External control range is 0V(min.)-12V(max.).

< Ext. control voltage 3 (function No.6 is ON) >
External control range is 0V(min.)-10V(max.).

(7) Pulse peak ratio adjustment: Function No. 7 ---------- O

The factory setting is 50%, which may be adjusted by selecting Function No. 7. When selected, the set value appears on the left digital display with the unit indicator LED for “%” turned ON.
Pulse peak ratio can be adjusted in the range between 5% and 95%.



Pulse peak ratio is defined as the percentage of pulse current period in a cycle as follows.

$$\text{Pulse peak ratio} = \frac{a}{b} \times 100\%$$

10. OPERATION (continued)

(8) Result display holding time setup: Function No. “9” ----------X
After completion of welding, the mean value of output current during last 1-second period is displayed by flashing for approx. 20 seconds, but this time can be set up with Function No. “9”. The setup range is 0 to 60 seconds.

(9) AC Ratio Adjustment: Function No. “10” ----
O
The AC ratio is factory preset to 70% before shipment. The adjustment of AC ratio can be set up with Function No. “10”. At this time, the set point is indicated on the left-side digital meter, and the “%” LED lights up.
The AC ratio is set up in the range from 10% to 90%.

(10) Operating sound switching: Function No. “11” ---------- X
By turning Function No. “11” OFF, the operating sound or noise arising when the panel key is manipulated can be arrested. However, no operating sound volume can be controlled.

(11) External output terminal 1 switching: Function No. “12”---------- X
External output terminal 2 switching: Function No. “13” ----
X
The assignment of external output terminal 1 and that of external output terminal 2 can be changed with Function No. “12” and Function No. “13” respectively.

The relationship between the function to be assigned and the number to be set up is as described in the table below:

Setup No.	Description	Function
1	Power source preparations	This function works for use in power source preparation relay.
		The operation is carried out when no abnormality is present, such as open phase, operation stop and temperature error, and the power switch is “ON”.
		Function No. “12” is factory set before shipment.
2	Pulse synchronizing output	When the pulse is “ON”, the section across terminals is closed during pulse duration.
		Function No. “13” is factory set before shipment.
3	EN synchronizing output	In AC TIG welding, the circuit is closed between terminals during EN period (the electrode is minus).
4	AC synchronizing output	In AC-DC TIG welding, the circuit is closed between terminals during AC period.

(12) Pulse synchronizing input signal switching: Function No. “14” – x
By turning Function No. 14 “ON”, the pulse current and base current can be changed over by inputting external signals into the pulse synchronizing input terminal. At this time, the panel pulse must be set to “ON”. Also, the panel pulse frequency setting becomes impossible.
Closed circuiting across terminals produces pulse current and open circuit produces base current.

* CAUTION

Even when the pulse synchronizing input terminal is closed during initial current and crater current period, no pulse output is produced. Only when the input signal level was held at least 2 ms, the status can be switched.

(13) Cleaning width display change-over: Function No. “15” – x
By turning Function No. 15 “ON”, the value indicated on the digital meter can be used as EP ratio in cleaning width setup, and the “%” LED is also lit on the unit LED. Further, on the left-side digital meter, the standard value is displayed by flashing.

10. OPERATION (continued)

(14) Soft pulse: Function No. “16” – x

By turning Function No. 16 “ON”, it is possible to change pulse welding to “soft pulse” in case where the pulse is “ON” in DC TIG welding. In soft pulse, current is changed smoothly, and soft arc is produced, compared with “standard” pulse, thereby reducing a welding sound. This soft pulse is suitable for thin plate welding since it is hard to burn through or melt down, compared with “standard” pulse at the same average current.

In case where a soft pulse is used, it is recommended that the pulse frequency should be set at 10Hz or more and the pulse width should be set at 40% to 60%.

(15) Current adjustment by torch switch: Function No. “17” – x

By turning Function No. 17 “ON”, the output current can be changed by the current change amount set up in advance by torch switch clicking operation only during the self-holding period in the “Crater-ON” or “Crater-ON (Repeat)” mode.

Function No. “18”: The current change amount is set up by single clicking.

Function No. “19”: The current change amount is set up by double clicking.

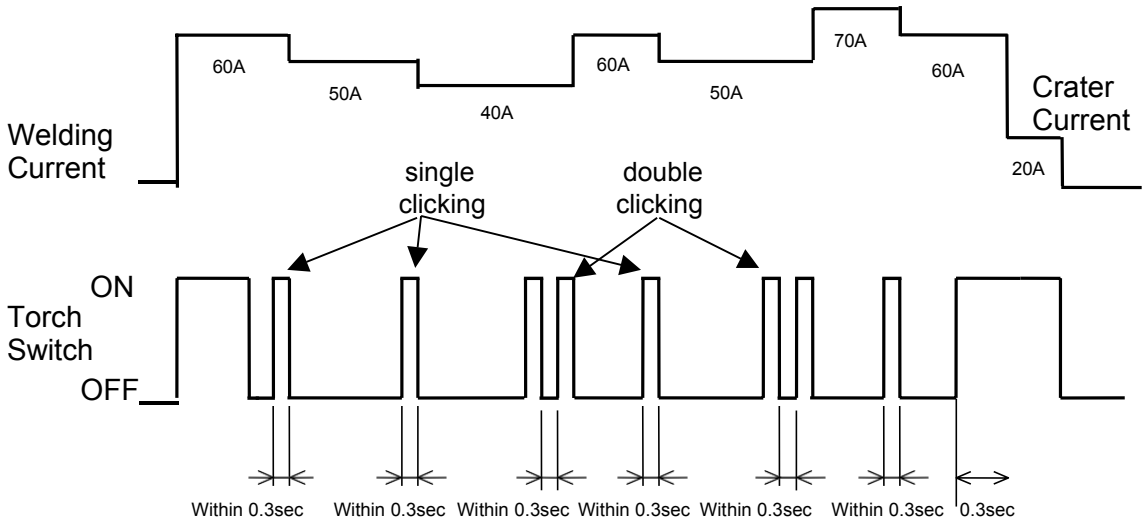
The current change amount setup range is –50A to +50A.

(Example)

Crater-ON, no initial current, welding current 60A and crater current 20A

F18: -10A

F19: 20A



<Precautions>

1) If this function is set to “Effective” (ON), the function of F3 becomes invalid (OFF) automatically, while this function becomes invalid (OFF) automatically by validating “F3” (ON).
2) It is necessary to press the switch for as long as 0.3 second or more during transfer to crater at startup.
3) In case where the operation is transferred from crater to the main welding in the “Crater-ON” (Repeat) mode, the operation starts with the welding current outputted before transferring to the crater.

10. OPERATION (continued)

(16) Current offset adjustment: Function No. “20” – x
If a welding cable is made long in case for AC TIG welding in point of welding current characteristics, the actual average welding current (value indicated on the ammeter) becomes smaller than the set current, and as the welding current is larger, its difference becomes larger. In such a case, the difference between the set current and actual average welding current can be made smaller by regulating welding current with Function No. “20”. This function is effective if used when no actual current reaches 300A, for example in case where the welding cable was extended. This function also works in the case of DC TIG or DC manual welding.
The setup range is 0 to 30. If the set point is incremented by 1, as a standard, the average welding current increases by approx. 1A. Also, the set adjustment amount is constantly added in all current ranges.

10.1. 18 Analog remote control (K5048B) (optional accessory)
When the power switch was turned ON, the analog remote control is automatically recognized. When the analog remote control is connected to the machine, the only remote control is effective and the parameters “welding current (base current)” and/or “pulse current” selected on the front panel may not be adjusted by the parameter adjusting knob [4] on the front panel. They must be adjusted on the analog remote control that is connected to the machine. Those set values may be monitored on the digital display on the front panel.
When take off the remote control, setting figure disappear.

* Insert and withdraw the remote control always after turning the power switch “OFF”.

10. OPERATION (continued)

⚠ CAUTION
For electrode stick, follow the instruction below.
● **Keep the electrode stick in a place with low humidity.** ● **Dry the electrode stick sufficiently before using.** ● **When the gas burner is used for pre-heating or removing moisture of the base metal, be sureto heat to 100˚C or above.** ● **Slag and fume generated when tack welding will cause wetting the part of base metal to be welded. Remove slag and fume immediately after tack welding.** ● **When welding is performed outdoors and wind velocity exceeds 10ft/sec, use a wind shield.**

10.2 DC STICK welding

10.2.1 DC STICK welding

Set the welding process to DC STICK welding ( ) with the WELDING METHOD key [1].

The welding current setting mode is automatically selected and setting value is indicated on the left digital display with the unit indicator LED for amperage “A” turned ON.
When switched to DC STICK welding, or when turn on the switch with DC STICK welding is selected, no-load voltage is not provided for approx. 5 seconds for safety. 5 seconds later, the voltage is automatically provided.

10.2.2 Welding current setting

The welding current may be set with the parameter adjusting knob [4] in the range specified in the table shown below:
Current range is 10A-250A.

10.2.3 Internal function setting

The function listed below may be adjusted with Function selection key [10]. See Subsection 10.1.17 for internal function setting.

(1) Hazard reducing function: Function No. 8

This is a safety function that reduces risks of an electric shock by limiting no-load voltage of welder to lower level at any time except welding period.
It is therefore recommended to utilize this function when the machine is used at high site or in confined environment.
The factory setting of this function is [OFF]. To activate this function, set Function No. 8 to [ON].

10.2.4 Analog remote control (K5048B)

This machine automatically recognizes the analog remote control. When the analog remote control is connected to the machine, the only remote control is effective and the parameters “welding current (base current)” and/or “pulse current” selected on the front panel may not be adjusted by the parameter adjusting knob [4] on the front panel. They must be adjusted on the analog remote control that is connected to the machine. Those set values may be monitored on the digital display on the front panel.
When take off the remote control, setting figure disappear.

10. OPERATION (continued)

10.3 Information common to all models

10.3.1 Indication on digital display

Digital displays are designed to indicate the items listed below:

(1) Parameter set values

In the Set Value Indication mode during down period (except result indication period immediately after welding process) and during welding period, the parameter set value under adjustment is indicated.

(2) Output current at welding

During welding period, the indication of parameter set value on the digital display is automatically switched to the indication of average output current which is updated every 0.5 seconds to reflect the latest output condition. Its indication accuracy corresponds to Class 2.5 which is equivalent to that of common analog current meter.

If it is required to change each parameter setting with its set value monitored during welding, depress the parameter selection key [3] to change the indication mode into the “Set Value Indication” mode where the parameter indicator LED starts blinking. If no action is applied for 5 seconds more or less, or when a selectable parameter is back where it started, the indication mode automatically returns to the “Average Indication” mode.

When the torch switch is depressed, the sequence parameter indicator LEDs will turn ON sequentially in response to the welding process in operation. When switched to the “Set Value Indication” mode, the indicator LED of sequence parameter selected with the parameter selection key [3] will start blinking.

The average display of the output current is possible adjust offset in the range of ±10A by Function No.10. Adjustment quantity is added(subtracted) at the all current range. For this adjustment, gain adjustment which is change adjust amount is not possible.

See Section 10.3.2, “Adjustor Knob” for the parameters that may be adjusted during welding with the parameter adjusting knob [4].

(3) Result after the end of welding

When the welding is finished, the average output current for the last 1 second is indicated for approx. 20 seconds by blinking (with no consideration given to the output conditions for crater filler process). This indication may be used for a welding personnel to check the conditions on which the welding has been completed and to adjust the conditions for better result. This indication will disappear in 20 seconds or when the next welding starts or any key on the front panel is depressed.

The indication period may be adjusted in the range between 0 and 60 seconds by selecting Function No. 9 with Function selection key [10] where the set value will be indicated on the left digital display with the unit indicator LED for “second (sec)” turned ON.

(4) Errors

Any error caused to the machine will be indicated with blinking numeral assigned to each error type. See Section 11.1, “How to Solve an Error” for further details including error numbers.

Notes:

The mean value of output displayed on the digital meter is processed with software, which cannot be guaranteed as measuring instrument management data. (Indication accuracy: Class 2.5 or its equivalent)

10. OPERATION (continued)

10.3.2 Adjustor knob

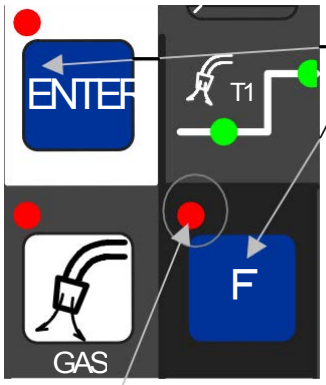
To adjust parameters with adjustor knob [4] during welding, depress the parameter selection key [3] to change the mode into the Set Value Indication mode. The initial conditions, main conditions and crater filler conditions become changeable during initial current, main welding and crater, respectively.

During welding period, the welding current (base current) may be adjusted immediately after it is switched to the Set Value Indication mode. In addition to welding current (base current), two other parameters (pulse current and pulse frequency) may be also adjusted during welding period with the parameter selection key [3] depressed. Also, even by pressing the AC FREQ. key [6], AC BALANCE key [7] and AC-DC change-over frequency setup key [8], the set point mode is selected, and the adjustment becomes possible during any period.

During welding period, the parameters may not be adjusted in the Average Indication mode.

10.3.3 Key Lock (available only at TIG welding)

Key lock is a function to prevent the welding conditions from being changed by accidentally operating keys and knobs on the front panel. Only the keys and parameter adjusting knob which are used for changing each parameter and modes can be protected. However, the settings can be checked and confirmed by using the Parameter selection key [3] and the Arc SPOT TIME setting key [9].



Holding down both the F [10] key and ENTER key [19] simultaneously

Holding down both the F key [10] and ENTER key [19] simultaneously for a while brings the key-lock condition. While keys are locked, the F lamp (located at the upper left of the F key) blinks. Key lock can be cancelled by holding both the F key and ENTER key simultaneously for a while again. Key lock cannot be cancelled by starting the machine up again.

While keys are locked, the F lamp blinks

Even when the keys are locked, GAS CHECK, INCHING, and JOB MEMORY function can be activated.

10.3.4 JOB MEMORY Function (available only at TIG welding)

The JOB MEMORY function enables welding conditions to be reproducible by storing the welding conditions in memory inside power source and by reading out the stored data at any time. The number of welding conditions that can be held in memory is up to 100.

10. OPERATION (continued)

⚠ CAUTION

- **The welding conditions (electronic information) stored by this function are susceptible to occurrence of static electricity, impact, repair, etc., and there is a possibility that the storage contents may be changed or lost. BE SURE TO MAKE A COPY FOR IMPORTANT INFORMATION.**
- **We shall not assume any responsibility for any change or loss of electronic information resulting from repair, which you should note in advance.**

Once the machine enters the memory mode and read-out mode, all the key operations are denied except the SAVE key, LOAD key, and ENTER key. To exit the mode, press the LOAD key [17] if it is in the memory mode and the SAVE key [18] if in the read-out mode. Memory can be copied to a different condition number after reading the welding conditions to be copied.

Note:

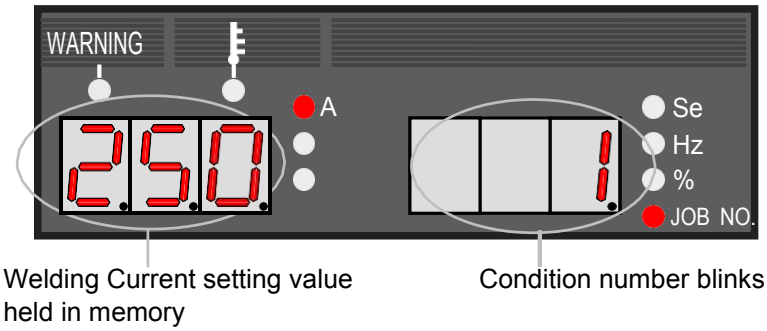
Even when welding conditions are read out while the analog remote control is connected to the welding power source, the setting values preset at the analog remote control are valid.

① SAVE Function

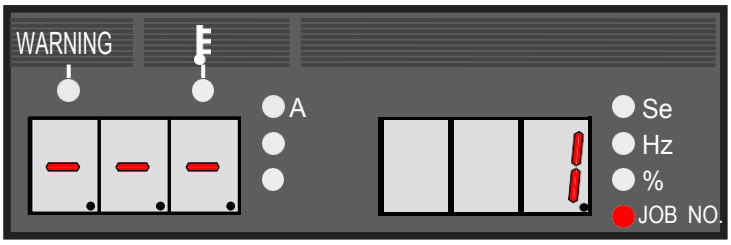
Welding conditions being currently in use are stored in the memory inside the welding power source.

- Holding the welding conditions in memory

(1) When pressing the SAVE key [18], the machine enters memory mode, the SAVE lamp (located at the upper left of the SAVE key) lights up. See the following picture. In the right display, condition number “1” blinks and the LED lamp of the welding condition number lights up. In the left display, the setting value of welding current preset to the condition number "1" is displayed. Under this condition, a condition number can be set while turning the parameter adjusting knob [4].



In the event that any memory data is already preset to the condition number you selected, the CRATER lamp, the WELDING METHOD lamp, etc. also light up. If no memory data is preset to the condition number you selected, “- - -” in the left display blinks. In this case, the system skips the parameter check condition of Step (2) and jumps to Step (3).



10. OPERATION (continued)

(2) When pressing the ENTER key [19] after setting the condition number, the ENTER lamp blinks (located at the upper left of the key). Under this condition, you are allowed to confirm the setting value of the parameter preset to the condition number by using the Parameter selection key [3]. The setting value of the parameter you selected blinks.

Note:

In the save mode, you can not change the welding condition number or select any memory/readout mode. To reset the condition number, press the SAVE key [18], then return to the step (1).
To quit the setting and exit from the memory mode, press the LOAD key [17].

(3) Pressing the ENTER key [19] again holds the data in memory and allow you to exit from the memory mode.

② LOAD Function

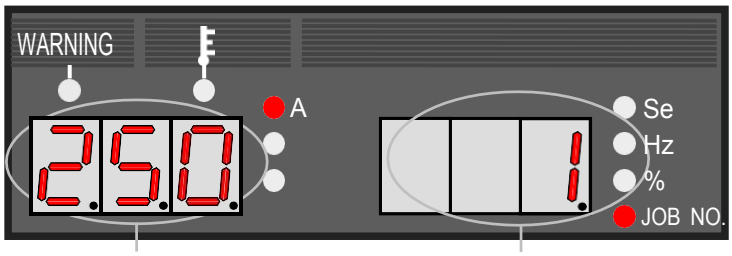
The welding conditions stored in memory are read out from the memory inside welding power source.

Note:

The welding conditions currently used are overwritten with the welding conditions that are read out. When you wan to save the welding conditions that have been used until now, set the welding conditions to any condition number, then carry out readout.

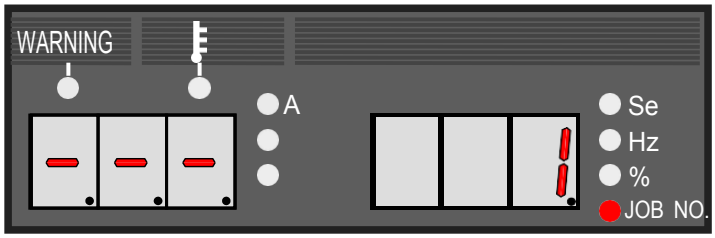
- Reading out the preset welding conditions

(1) When pressing the LOAD key [17], the machine enters the readout mode, LOAD lamp (located at the upper left of the LOAD key) lights up. See the figure below. The condition number "1" in the right-side display blinks and the JOB No. LED lamp lights up. In the left-side display, the setting of welding current preset to condition number "1" lights up. Under this condition, a condition number can be set while turning the parameter adjusting knob [4].



Welding Current held in memory　　Condition blinks

In the event that any memory data is preset to the condition number you selected, the CRATER lamp, the WELDING METHOD lamp, etc. also lights up. When no memory data is preset to the condition number, "- - -" in the left-side display appears and blinks. See the figure below.



(2) When pressing the ENTER key [19] after setting the condition number, the ENTER lamp (located at the upper left of the key) blinks. Under this condition, you are allowed to confirm the setting of each parameter you want to read out by using the Parameter selection key [3]. The setting of the parameter you selected blinks.

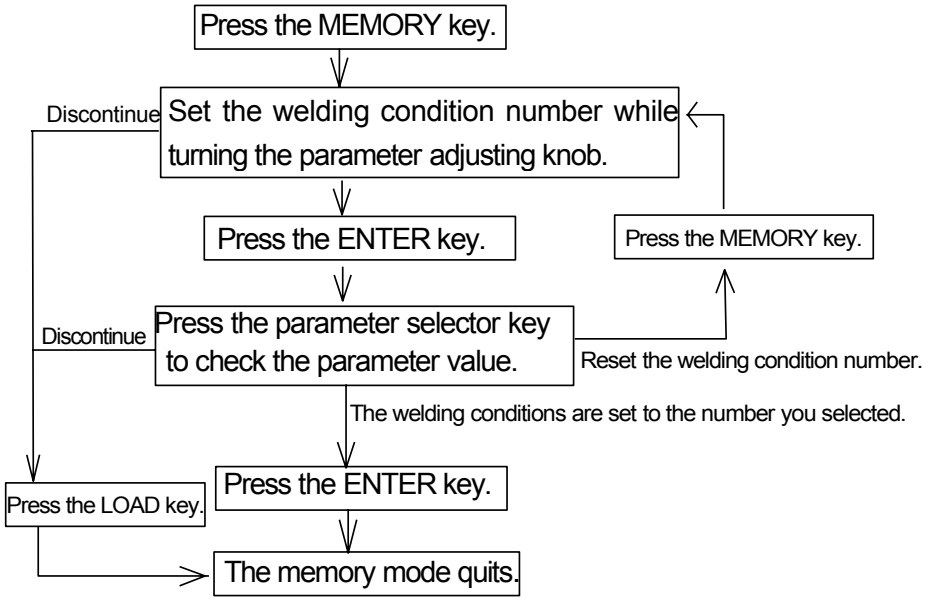
10. OPERATION (continued)

Note:

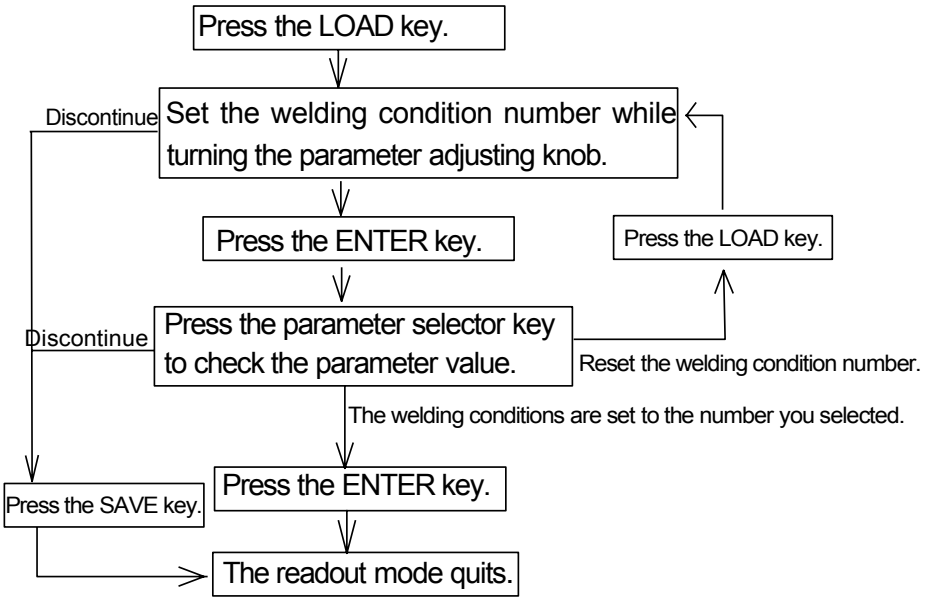
You are not allowed to change condition number or select a welding method, etc. To reset the condition number, press the LOAD key [17], then return to the step (1). To quit the setting and exit from the readout mode, press the SAVE key [18].

(3) When pressing the ENTER key [19] again, you can read out the preset welding conditions and exit from the readout mode.

- Operation flow in the memory mode



- Operation flow in the readout mode

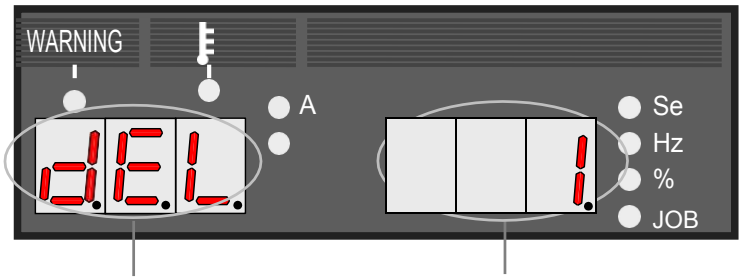


10. OPERATION (continued)

③ Erasing the Welding Conditions
When you erase the welding conditions stored in memory, you can select either erasing all or erasing one.

● Erasing the welding conditions

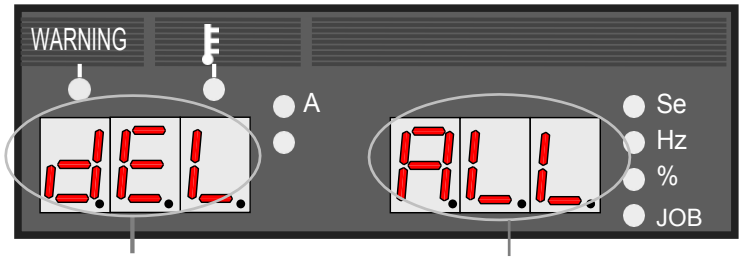
(1) Turn off the power switch and turn on the power switch with both the LOAD key [17] and SAVE key [18] pressed. Release the keys after turning on the power switch, and then "dEL" appear in the left-side display. See the picture below.



”dEL" display means the machine in the delete mode.

Condition number to be deleted blinks.

(2) Set the condition number to be deleted while turning the parameter adjusting knob [4]. When turning the knob counterclockwise, "ALL" appears in the right-side display as illustrated below and you can erase all the welding conditions.



"dEL" is displayed

"ALL" blinks

Note:

When the welding conditions are deleted by selecting "ALL" welding conditions currently in use are also deleted. Consequently, all the parameters return to the initial settings.

(3) Pressing the ENTER key [19] blinks "dEL." Confirm the condition number again and if you want to cancel erasing of the condition number, press any key other than the ENTER key [19] to return to step (2). To quit the delete mode, turn off the welding power source.

(4) Pressing the ENTER key [19] again deletes the welding condition that is preset to the condition number. When "End" is displayed after end of data deletion, turn off the power switch, then start up the welding machine.

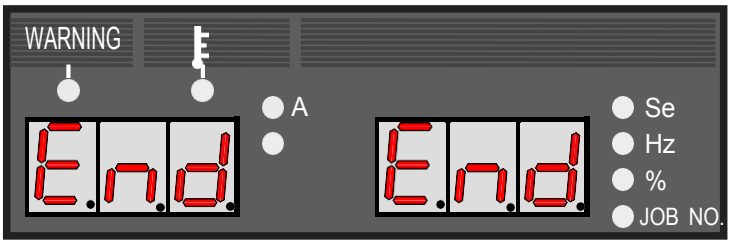
Note:

When pressing the ENTER key [19] twice in the deletion mode, you can not recover the erased welding conditions. When you attempt to delete a welding condition that is held in memory, make sure that the condition number you want to erase is surely selected.

10. OPERATION (continued)

10.3.5 Resetting to Initial Values

When resetting to the welding conditions to initial values, the welding conditions that are currently used (including the welding condition currently used) are all reset to initial values. But, even when resetting to initial values, the welding conditions held in memory are not changed. To reset to initial values, turn off the power switch, and then turn on the power switch with both the F key [10] and GAS CHECK key [16] held down. When "End"s appear in the displays after turning on the power switch, release the keys, turn off the power switch, then turn it on again. See the picture below.



See “SPECIFICATIONS” for initial values of each parameter and function.

10.3.6 Confirming software version

The version of software incorporated in the welding power source can be verified following these steps. Turn on the power switch with only the F key [10] held down. After powering the welding power source, the version number appears in the display.

(Example)
Right and left displays : "P10464"← Software number (P10464) is displayed.
↓ Press the F key [10].
Left display : "001" ← Main software version (Ver. 001) is displayed.
Right display : "000" ← Sub software version is displayed.
↓ Press the F key [10].
Left display : "- - -"
Right display : "000" ← Combination is displayed.
↓ Press the F key [10].
The welding power source starts up as usual and gets ready to perform welding.

10.3.7 Automatic Stop of Fan

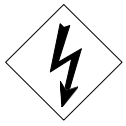
The cooling fan automatically stops in 10 minutes after welding is finished and automatically starts turning when welding is started. When turning on the welding power source, the cooling fan is also turning but automatically stops in 10 minutes when no operation is carried out.

10.3.8 Fan noise reducing function

To reduce the fan noise level during welding suspension, the fan rotation is decelerated. However, this function is effective only when used at the output current 250A max.

11. APPLIED FUNCTION

11.1 How to Solve an Error

⚠ WARNING	
	**Observe the following to prevent electrical shock.**

- **Do not touch charging parts inside or outside the welding power source.**
- **Only the certified operators or the person who understand the welding machine well can change wiring or switch setting in the welding machine.**
- **Turn OFF all power switches in the switch box and wait for 3 minutes or more before touching the inside parts of the welding machine.**

If an error occurs during use, an error code shown in the displays on the front panel blinks, then the welding power source stops automatically. In this case, check the errors in the following table.

No.	Displays on the front panel		Classification of errors
	Left	Right	
1	d A I	H E n	Torch switch off state waiting
2	E -	0 0 0	Operation Stop
3	E -	1 0 0	Control power supply error
4	E -	2 0 0	Primary / secondary current detection error
5	E -	3 0 0	Thermal overload
6	E -	5 0 0	Abnormal water pressure
7	E -	5 1 0	Water cooling unit error
8	E -	6 0 0	Replacement of batteries (warning)
9	E -	7 1 0	Open-phase detection error
10	E -	7 5 1	Secondary side over voltage error
11	E -	9 X X	Microcomputer error

11. APPLIED FUNCTION (continued)

1) dAIHEn Display

If “dAI” and “HEn” in the displays blink, it indicates the “Torch switch off state waiting“.
When turning on the power switch, the displays on the front panel shows “dAI” and “Hen” for one second, then the welding power source becomes operable. But, if the torch switch remains on, the safety circuit will function, the welding power source will hold a halt condition, then the WARNING lamp and "dAI” and “HEn" shown in the displays will blink. In this case, turn off the torch switch to reset the safety circuit and make the welding power source operable.

2) E-000 Display

If “ E-“ and “000” in the displays blink, it indicates the “Operation Stop “.
When disconnecting the wiring of the STOP terminals (Operation Stop terminals: wiring number 213) on the 12P external connection terminal block (TM1), “E-“ and “000” in the displays blink and the welding power source stops. In this case, after turning off the power switch and eliminating the possible causes of the stoppage of the welding power source, short-circuit the STOP terminals and turn on the power switch to cancel the error.

Note:

When canceling the operation stop, it is also possible to solve the error only by short-circuiting the Operation Stop terminals again without starting the welding power source up again. Refer to Section 10.1.17, “Internal Functions”.

3) E-100 Display

If “E-“ and “ 100” in the displays blink, it indicates the " Control power supply error ".
If there is an error in the control power source, the warning lamp will light up and “E-“ and “100” in the displays will blink, then the welding power source will automatically stop. To cancel the error, start the machine up again.

4) E-200 Display

If “E-“ and “200” in the displays blink, it indicates the " Primary/Secondary current detection error ".
If an error is detected in the current detecting area, “E-“ and “200” in the displays will blink and the welding power source will stop automatically. In this case, turn off the power switch, then turn it on again after making sure that CN8 and CN9 on the printed circuit board P10293U are surely connected.

5) E-300 Display

If “E-“ and “300” in the displays blink, it indicates the "Thermal overload"
If the actual duty cycle exceeds the rated duty cycle of or temperature inside the welding power source increases, "E-“ and “300" will blink and the welding power source will stop automatically. At this time, the temperature lamp also will be lit. In this case, wait more than 10 minutes with the power switch pressed and the fan turned. When restart welding, turn off the power switch and restore the system after lowering the duty cycle and the welding current. Such action will cancel the error. Repetitious welding without more than ten-minute rest may lead to damage to the welding machine. Refer to Section 3.1, “Rated Duty Cycle” for the rated duty cycle of the welding power source.

6) E-500 Display

If “E-“ and “500” in the displays blink, it indicates the “Abnormal water pressure”.
If no cooling water is going through the water-cooled hose or shortage of water pressure is occurred, the WARNING lamp will light up, “E-“ and “500” in the display will blink, then the welding machine will automatically stop. In this case, check to make sure that the water-cooled hose does not leak water and that adequate cooling water is going through the hose. When using an air-

cooled torch, make sure that the TORCH lamp on the front panel is OFF (AIR).

11. APPLIED FUNCTION (continued)

7) E-510 Display

If "E-“ and “510" in the displays blink, it indicates the "Water cooling unit error".
As this welding power source connect the GEKAMAC water cooling unit.
If CON4 connector 1-2pin is open circuit for error signal comes from GEKAMAC water cooling unit, “E-“ and 510” are displayed. See the manual of GEKAMAC water cooling unit and checking for the solution.

8) E-600 Display

If "E-“ and “600" in the displays blink, it indicates the "Replacement of batteries (warning)".
This welding power source uses batteries so that it can hold the welding conditions in memory even when no operation is carried out for long time. “E-“ and “600” in the displays blink when the batteries get low. “E-“ and 600” are displayed only when the front panel and the welding power source are temporarily not in use. To cancel the display of the error , press any key. Even when “E-“ and “600” appear in the displays, welding can continued to be performed, **but when the batteries run down, the preset welding condition functions and the settings of functions are all erased. The last welding conditions before power is applied to the welding machine can not be stored. Each time power is applied to the equipment, all the parameters are reset to initial values.** Refer to Section 12.4, “ Replacement of batteries” for details.

9) E-710 Display

If "E-“ and “710" in the displays blink, it indicates the "Open-phase detection error".

By detecting primary input open phase, the malfunction lamp lights up and “E-710” is displayed by flashing, and then the welding machine comes to an automatic stop. In this case, check the primary input voltage for each phase.

10) E-751 Display

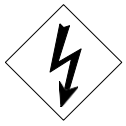
If "E-“ and “751" in the displays blink, it indicates the "Secondary side over voltage error".

In case where the secondary-side transistor surge voltage has become abnormally high, for example since an extension cable was used, the malfunction lamp lights up, and “E-751” is displayed by flashing, whereby the welding power souce comes to an automatic stop. In this case, take an action therefor in accordance with the description given in 10.1.5 “Notice of using AC TIG mode”, and then turn the power switch “ON” again.

(11) E-9XX Display

If “E-9XX“ in the displays blink, it indicated the “Microcomputer error”.
There could be an error in the built-in microcomputer, Please contact your dealer immediately. When contacting your dealer, you are required to provide the details of the problem you are facing.

11. APPLIED FUNCTION (continued)

⚠ WARNING	
	**Observe the following to prevent electrical shock.**

- **Do not touch charging parts inside or outside the welding power source.**
- **Only the certified operators or the person who understand the welding machine well can change wiring or switch setting in the welding machine.**
- **Turn OFF all power switches in the switch box and wait for 3 minutes or more before touching the inside parts of the welding machine.**

⚠ CAUTION

- **Try to move the control cable which is pulled out from the automatic connection terminal on the printed board father away from the welding power cable or the torch cable when making an external connection. Otherwise, equipment failure may be caused by noise, etc., during welding operation.**
- **Do not pull out the wiring on the printed circuit board to outside except the wiring to the external connection terminal block.**

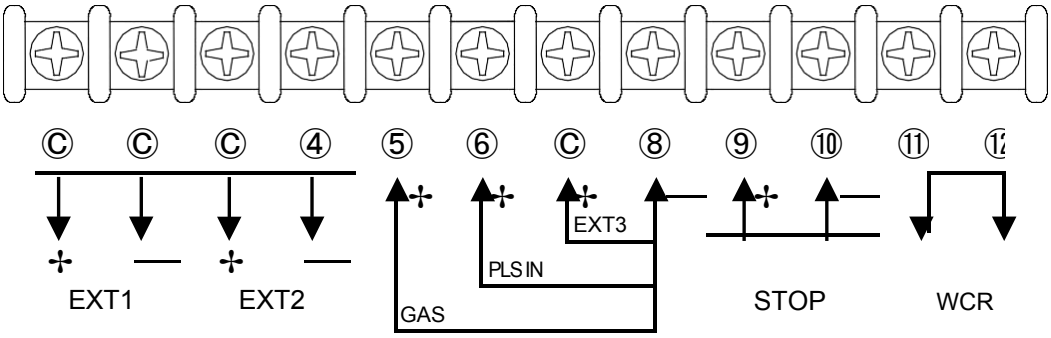
11.2 External Connection of Inside Terminal Block of Automatic Machine

When taking off the upper cover of the welding power source, you will find there is a 12P terminal block (TM12P) on the printed board P10293T on the chassis. Use the 12P terminal block to connect with an automatic machine. Refer to 12.7, “Parts layout” for the locations of the terminal blocks.

Note:

*** Wait more than three minutes after turning off the line disconnect switch or no-fuse breaker and the power switch on the front panel to remove the cover.**
*** To pull out the external connecting wire, break the grommet with film on the rear surface so as not to come into contact with the printed circuit board parts and sheet metal edge or the like.**

[12P terminal block]



11. APPLIED FUNCTION (continued)

12P terminal block (TM 12P)

Pin No.	Signal name	Function	
Ⓒ+ − Ⓒ-	EXT1 (Output) External output terminal 1	From among the power source preparation, pulse synchronizing output, EN synchronizing output and AC synchronizing output functions, select the required one for use. For the setup method, see 10.1.17 “Internal Functions”.	*1
Ⓒ+ − ④-	EXT1 (Output) External output terminal 2		
⑤+ − ⑧-	GAS (INPUT) Solenoid Valve Control	The terminals used for controling the gas solenoid valve by external signals. (If the terminals are short-circuited, the gas valve will open.)	*2
⑥+ − ⑧-	PLSIN (Input) Pulse synchronizing input signal	Short-circuiting across terminals outputs pulse current. For details, see 10.1.17 “Internal Functions”.	
Ⓒ+ − ⑩-	EXT3 (INPUT) Extra Input Signal	The terminals used for special specifications. These terminals should not be used for normal use.	*2
⑨+ — ⑩-	STOP (INPUT) Operation Stop	To stop welding externally. Release the wiring between two terminals to run Operation Stop. Welding machine is stopped by running Operation Stop. Close the terminals after turning off the torch switch to restart welding. To avoid accidental restart, use of a Pushlock Turn reset switch is suggested.	*2
⑪+ − ⑫-	WCR(OUTPUT) Current Detection	Contact Output of welding current relay used for detection of welding current. The contacts close while welding current is flowing.	*3

Precaution for connection with terminals on the terminal block
The wires from the terminal blocks should be twisted for each signals to avoid accidental operation. Take care that the wires form the terminal blocks do not cross other signal wires from other welding power source.

*1 Equivalent circuit is as the figure shown right. Maximum capacity of TR is 80V, 100mA. When connecting such as relay to two terminals, do not exceed 80% of the maximum capacity of TR. (Figure 1)

*2 Equivalent circuit is as the figure shown right. Connect allowable contacts (10mA or more) to two terminals. (Figure 2)

*3 Rating of the provided relay contacts is 125V AC, 0.5A, 30V DC, 1A. Do not exceed 80% of the rating of the provided relay contacts.

*4 Be careful that no-load voltage (100V or less) is applied to between the terminals during welding.

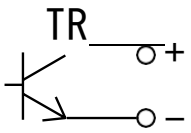


Figure 1

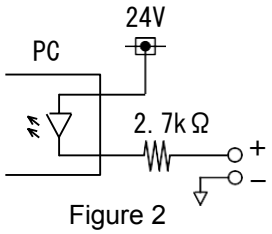


Figure 2

When using the welding power source by combining the following torches, use the proper torch adapter.

Connecting to the Extension Torch Cable/Hose

（1） Water Cooled Torch

Connect the extension cables/hoses (optional accessories) as the figures shown below.

11. APPLIED FUNCTION (continued)

11.2.2 Tungsten Electrode

Use cerium-Tungsten Electrode (grey mark) or thoriated tungsten electrode (red mark). Using DAIHEN cerium-tungsten electrode that is hardwearing realizes good arc start and better work efficiency.

■ Cerium-Tungsten Electrode

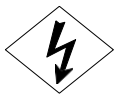
Part No.	Electrode Dimension(mm)		Max. Tolerance Current(A)	
	Dia.	Length	DC Straight Polarity	AC
0870-016	1.6	150	150	130
0870-024	2.4	150	250	220
0870-032	3.2	150	400	290

■ Thoriatd Tungsten Electrode

Part No.	Electrode Dimension(mm)		Max. Tolerance Current(A)	
	Dia.	Length	DC Straight Polarity	AC
0831-005	0.5	150	20	
0831-010	1.0	150	80	
0831-016	1.6	150	150	
0831-316	1.6	75	150	
0831-020	2.0	150	200	
0831-024	2.4	150	250	
0831-324	2.4	75	250	
0831-032	3.2	150	400	
0831-332	3.2	75	400	
0831-040	4.0	150	500	

12. MAINTENANCE AND TROUBLESHOOTING

⚠ WARNING



Observe the following to prevent electric shock.

- **Do not touch the charging parts inside or outside the welding power source.**
- **Turn off all of the line disconnect switches before touching the parts inside the welding machine.**
- **Perform the maintenance checks periodically. If any damaged parts are found, only use the welding machine after troubleshooting or repairing.**
- **Only certified operators should maintain, inspect, or repair the welding machine.**
- **When carrying out the maintenance, wait more than three minutes after powering off all input power supply by turning off the line disconnect switch in the switch box. Capacitor may be discharging even after powering off all input power supply. Check to make sure that charging voltage does not exist before carrying out the maintenance.**
- **This welding power source uses a high-frequency inverter system, be careful of accidental connection of the line disconnect switch at input side.**
- **Have qualified operators or the persons familiar with this welding power source test withstand voltage. And install a protective wall around the welding machine to keep away others from the welding machine.**

⚠ CAUTION

Rotating parts may cause injuries. Be sure to observe the following.

- **Only certified operators should maintain, inspect, or repair the welding machine.**
- **Install a fence around the welding machine to keep others away from it.**
- **Do not put your hands, fingers, hair and clothes near the fans and wire feed roll rotating.**

⚠ CAUTION

- **Do not touch the parts for the main circuit which are located inside the power source, such as single-phase transformer, DC inductor, heat sink, etc. immediately after welding is performed, as the parts are extremely hot. Wait until the parts cool down, when touching. Failure to observe the demand may result in burn.**

⚠ CAUTION

- **The welding conditions (electronic information) stored using the JOB MEMORY keys are likely to be affected by occurrence of static electricity, and there is a possibility that the preset data contents may be changed or erased. We recommend taking notes of important data.**
- **We shall not assume any responsibility for any change or erase of the electronic information resulting from repair.**

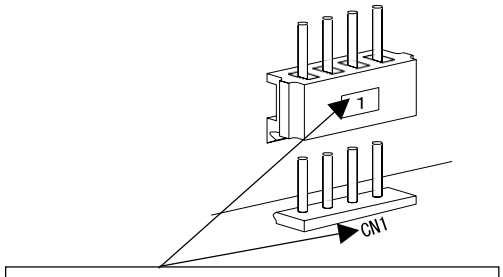
12. MAINTENANCE AND TROUBLESHOOTING (continued)

12.1 Carrying out Maintenance on the Welding Power Source

(1) Periodical checking
Periodically check the welding power source to ensure the safety of the equipment and the efficiency of work.

- Check the following daily:
  - No strange vibration, buzzing noise, and smell are generated from the welding power source.
  - No excessive heat is generated from the cable connections.
  - Fan functions properly when the power switch is turned on.
  - The switches properly function.
  - Connection and insulation of cables are surely made.
  - There is no break in cables.
  - Fluctuation of power source voltage is not large.
  - Case Earth is surely connected. (Disconnection of the Case Earth may result in failure or malfunction of the equipment.)
- Check the following each three to six months:
  - There is no damage inside the torch.
  - There are no loose connections or no poor contacts caused from rust, on input side of the welding power source and output side of the cables.
  - There is no trouble with insulation.
  - The welding power source is properly grounded.
  - Built-up dust on the transistor or the cold plate on the rectifier may affect the equipment's. Take off the cover of the welding power source once a half year, then remove dust by blowing moisture-free compressed air on each part.
  - The dust protective filter located on the inlet of the fan does not clog, which may result in damage to the welding power source. Be sure to inspect it periodically.

12.2 Precaution for Replacement of the Printed Circuit Board

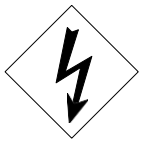


NOTE: Match the number on the printed circuit board with that on the connector.

- Make sure that the connector number inscribed on the printed circuit board matches the number marked on the connector.
- Turn off the control power switch and line disconnect switch before carrying out maintenance on the welding power source and wait three minutes until the capacitors inside the welding power source discharge.
- This welding power source uses a high-frequency inverter system, be careful of accidental connection of the line disconnect switch at input side.
- Surely connect the connectors until the connector clicks. Failure to do so may result in damage to the printed circuit board and to the machine.
- With the connectors disconnected, do not turn on the power switch on the front panel.
- Do not use organic solvent such as thinner, trichloroethylene, gasoline, etc., to clean the plastic cover and carrying handle of the welding machine. Deformation and flaw may result from the adherence of the organic solvent.

12. MAINTENANCE AND TROUBLESHOOTING (continued)

12.3 Insulation Resistance Test

⚠ WARNING	
	**Observe the following to prevent an electrical shock.**
● **Have qualified operators or the persons familiar with this welding power source measure insulation resistance and test withstand voltage. And install a protective wall around the welding machine to keep away others from the welding machine. Check to make sure that charging voltage does not exist before carrying out the maintenance before carrying out measurement of insulation resistance and withstand voltage test.**	

When measuring insulation resistance and testing withstand voltage, follow the steps below. And, refer to the schematic diagram, parts layout, and parts list for maintenance.

1. Disconnect the grounding cable (wiring number: 80) from the earth.
2. Short-circuit on AC side and commutation side of DR1.
   Short-circuit between TR1 (C1) and (E1), TR2 (C2) and (E2), TR3 (C1) and (E1), TR4 (C2) and (E2), TR5･6 (C1) and (E1), TR5･6(C2) and (E2).

Be sure to reconnect the cables after carrying out measurement of insulation resistance and withstand voltage test.

12.4 Replacement of Batteries

This welding power source uses lithium batteries to hold welding conditions in memory. The life of the batteries differs depending on the environments. “E-“ and “600” shown in the displays on the front panel blinks when the batteries gets low. Replacement of the batteries every 5 years or so are recommended even when “E-“ and “600” do not blink. Replace the batteries following the steps:

1. Turn off the line disconnect switch in the switch box or the no-fuse breaker, and the power switch of the welding power source.
2. After more than three minutes, remove six screws that secure the front panel, and then pull the front panel out. Do not pull it forcibly. With the wiring inside the equipment disconnected, do not turn on the power switch. Failure to do so may result in damage to the welding power source.
3. Remove the connectors on the PCB P10263R to replace the printed circuit board. Refer to the position for “Rear side of the front panel” in Section 12.7, “ Parts List”.
4. Insert the disconnected connectors into the PCB P10263R.
5. Screw the front panel in position.

12. MAINTENANCE AND TROUBLESHOOTING (continued)

12.5 Troubleshooting

When an error code is displayed, refer to Section 11.1, “How To Solve an Error”.

- Check the troubleshooting information listed below before contacting your dealer for service.

No.	Trouble		Cause	Solution
1	The power switch on the front panel is tripped.	Never turn it on again. Contact your dealer.		
2	The main power lamp PL will not light.	When turning on the power switch, the displays light.	Trouble with PL.	Inspect PL.
		When turning on the power switch, nothing appears in the display.	The line disconnect switch in the switch box is not turned on.	Inspect the power box.
			The input cables are not surely attached.	Inspect the input cables.
3	When turning on the power switch, nothing appears in the display.	The main power lamp PL will not light.	Refer to No.2 in this list.	
		PL lights.	Shortage of the input voltage	Check for proper input voltage.
			Trouble with the power circuit.	After inspecting PCB P10263Q, replace it if necessary.
4	When turning on the power switch, the WARNING and TEMPERATURE lamps light up and an error code appears in the display.		Refer to Section 11.1, “How To Solve an Error”.	
5	Shield gas is not generated when the torch switch is pressed.	Gas is not generated when the GAS CHECK key is pressed.	The discharge valve of the gas cylinder is closed.	Open the gas valve.
			Lack of gas pressure of the gas cylinder.	Check for proper gas pressure.
			Trouble with the gas electromagnetic valve SOL.	Inspect the gas electromagnetic valve SOL.
		Gas is generated when the GAS CHECK key is pressed.	Disconnection of the torch switch cable or incomplete insertion to receptacle.	Check the wiring numbers 160, 161, 168, 169, 258 and 259.
6	Shield gas does not stop.		The GAS CHECK lamp lights up.	Stop gas checking by pressing the GAS CHECK key.
			Trouble with the gas solenoid valve SOL	Check for operation of the gas solenoid valve of wire feeder.
7	When the torch switch is pressed, no high frequency spark is not generated	The sound of spark discharge can be heard.	Electrode gets whiten.	Polish electrode.
			Base metal cable is connected to the negative (-) terminal output. (High frequency voltage is leaking.)	Properly connect the torch and the base metal cable.

	between electrode and base metal.	The sound of spark discharge can not be heard.	The connectors on the high frequency generating circuit are not firmly inserted.	Check for proper insertion of the connectors on PCB P10263X.

12. MAINTENANCE AND TROUBLESHOOTING (continued)

No.	Trouble		Cause	Solution
8	When pressing the torch switch, high frequency is generated but no arc is output.	When electrode touches on the base metal, arc is output.	Electrode gets white.	Polish electrode.
			Electrode is too thick. Current setting is too low.	Set to the proper electrode and current.
		When measuring output voltage in STICK mode, no –load voltage is generated.	Trouble with the main circuit of inverter.	After turning off the power switch, contact your dealer.
		No-load voltage is generated.	Trouble with the control circuit.	Check for PCB P10293P and P10464U.
9	WCR keeps working.		Trouble with the hole current detector CT2	Inspect the hole current detector CT2.
			Trouble with the WCR circuit	After inspecting PCB P10293P, replace it if necessary.

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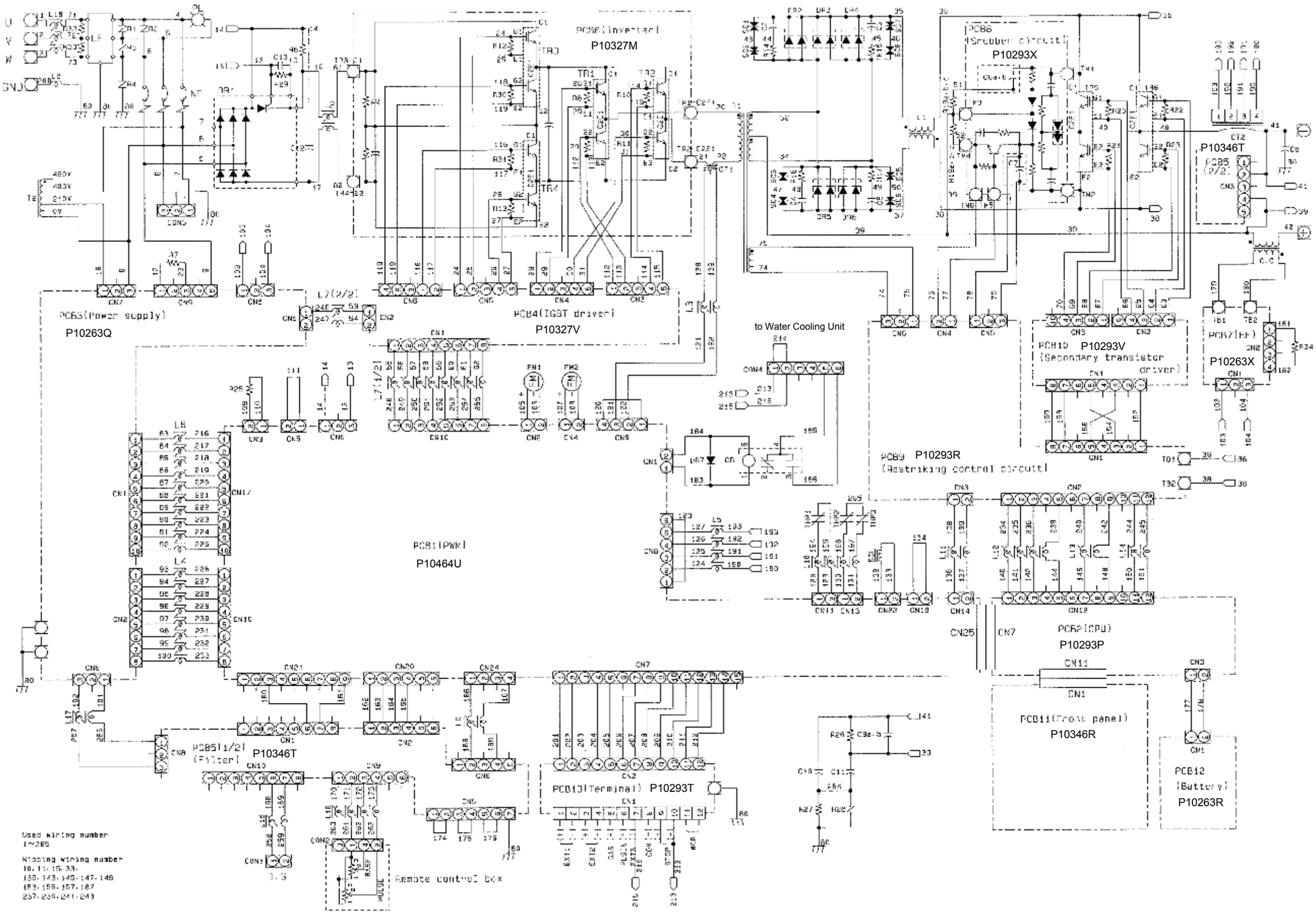
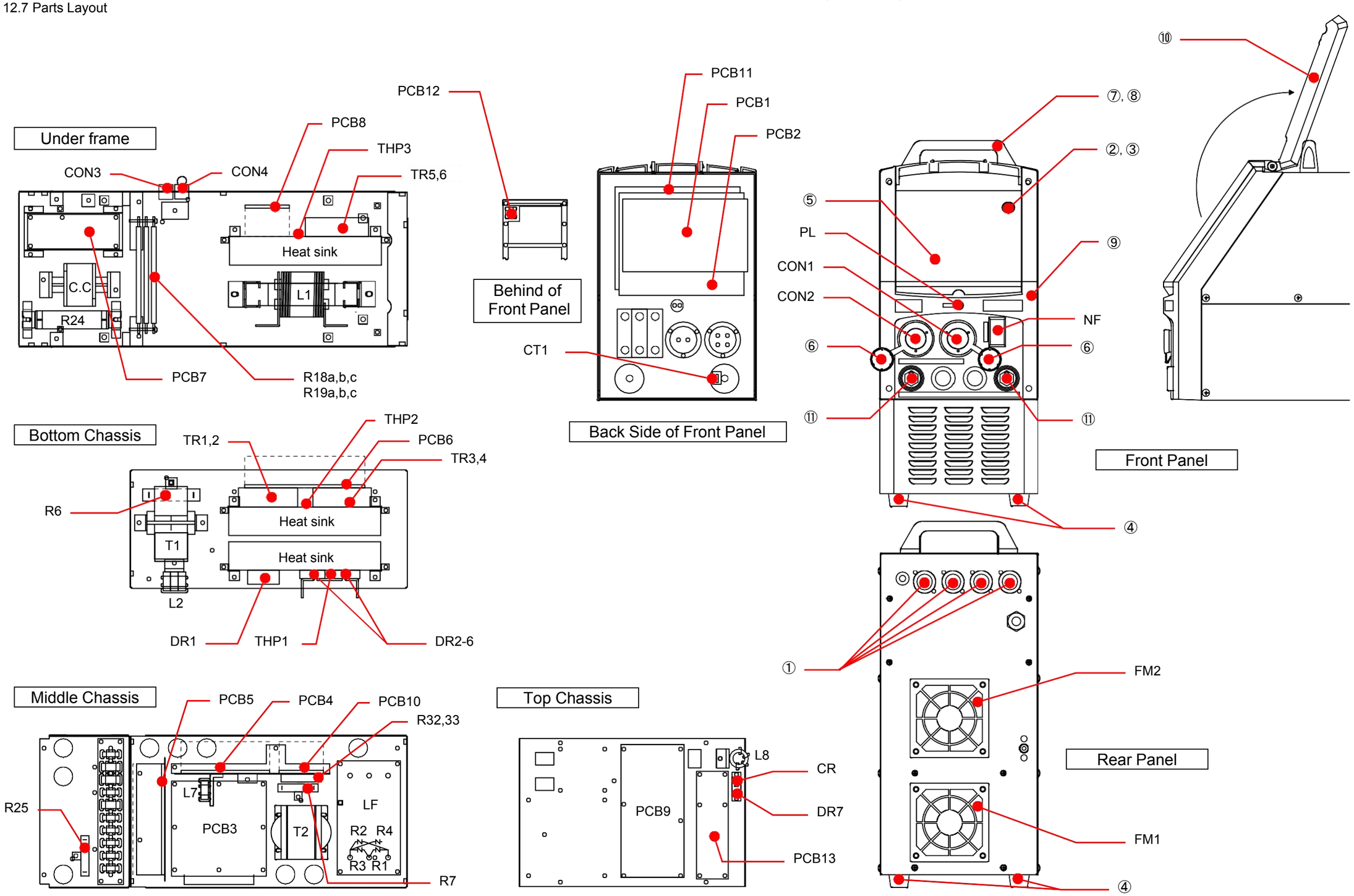
12. MAINTENANCE AND TROUBLESHOOTING (continued)

12.6 Schematic Diagram



12. MAINTENANCE AND TROUBLESHOOTING (continued)

12.7 Parts Layout



13. PARTS LIST

- Please contact your dealer to order parts. (See the back cover for telephone and fax numbers, and mailing addresses.)

Symbol	Part No.	Description	Specifications	Q'ty	Remarks
NF	4614-101	Circuit protector	CB3-X0-10-072-42D-C	1	
LF	4519-022	Line filter	CF3030C-DJ	1	
PL	4600-366	Pilot lamp	N46010A7KW-01	1	
DR1	4531-204	DR&SCR complex module	DFA75BA160	1	
DR2 – 6	4531-308	High speed diode module	DBA200UA60	4	
DR7	4531-710	Diode	D1N60	1	
TR1, 2	4534-418	IGBT module	CM150DY-12NF	2	
TR3, 4	4534-407	IGBT module	2MBI150TA-060	2	
TR5, 6	4534-410	IGBT module	CM300DU-12F	2	
CT1	4810-030	CT	W-W03029	1	
CT2	4406-009	Hole current detector	HA400S3EH	1	
T1	P10293B00	Inverter transformer	P10293B00	1	
T2	W-W02936	Auto transformer	W-W02936	1	
C.C	P10464C00	Coupling coil	P10464C00	1	
L1	P10293L00	DC reactor	P10293L00	1	
L2	4739-497	Ferrite core	E04RA400270150	3	
L3	4739-543	Ferrite core	E04RA310190100	1	
L4, 5, 6	4739-497	Ferrite core	E04RA400270150	3	
L7	4739-497	Ferrite core	E04RA400270150	1	
L8	4739-497	Ferrite core	E04RA400270150	2	
L9 – 14	4739-543	Ferrite core	E04RA310190100	6	
L15, 16	4739-543	Ferrite core	E04RA310190100	2	
L17	4739-543	Ferrite core	E04RA310190100	1	
L18	4739-497	Ferrite core	E04RA400270150	2	
THP1	4258-033	Thermostat	67L070	1	Side of DR2- 6
THP2	4614-057	Thermostat	67L080	1	Side of TR1- 4
THP3	4258-033	Thermostat	67L070	1	Side of TR5, 6
SOL	4813-046	Solenoid valve	TYPE5511DC24V	1	
FM1	4805-074	Fan	4715SL-05W-B60-D00	1	Lower side (High speed type)
FM2	4805-046	Fan	4715KL-05W-B40-P00	1	Upper side (Low speed type)
CR	4341-139	Relay	G2R-1-T DC24V	1	
SC1 – 4	4519-029	Surge clamper	1.5KE250CA	4	
R1 – 4	4536-119	Surge absorber	ENC911D-14A	4	
R5	Missing number				
R6	4509-819	Cement resistor	40SH 200ΩJ	1	
R7	4509-825	Cement resistor	20SH 15kΩJ	1	
R8 – 13	4509-704	Carbon film resistor	RD1/4W 1 kΩJ	6	
R14 – 17	4509-121	Metal film resistor	RNP-50SC 10ΩF	4	
R18a, b, c	4504-411	Non-inductive resistor	NCRF24V 30ΩJ	3	
R19a, b, c	4504-411	Non-inductive resistor	NCRF24V 30ΩJ	3	

13. PARTS LIST (continued)

Symbol	Part No.	Description	Specifications	Q'ty	Remarks
R20 – 23	4509-704	Carbon film resistor	RD1/4W 1kΩJ	4	
R24	4504-503	Wire wound resistor	GG80W 200ΩJ	1	
R25	4509-922	Cement resistor	20SH 10ΩJA	1	
R26	4509-113	Metal oxide film resistor	RS3B 20kΩJ	1	
R27	4509-046	Metal oxide film resistor	RS1B 10kΩJ	1	
R28	4536-112	Surge absorber	ENC821D-14A	1	
R29	4509-704	Carbon film resistor	RD1/4W 1kΩJ	1	
R30, 31	4509-704	Carbon film resistor	RD1/4W 1kΩJ	2	
R32, 33	4509-905	Cement resistor	MHR20A513JI	2	
C1	Missing number				
C2 – 5	4518-519	Film capacitor	MIC-ST3D182J	4	
C6a, b	4518-411	Film capacitor	EM351200D0BA1HP	2	
C7	4518-411	Film capacitor	EM351200D0BA1HP	1	
C8	4517-458	Ceramic capacitor	2kV 0.001μF	1	
C9a, b	4517-459	Ceramic capacitor	DEHR32E103KA2B	2	
C10	4517-459	Ceramic capacitor	DEHR32E103KA2B	1	
C11	4518-538	Film capacitor	US16X563JBASA	1	
C12	4518-530	Film capacitor	US16X154JAASA	1	
C13	4518-402	Film capacitor	50V 0.47μF	1	
CON1	4730-002	Metal consent socket	DPC25-2BP	1	2P
CON2	4730-006	Metal consent socket	DPC25-4BP	1	4P
CON3	P10464X02	Cable with 3P connector	P10464X02	1	
CON4	P10464X04	Cable with 6P connector	P10464X04	1	
CON4	P10464X08	Jumper plug	P10464X08	1	
PCB1	P10464U00	Printed circuit board	P10464U00	1	
PCB2*	P10293P00	Printed circuit board	P10293P00	1	Refer to "NOTE" below.
PCB3	P10263Q00	Printed circuit board	P10263Q00	1	
PCB4	P10327V00	Printed circuit board	P10327V00	1	
PCB5	P10346T00	Printed circuit board	P10346T00	1	
PCB6	P10327M00	Printed circuit board	P10327M00	1	
PCB7	P10263X00	Printed circuit board	P10263X00	1	
PCB8	P10293X00	Printed circuit board	P10293X00	1	
PCB9	P10293R00	Printed circuit board	P10293R00	1	
PCB10	P10293V00	Printed circuit board	P10293V00	1	
PCB11	P10346R00	Printed circuit board	P10346R00	1	
PCB12	P10263R00	Printed circuit board	P10263R00	1	
PCB13	P10293T00	Printed circuit board	P10293T00	1	

***NOTE: When ordering a printed circuit board P10264P00, provide the software version on a label below a nameplate attached to the rear side of the welding power source.**

P10464 Ver. ###.###.000

Replace the ###.### with software version.

13. PARTS LIST (continued)

Symbol	Part No.	Description	Specifications	Q'ty	Remarks
①	4739-474	Grommet with film	W-W02805	4	
②	4735-038	Knob	K-100 22RSB	1	Adjusting knob
③	4735-039	Cap	K-100 22CSBL	1	
④	4739-475	Rubber foot	C-30-RK-3220	4	
⑤	P10464W02	Control panel sheet	P10464W02	1	
⑥	4739-476	Cap	W-W02814	2	
⑦	P5801G03	Carrying handle	P5801G03	2	
⑧	P10263G12	Bush	P10263G12	4	
⑨	P10263J01	Front cover	P10263J01	1	
⑩	P10263J02	Control panel cover	P10263J02	1	
⑪	4734-007	Machine socket	DIX BE 50 / 70	2	Output terminal
	4734-016	Power cable connector	DIX SK 50	1	For base metal and holder
	4519-030	Filter kit	109-1000F13	1	
	4519-031	Dust filter	109-1000M13	1	
	4730-001	Plug	DPC25-2A	(1)	For CON1
	4730-005	Plug	DPC25-4A	(1)	For CON2

14. SPECIFICATIONS

14.1 Specifications

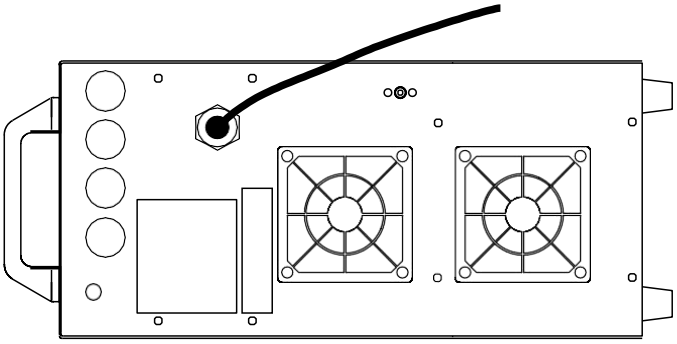
（1） Welding power source

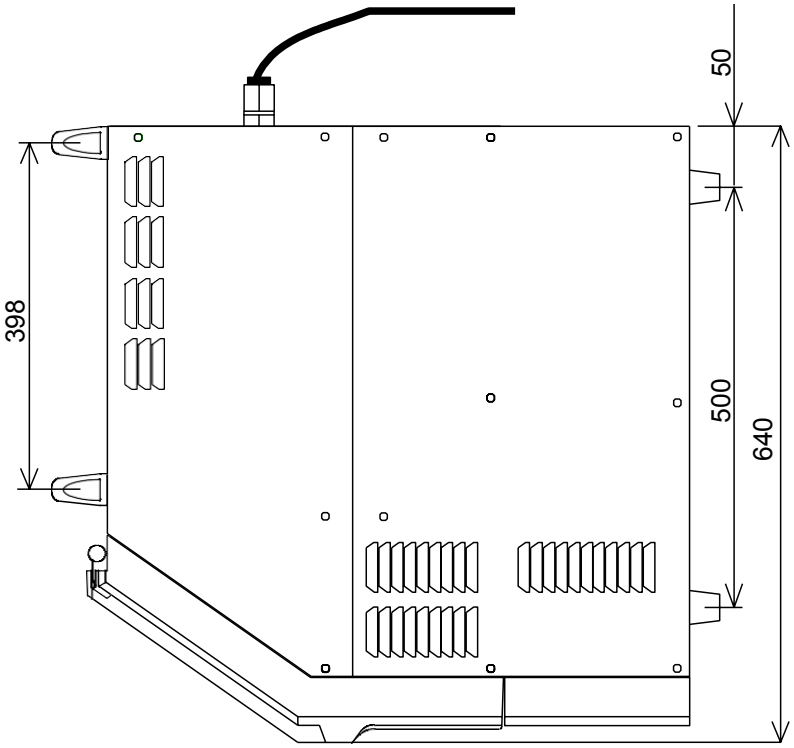
Specificaitons \ Model	PoWer TIG 300 AC / DC Pulse			
Model	DA – 300P			
Welding method	DC TIG	AC TIG	AC – DC TIG	DC STICK
Number of phase	Three			
Rated frequency	50 / 60 Hz			
Rated input voltage	400 V			
Input voltage range	400 V ±15 %			
Rated input power	11.9 kVA 8.9 kW	12.5 kVA 9.4 kW		13.2 kVA 10.0 kW
Rated input current	17.3 A	18.1 A		19.1 A
Rated output current	300 A	300 A		250 A
Rated output current range	4 A ～ 300 A	10 A ～ 300 A		10 A ～ 250 A
Rated load voltage	22 V	22 V		30 V
Max. no-load voltage	58 V			
Rated duty cycle	40 %			
Pre flow time	0.1 ～ 20 sec.			
Post flow time	0.1 ～ 30 sec.			
Up slope time	0.1 ～ 10 sec.			
Down slope time	0.1 ～ 10 sec.			
Arc spot time	0.1 ～ 10 sec.			
Crater-fill operation	ON / OFF / REPEAT			
Pulse frequency	0.1 ～ 500 Hz			
Pulse peak ratio	50 % (Changing with F(function)key from 5 % to 95 %)			
AC frequency	50 ～ 200 Hz			
AC balance	– 30 ～ 30 (EP ratio : 5 ～ 50 %)			
AC-DC frequency	0.1 ～ 50 Hz			
Number of JOB MEMORY (welding condition)	100			
Temperature rise	+ 160 ℃ (+320 ˚F)			
Operating temperature range	– 10 ℃ ～ + 40 ℃ (+14 ～ +104 ˚F)			
Operating humidity range	20 % ～ 80 % (without dew condensation)			
Strange temperature range	– 10 ℃ ～ + 60 ℃ (+14 ～ +140 ˚F)			
Storage humidity range	20 % ～ 80 % (without dew condensation)			
External dimension (W × D × H)	250 mm × 640 mm × 544 mm (without carrying handle)			
Mass	45 kg			
Degree of protection	IP 21 S			
Torch cooling method	Water / Air			
Start method	High frequency start / Lift start			

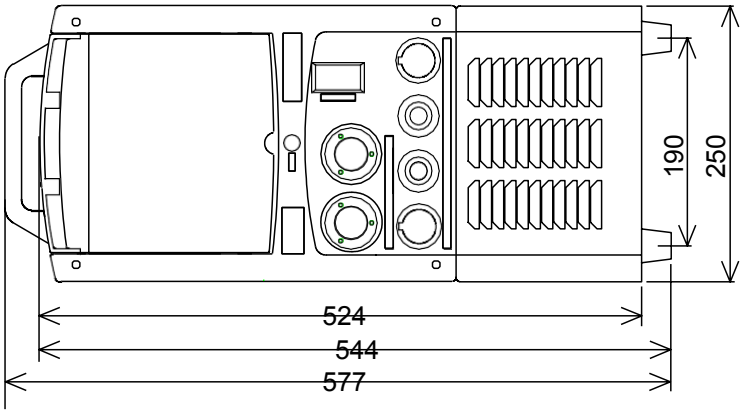
*The welding power source complies with the requirements of IEC 60974-1.

14. SPECIFICATIONS (continued)

14.2 External View







14. SPECIFICATIONS (continued)

● Initial Values and Setting Range of Parameters

		Initial value	Setting range	
Pre flow time		0.3 second	0 – 20 seconds	
Up slope time		1 second	0 – 10 seconds	
Welding current for stick welding		10 A	10 – 250 A	
▮ Initial current	DC TIG	10 A	4 – 300 A	
▮ Welding current ▮ Pulse current ▮ Crater current	AC TIG AC-DC TIG		STANDARD HARD	10 - 300 A
			SOFT	10 – 200 A
Pulse frequency		2 Hz	0.1 – 500 Hz	
Down slope time		1 second	0 – 10 second	
Post flow time		7 second	0 – 30 second	
Arc spot time		3 second	0.1 – 10 second	
AC frequency		70 Hz	50 – 200 Hz	
Cleaning width		0	-20 – 20	
AC-DC change frequency		1 Hz	0.1 – 50 Hz	
Condition number		1	1 – 100	

● Function

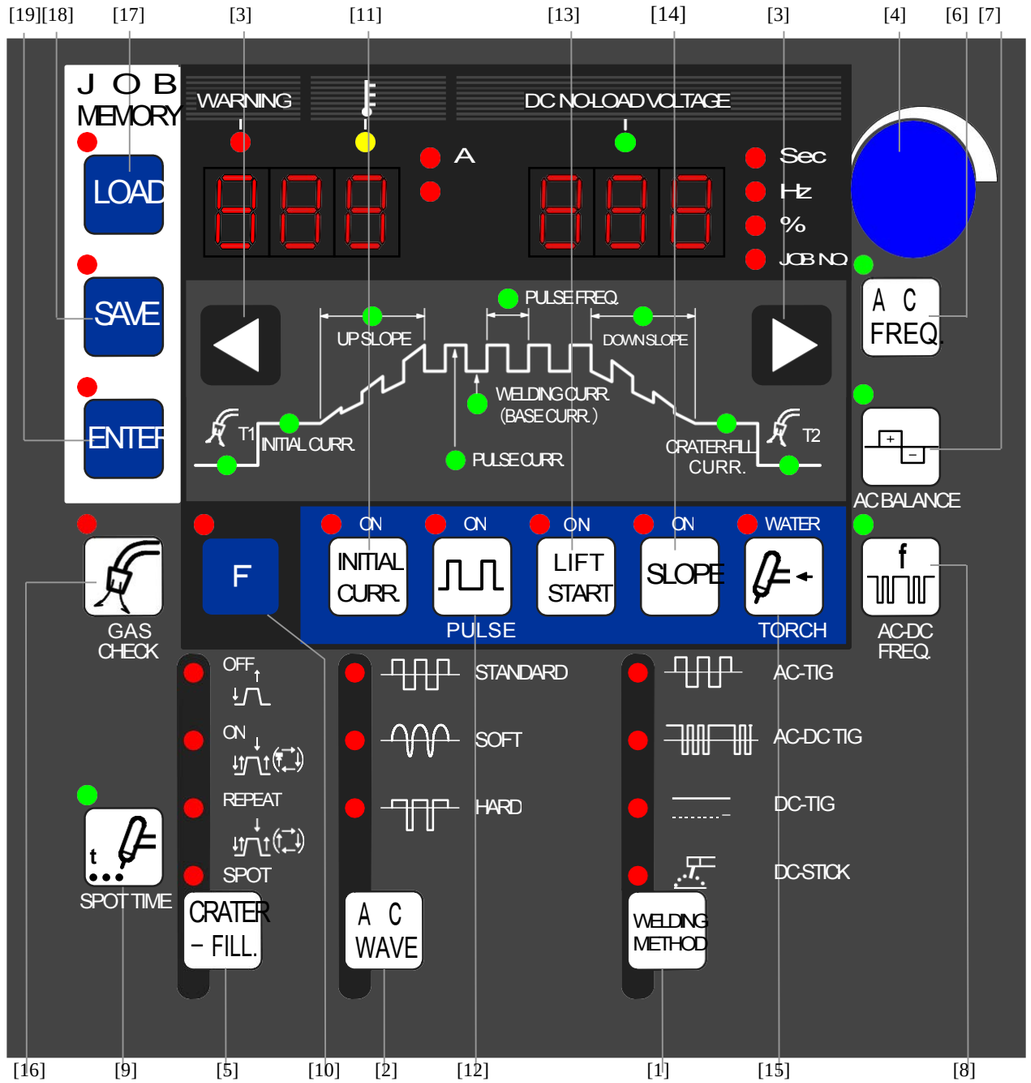
	Initial value	Setting range
Crater	OFF	OFF / ON / REPEAT / ARC SPOT
Welding method	AC TIG	AC TIG / AC-DC TIG DC TIG / DC STICK welding
AC wave form	STANDARD	STANDARD / SOFT / HARD
Initial current	OFF	ON / OFF
Pulse	OFF	ON / OFF
Lift start	High frequency start	Lift start / High frequency start
Slope	OFF	ON / OFF
Torch	AIR	Water / Air

● Internal function <Refer to 10.1.17 Internal Functions for detail.>
What can and cannot be stored in memory by each welding conditions memory number are discriminated by "○" and "×" given in the table below.

		Memory	Initial value	Setting range
F1	Start current	×	ON	ON (HIGH) / OFF (LOW)
F2	Change in sequence at arc spot time	×	OFF	ON (VALID) / OFF (INVALID)
F3	Termination of repetition	×	OFF	ON (VALID) / OFF (INVALID)
F4	Automatic/Stick	×	OFF	ON (AUTOMATIC) / OFF (STICK)
F5	External command 12 V MAX	×	OFF	ON (VALID) / OFF (INVALID)
F6	External command 10V MAX	×	OFF	ON (VALID) / OFF (INVALID)
F7	Pulse peak ratio	○	50 %	5 – 95 %
F8	Voltage reducing function	×	OFF	ON (VALID) / OFF (INVALID)
F9	Result display holding time	×	20 seconds	0 – 60 seconds
F10	AC ratio	○	70 %	10 – 90 %
F11	Change of operation sound	×	ON	ON (VALID) / OFF (INVALID)
F12	Change of external output terminal 1	×	1	1:Power preparation 2:Pulse synchronized output 3:EN synchronized output 4:AC synchronized output
F13	Change of external output terminal 2	×	2	
F14	Change of pulse synchronized input signal	×	OFF	ON (VALID) / OFF (INVALID)
F15	Indication change of cleaning width indication	×	OFF	ON (EP ratio indication) / OFF (±indication)
F16	Soft pulse	×	OFF	ON (soft pulse) / OFF (standard)

* Further, F17 to F20 have the functions as well. For details, see 10.1.17 "Internal Functions".

● In reading the "Operation" paragraph described in "10.1 Basic Setup" and in the subsequent paragraphs, consult this page to check the key location or the like.



[1] WELDING METHOD change-over key	[9] ARC SPOT TIME setting key	[17] LOAD key
[2] AC WAVE change-over key	[10] Function selection key	[18] SAVE key
[3] Parameter selection key	[11] INITIAL CURR. selection key	[19] ENTER key
[4] Parameter adjusting knob	[12] PULSE selection key	
[5] CRATER FILL. key	[13] LIFT START key	
[6] AC FREQ. key	[14] SLOPE selection key	
[7] AC BALANCE key	[15] TORCH change-over key	
[8] AC-DC change-over frequency setup key	[16] GAS CHECK key	

14. SPECIFICATIONS (continued)

QUICK MANUAL
For details, refer to “10. OPERATION”.

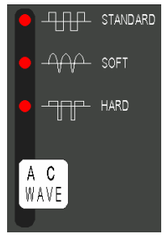
Ⓒ Before Using the Welding Power Source

1. Settings of Welding Method

Select “AC TIG”, “AC-DC TIG”, DC TIG” or “DC STICK” by using the WELDING METHOD key.

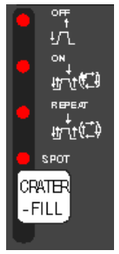
For DC STICK welding, skip steps 1, 2, 3, and 4.

2. AC WAVE selection



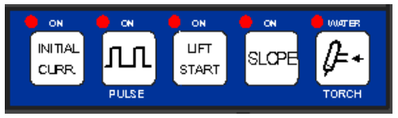
In the case of AC TIG and AC-DC TIG welding, select “STANDARD”, “SOFT” or “HARD” with the AC WAVE selector key.

3. Settings of Crater/Arc Spot



Use the CRATER-FILL key to select OFF / ON / REPEAT / SPOT.

4. Settings of Functions



- For using INITIAL CURRENT, press the INITIAL CURR. key to set the function to “ON”.
  [ON]: INITIAL CURR. lamp is on.
  [OFF]: INITIAL CURR. lamp is off.

- For pulse welding, set to “ON” by using the PULSE key.
  [ON]: PULSE lamp is on.
  [OFF]: PULSE lamp is off.

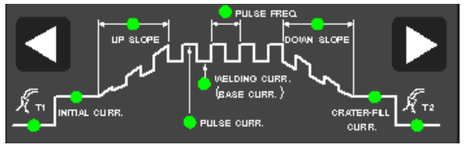
- For LIFT START, set to “ON” by using the LIFT START key. For HIGH FREQUENCY START, set to “OFF” with this key.
  [ON]: LIFT START lamp is on.
  [OFF]: LIFT START lamp is off.

- For using SLOPE function, set to “ON” with the SLOPE selection key.
  [ON]: LIFT START lamp is on.
  [OFF]: LIFT START lamp is off.

- For using the water-cooled torch, set to “WATER” with the TOCH key, and then run cooling water.
  [WATER]: TORCH lamp is on.
  [AIR]: TORCH lamp is off.

NOTE:
There may be unavailable functions in some crater settings. Refer to “OPERATION” for details.

5. Settings of Parameter



Use the parameter selection keys to select the parameter you want to set, then adjust it while turning the parameter adjusting knob.

When the arc spot time is set up, select the key shown in the figure on the left, and then use the parameter adjusting knob for time setting.

Using the parameter adjusting knob, adjust the AC frequency after selecting the key shown in the figure on the left in the case of AC TIG and AC-DC TIG welding.

Using the parameter adjusting knob, set up the EP ratio after selecting the key shown in the figure on the left so that the required cleaning width is obtained in the case of AC TIG and AC-DC TIG welding.

NOTE:

- **Turning the parameter adjusting knob clockwise increases the parameter. To decrease the parameter, turn the parameter adjusting knob counter-clockwise. The parameters largely increase or decrease by turning the parameter adjusting knob quickly.**
- **There may be unavailable parameters in some crater settings and function settings. Refer to Section 10, “OPERATION” for details**.

6. Checking the Rate of Gas Flow

Open the discharge valve of the gas cylinder, press the GAS CHECK key to check the rate of gas flow. After performing GAS CHECK, stop the gas flow by pressing the GAS CHECK key.

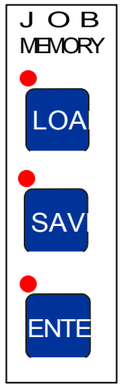
Now you have completed the preparations that are required to start welding. Press the torch switch to start welding.

Protecting the Keys and Releasing the Key Protection

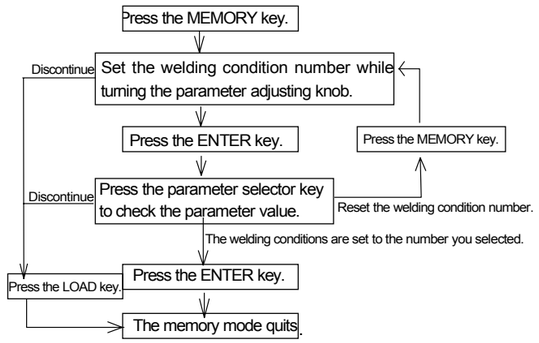
- Protecting of the keys
  Hold down the ENTER key + the F key at a time for a few seconds. The F lamp starts blinking. Blinking of the F lamp means the welding machine is in the key protection mode.

- Releasing the key protection
  Hold down the ENTER key + the F key at a time for a few seconds. When the F lamp turns off, the key protection function is released.

Presetting the Welding Conditions

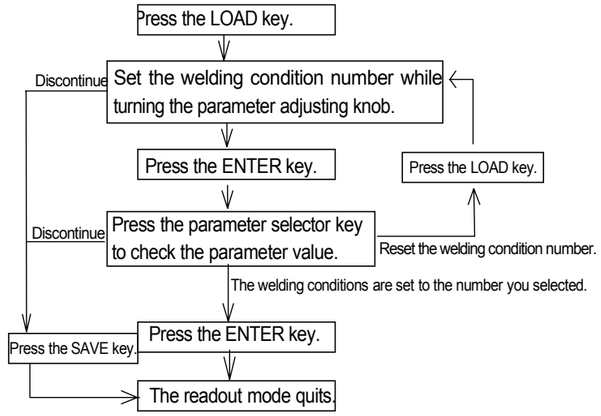


1) Pressing the SAVE key enters the save mode. The preset welding condition number is displayed in the right display and the welding current is displayed in the left display.
2) Preset the welding conditions to the desired numbers 0 - 30 while turning the parameter adjusting knob. When “---“ is displayed in the left display, the number you selected is available. When “---” is not displayed in the left display, the number you selected is unavailable. In this case, select another number. Otherwise, the welding conditions preset to the number are erased and overwritten with the welding conditions you newly set.
3) Press the ENTER key to check the parameter that is preset to the number.
4) When pressing the ENTER key again, the welding conditions are set.



④ Loading the Welding Conditions

1) Pressing the LOAD key enters the load mode. The preset welding condition number is displayed in the right display and the welding current is displayed in the left display.
2) Preset the welding conditions to the desired numbers 0 – 30 while turning the parameter adjusting knob. When “---“ is displayed in the left display, no welding conditions are preset to the number you selected.
3) Press the ENTER key to check for the parameter preset to the number.
4) When pressing the ENTER key again, the welding conditions preset to the welding condition number are retrieved.



⑤ Settings of the (Internal) Functions

1) When holding down the F key for a few seconds, the function mode is activated. The function number blinks in the left display, the function status is displayed in the right display.
2) Set the function number while turning the parameter adjusting knob.
3) When pressing the F key, the function number lights up, then the function status blinks.
4) Set the function status while turning the parameter adjusting knob.
5) To cancel the function mode, hold down the F key for a few minutes.

⑥ Error code table

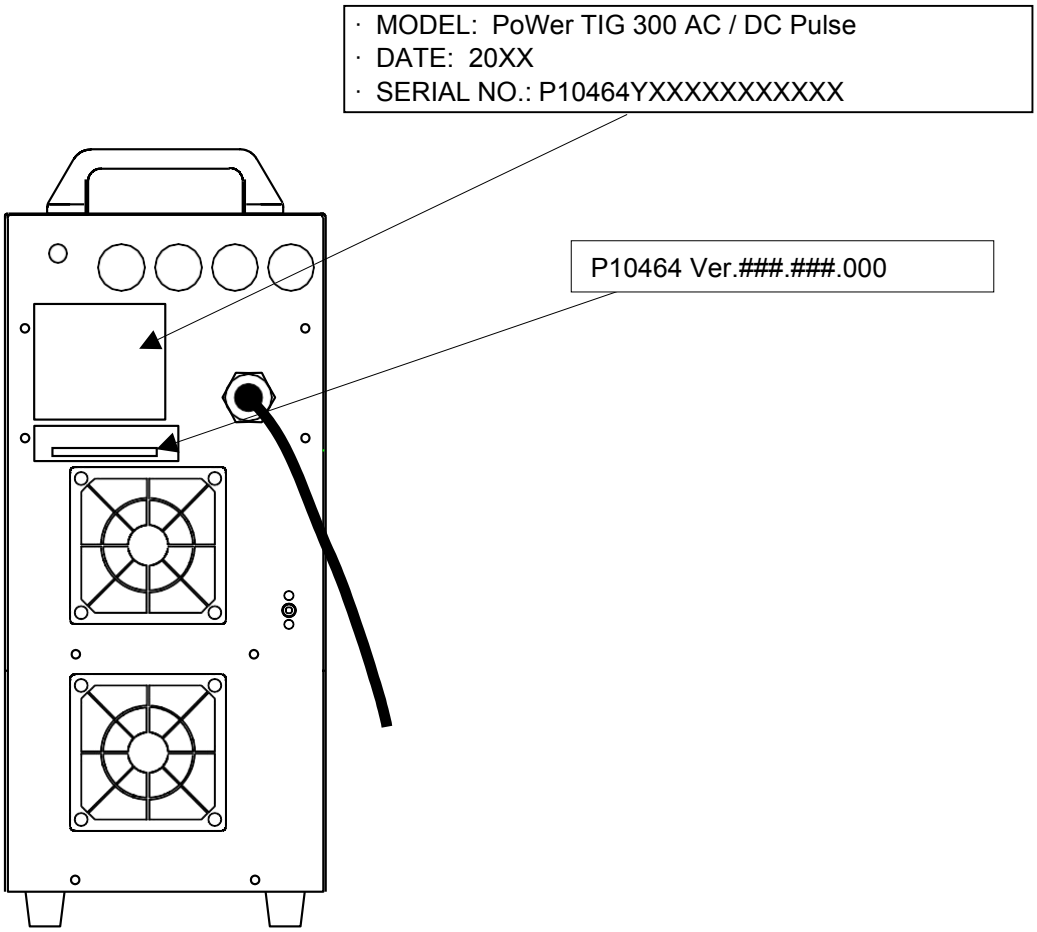
No.	Displays on the front panel		Classification of errors
	Left	Right	
1	dAI	Hen	Torch switch off state waiting
2	E-	000	Operation stop
3	E-	100	Control power supply error
4	E-	200	Primary/secondary current detection error
5	E-	300	Thermal overload
6	E-	500	Abnormal water pressure
7	E-	510	Water cooling unit error
8	E-	600	Replacement of batteries (warning)
9	E-	710	Open-phase detection error
10	E-	751	Secondary side over voltage error
11	E-	9XX	Microcomputer error

15. SERVICE AND SUPPORT

Please contact your local dealer for service. (See the back cover for telephone numbers, fax numbers, and mailing addresses.)

NOTE:

1) **See Section 12, "MAINTENANCE AND TROUBLESHOOTING" before contacting your dealer for service.**
2) **When contacting your dealer for service, you are required to provide the following information:**
   - **Address**
   - **Name**
   - **Telephone number**
   - **Product model**
   - **Manufacture year**
   - **Serial number**
   - **Software version number**
   - **Details of troubles**



PoWer TIG Series

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