PoWer MIG Series

GeKaMac®



PoWer MIG GS 380 S

Users Manual

Please Read and Understand This Manual
Before Operating The Welding Machine

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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.
Leaving accretive dust in the welding machine may cause an insulation deterioration and result in electrical shock and fire.

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 electrodes or 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.
11. Remove dust by blowing moisture-free compressed air on each part periodically.



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 face shields or 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 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, 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.
Leaving piled-up dust in the welding power source may cause insulation deterioration and result in electrical shock and 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 power cable for base metal 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 anything 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, arc may be generated and cause damage by a fire if the wire contacts the frame or the work piece.
15. Remove dust by blowing moisture-free compressed air on each part periodically.

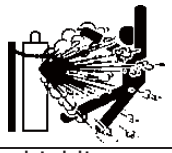


FUMES AND GASES can be hazardous to your health.

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 arc rays 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 handle 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 the valve outlet when opening cylinder valve.
8. Keep protective cap in place over valve except when a gas cylinder is in use or connected for use.
9. Do not disassemble or repair the gas regulator except if you are authorized by the manufacturer.

⚠ WARNING

Be sure to observe the followings for preventing physical injury, a fire and electric shock.

Handling of plastic parts

Front panel and the likes on this power source are made of polycarbonate.
Make sure to observe the following notice.

1. Do not apply external force and a shock to front panel and the likes. Otherwise, it maybe broken and in trouble.
2. Polycarbonate can endure wiping off with water and alcohol in general but using at a sticking place with an organic solvent, chemicals, cutting oil and atmosphere such as composition oil, it gives bad influence to polycarbonate and it causes a crack (breaking) and a strength down.
   If abnormality was discovered such as crack on the front panel, stop operating immediately and ask to repair and change.




Rotating parts may cause injury. 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, injury 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 machines 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 or wire feeder where they will pit or fall.

WELDING WIRE can cause puncture wounds.

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



To prevent electromagnetic troubles, read the following. Also, if electromagnetic troubles occur, check the following again.

Before installing arc welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

1. other supply cables, control cables, signalling and telephone cables, above, below and adjacent to the arc welding equipment.
2. radio and television transmitters and receivers.
3. computer and other control equipment;
4. safety critical equipment, for example guarding of industrial equipment;
5. the health of the people around, for example the use of pacemakers and hearing aids;
6. equipment used for calibration or measurement;
7. The user shall ensure that other equipment being used in the environment is compatible;
8. the time of day that welding or other activities are to be carried out;

Methods of reducing EMC:

- Public supply system
  Add a noise filter to the input cables.
- Maintenance of the arc welding equipment
  Close and fix all doors and covers of the welding machine.
- Welding cables
  Do not use an unnecessarily long cable.
  Place a base metal cable and a torch side cable as closely as possible.
- Equipotential bonding
  Bonding of all metallic objects in the surrounding area should be considered.
- Earthing of the workpiece
  The connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.
- Screening and shielding
  It is selective screening and shielding of other cables and equipment in the surrounding area.

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

Arc welding equipment Part 10: Electromagnetic compatibility (EMC) requirements IEC 60974-10, from International Electro technical Commission

WARNING: The class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radiated disturbances.

WARNING: This equipment does not comply with IEC 61000-3-12. If it is connected to a public low voltage system, it is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment may be connected.

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.

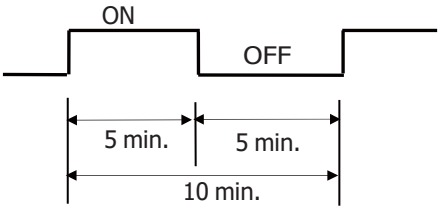
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3. GENERAL NOTICE OF OPERATION

3.1 Rated Duty Cycle

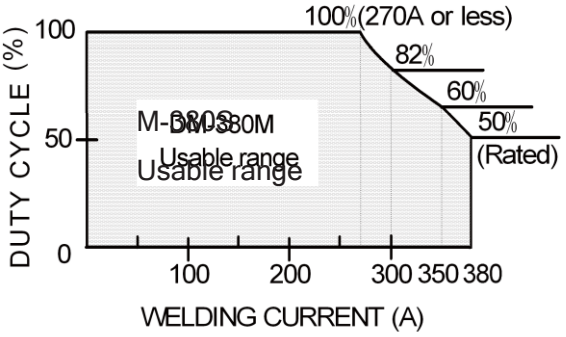
⚠ CAUTION
● Use this welding machine at or under the rated duty cycle. Exceeding the rated duty cycle limitation may result in damage to the welding machine.

- The rated duty cycle of the welding power source is the following: 380A, 50%
- The duty cycle of 50% means the machine must be rested for 5 minutes after 5 minutes of continuous welding at the rated current.



Operation cycle of 50% duty cycle

- Failure to observe duty cycle limitations may cause the temperature inside the welding power source to exceed tolerance levels. This may contribute 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, based on the appropriate 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 it, such as welding torches. Use the welding power source within the lowest rated duty cycle of the accessories.



3.2 Limitation of use

- This welding power source is not suitable for use in the rain.
- Do not use this welding power source for pipe thawing.

3.3 Applicable Welding Process and Wire Diameter

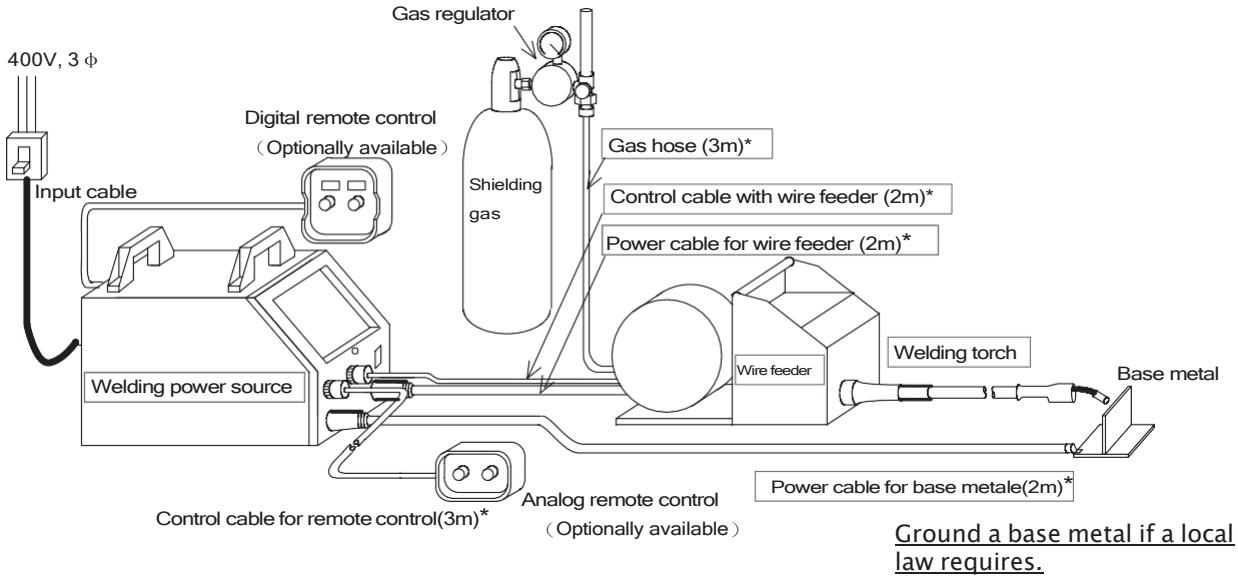
Applicable wire	Wire dia.(mmϕ)	Applicable gas
G3Si1 (MILD STEEL SOLID)	0.8	CO_2 or MAG(80%Ar, 20% CO_2)
	1.0	
	1.2	
G3Si1 (Fill) (MILD STEEL CORED)	1.2	CO_2

NOTE: Use of mixture gas other than the mixture ratio of the gas mentioned above may not properly adjust welding voltage at SYNERGIC control, etc.

4. STANDARD COMPOSITION AND ACCESSORIES

4.1 Standard Composition

● This welding power source is not included the accessories indicated in the boxes. Preparation of the Accessories for welding.



* Other length of cables/hoses is available. Refer to Section 11.4.2,"Extention Cable/Hose".

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

4.2 Preparation of consumables for welding

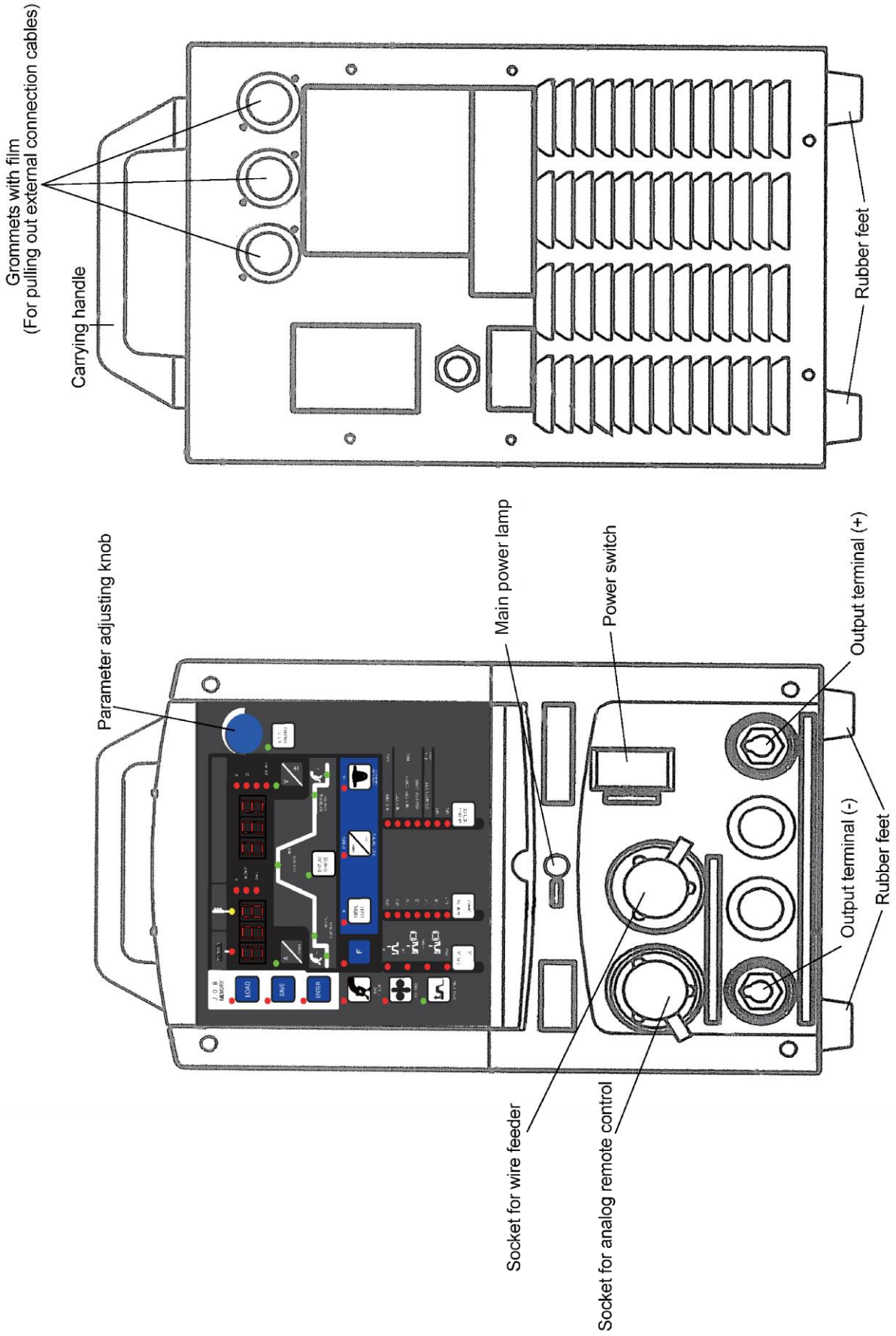
(1) Shielding gas
Use a suitable gas for welding method.

- Carbon dioxide gas (CO_2 gas)
  For welding (purity: 99.9% or more, moisture content: 0.002% or less)
- MAG gas
  80% argon (Ar) + 20% carbon dioxide gas (CO_2 gas)

(2) Welding Wire

5. FUNCTION OF EQUIPMENT

5.1 Welding Power Source



6. NECESSARY POWER SOURCE EQUIPMENT

6.1 Welding Power Source Equipment (for commercial use)

⚠ WARNING
● When the welding power source is used in a humid environment such as a construction site, on a steel plate, or on a steel structure, install an earth leakage circuit breaker.

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

Capacity of Necessary Power Source Utility

Power supply voltage	400V, 3 phases
Tolerance range of fluctuation of power supply voltage	400V±15%
Installed capacity	18kVA or more
Capacity of switch/circuit breaker	40A

6.2 Precautions for Use of the Engine Generator

⚠ CAUTION
● Use the auxiliary power of engine welder with an improved voltage waveform. Some engine welders have poor electricity, which may cause product damage. Contact an engine welder manufacturer for improvement of waveform.

To prevent the engine generator or auxiliary power from being damaged, 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 that has twice that of 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, this may result in abnormal decrease in output current with arc loss during arc start etc. Ask an engine generator manufacturer for a damper winding.
- Do not combine more than two welding power sources with an engine generator. The effect of each welding power source may cause easy loss of arc.

7. TRANSPORT AND INSTALLATION

7.1 Transport

⚠ WARNING	
Follow the instructions below to avoid trouble and product damage when carrying the welding power source.	
	● Do not touch the live electrical parts inside or outside the welding power source. ● Be sure to disconnect the line disconnect switch when carrying the welding power source.
	● When hanging the welding power source by a crane, do not use the carrying handle.

7.2 Installation

⚠ WARNING	
When installing the welding power source, follow the instructions below to avoid a fire caused by welding and physical injury from gas fumes.	
	● Do not place the welding power source near combustible materials and flammable gas. ● Remove combustible materials to prevent dross coming into contact with combustible objects. If that 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 power source is used in the place regulated by a local law. ● To prevent injury 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 power source in a tank, a boiler, a hold of a ship, because heavier gas such as carbon dioxide or argon gases are drifting there. ● When using the welding power source at a narrow space, comply with a trained supervisor's directions. And be sure to wear a gas mask. ● Do not operate the welding power source near the place where degreasing, cleansing, and spraying are performed. Otherwise, poisonous gas may be generated. ● Be sure to wear a gas mask or adequately ventilate when welding a coating steel plate. (Poisonous gas and fume may be generated.)

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.

Since large current abruptly flows inside the welding power source during welding, other machines near the welding power source may be troubled due to electromagnetic noise

- Do not ground the welding power source commonly with other machines.
- Close and fix all doors and covers of the welding power source.
- Do not use an unnecessarily long cable.
- Place a base metal cable and a torch side cable as closely as possible.

In the event of electromagnetic trouble, follow the instructions below.

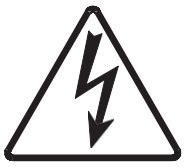
- Change the installation place of the welding power source.
- Keep the machines which may be affected away as far from the welding power source, cables and welding site as possible.
- Add a noise filter to the input cables.
- Mount an input cable in the grounded metallic conduit.
- Shield the whole welding places from electromagnetic trouble. If electromagnetic troubles are still not solved after following the above instructions, consult your nearest DAIHEN dealer.

⚠ CAUTION

Follow the instructions below when selecting an installation place of the welding power source.

- Do not install the welding power source in the place subject to direct sunlight and rain.
- Place the welding power source on a strong and stable surface.
- Install the welding power source in the place where the ambient temperature is between -10 and +40˚C.
- Altitude above sea level up to 1000m.
- Do not install the welding power source in the place where metal material such as spatter enters the welding power source.
- Keep the install distance of 30cm 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.

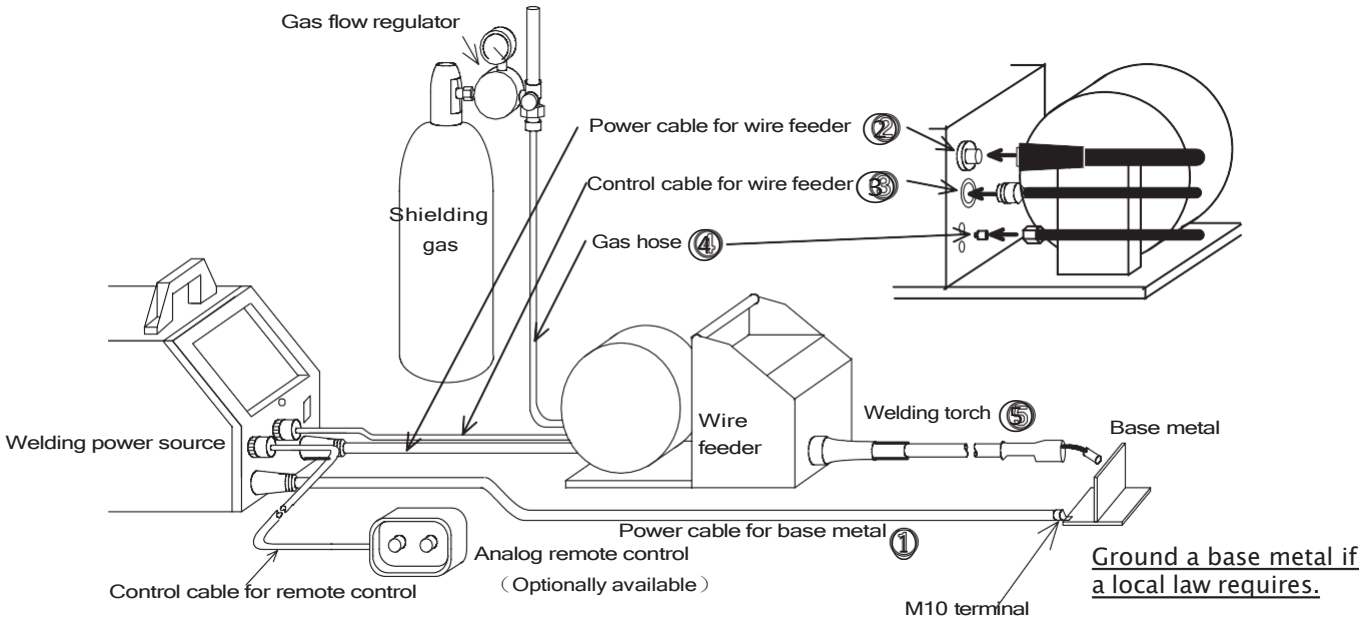
8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE

⚠ WARNING	
	Follow the instructions below to avoid electric shock.

Do not touch the live electrical parts, as this will result in fatal shock and severe burn.

- Do not touch the live electrical parts of the welding power source.
- Have a qualified electric engineer ground the case of the welding power source and the base metal or jig electrically connected, following a local low.
- With the line disconnect switch inside the switch box all turned off, ground and connect the welding power source.
- Do not use a cable with lack of capacity or a seriously damaged cable.
- Tighten and insulate the connections of cables.
- Surely attach the cover of the welding power source after connection of the cables.

8.1 Connecting of the Welding Power Source



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” above.

① Connect the power cable for base metal between the “base metal ⊖” terminal and the base metal.
② Attach the power cable for wire feeder to the “torch ⊕” output terminal.
③ Insert the control cable for wire feeder into the socket for wire feeder.
④ Attach the gas hose to the gas outlet on the wire feeder.
⑤ Connect the welding torch to the wire feeder.
⑥ Connect the hoses for water supply and for condensed water to the water cooler. (When using a water-cooled torch.)

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

8.2 Connecting of the Gas Hose

⚠ WARNING

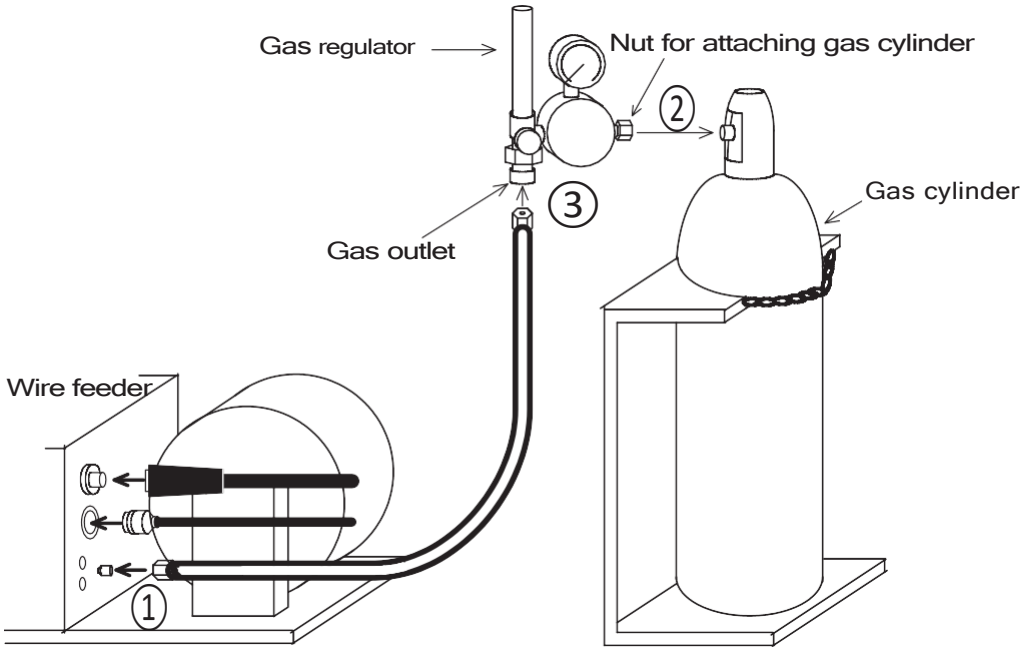


- There is a danger of suffocation caused by lack of oxygen when shielding gas is left flowing in a closed place. Be sure to turn off the shielding gas at the main when the welding power source is not in use.

⚠ CAUTION

- Be sure to connect the gas hose after fixing gas cylinder to the stand, as physical injury may result from the gas cylinder toppling over.
- Attach a proper gas regulator to a gas cylinder. Failure to observe the demand may result in physical injury. The gas regulator for high pressure gas must be used.

Ⓒ Securely attach the gas hose to the gas inlet located on the rear side of the wire feeder with a wrench, etc.
Ⓒ Fix the nut for attaching the gas cylinder with a wrench, etc.
Ⓒ Securely attach the gas hose to the gas outlet with a wrench, etc.

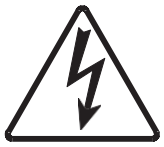


Gas Hose Fitting Size: 9/16-18 UNF

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

8.3 Grounding and connection of input side

⚠ WARNING



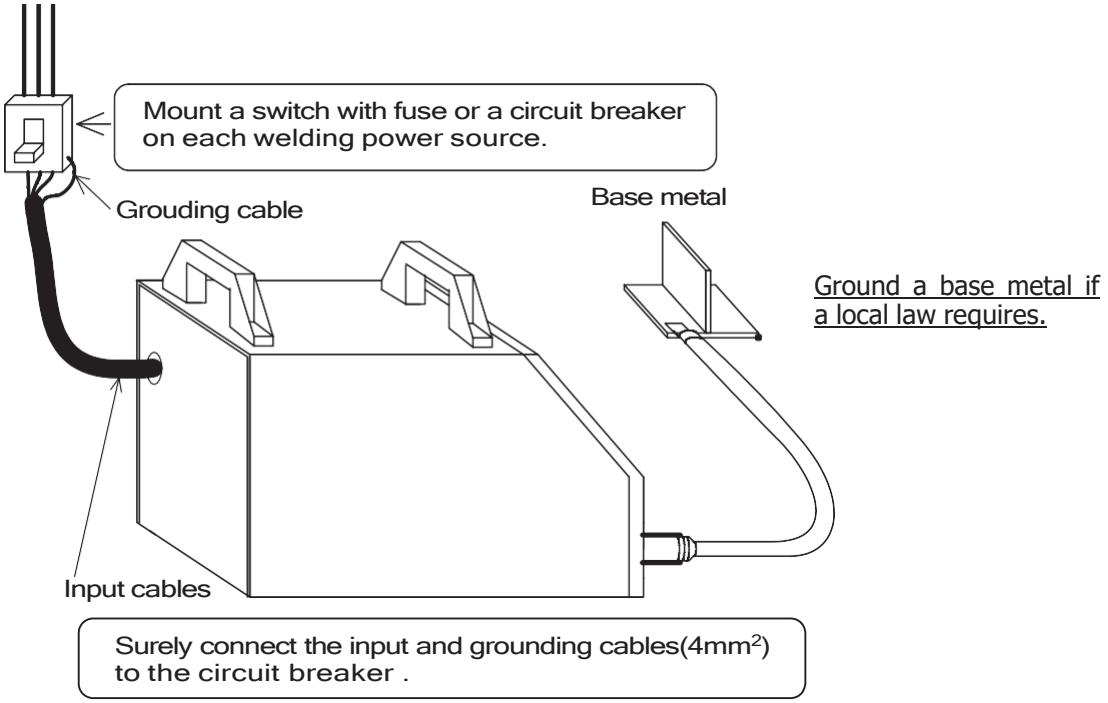
Follow the instructions below to avoid electric shock.

Touching the live electrical parts may result in fatal electric shock and severe burn.

- Do not touch the live electrical parts of the welding power source.
- Have a qualified electric engineer ground the case of the welding power source and the base metal or jig electrically connected in accordance with a local low.
- With the line disconnect switch in the switch box all touched off, ground and connect the welding power source.

⚠ CAUTION

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



⚠ CAUTION

Be sure to ground the case of the welding power source.
Use a grounding cable 4mm² or more cross section.

- 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 floating capacity (electrostatic capacity naturally generated between the input conductor and the case metal). If you touch the case, you may suffer from electric shock. Be sure to ground the case of the welding power source.

9. WELDING PREPARATION

9.1 Preparing the Protective Equipment

	To protect you from gas generated from welding, fume, and lack of oxygen, wear protective equipment

- To avoid gas poisoning and danger of suffocation, wear a gas mask or adequately ventilate when the welding power source 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 power source in a tank, a boiler, a hold of a ship, because heavier gas such as carbon dioxide or argon gases are drifting.
- When using the welding power source at a narrow space, comply with a trained supervisor's directions. And be sure to wear a gas mask.
- Do not operate the welding power source near the places where degreasing, cleansing, and spraying are performed. Otherwise, poisonous gas may be generated.
- Be sure to wear a gas mask or adequately ventilate when welding a coating steel plate. (Poisonous gas and fume may be generated.)

NOTE: Install a windshield to protect arc from wind when using an electric fan for ventilation or when welding outdoors. Failure to observe the demand may result in poor welding.

⚠ CAUTION	
	Use the protective equipment to protect you and other workers from arc rays, spattering dross, and noise from welding operation.

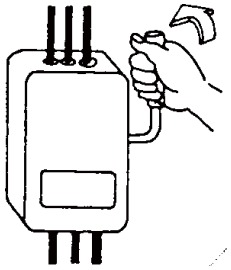
- When performing or monitoring welding operation, wear an eye protector with a good light blocking effect or face shield.
- Wear protective glasses to protect your eyes from the spattering dross.
- Wear protective equipment such as protective gloves, long-sleeve clothes, leg covers, and leather apron.
- 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 Flow Rate Regulator

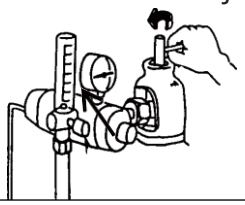
⚠ CAUTION
● Keep your face away from the outlet when turning on gas at the main of the gas cylinder, as burst of high-pressure gas may result in physical injury.

NOTE: Gas checking automatically stops in two minutes.



① Turn on the line disconnect switch. (400V, 3ϕ)

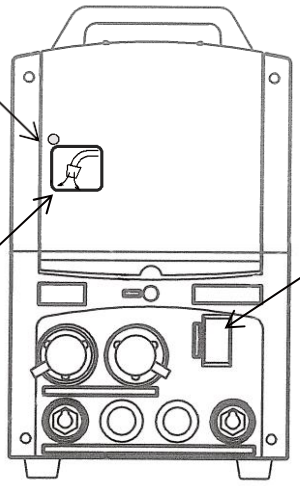
Gas flow rate adjusting knob



③ Set the gas flow rate regulator to "SHUT" , then turn on gas at the main.

⑤ Set the gas flow rate adjusting knob to "OPEN" to adjust the gas flow rate.

④ Press the GAS CHECK key. (The GAS CHECK lamp lights up.)



⑥ Press the GAS CHECK key again. (The GAS CHECK lamp goes out.)

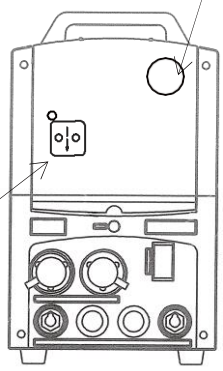
② Place the power switch in the "I" (ON) position.

9.3 Inching Operation

⚠ WARNING	
	● Do not look into the tip hole to check for the rate of wire feeding while inching. ● Do not bring torch tip close to face, eyes and body.
⚠ CAUTION	
	● Keep away your hands, fingers, hair or clothes from the rotating parts of the feed roll, etc. to prevent you from being caught into the rotating parts while inching.

After straightening the welding torch, feed the wire while pressing the inching button. ("INCHING" lamp lights up). When the wire appears from the end of the torch, release the INCHING key. Cut the wire at about 10mm from the end of the torch. When adjusting wire feeding speed, use the parameter adjusting knob. Inching operation can be controlled by using the INCHING button on the analog remote control (optional accessory). When controlling inching operation from the remote control, the INCHING key on the front panel does not function.

Parameter adjusting knob



INCHING key

9. WELDING PREPARATION (continued)

9.4 Welding Conditions

When setting to the improper welding conditions, the following troubles will occur.

Cause	Trouble
Wire extension is too long.	·Long Arc length ·Wide bead width ·Poor shield
Wire extension is too short.	·Short arc length ·Easy generation of spatter
Welding voltage is too high.	·Long arc length ·Wide bead width ·Shallow penetration and flat bead
Welding voltage is too low.	·Stick to base metal and easy generation of spatter ·Narrow bead width ·Deep penetration and low excess metal
Welding current is too high.	·Wide bead width ·Deep penetration and high excess metal
Travel speed is too fast.	·Narrow bead width ·Shallow penetration and low excess metal

9. WELDING PREPARATION (continued)

9.4 Welding Conditions (continued)

The data in the tables below is only for reference. Please find the optimum welding conditions for weldment shape and welding position.

9.4.1 Example CO_2 Welding Conditions

(1) Example Welding Conditions of Horizontal Fillet

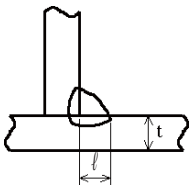


Plate thickness t (mm)	Leg length ℓ (mm)	Wire diameter (mmϕ)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)	CO_2 gas flow rate (ℓ/min)
1.2	2.5 - 3.0	1.0	70 - 100	18 - 19	50 - 60	10 - 15
1.6	2.5 - 3.0	1.0 - 1.2	90 - 120	18 - 20	50 - 60	10 - 15
2.0	3.0 - 3.5	1.0 - 1.2	100 - 130	19 - 20	50 - 60	15 - 20
2.3	3.0 - 3.5	1.0 - 1.2	120 - 140	19 - 21	50 - 60	15 - 20
3.2	3.0 - 4.0	1.0 - 1.2	130 - 170	19 - 21	45 - 55	15 - 20
4.5	4.0 - 4.5	1.2	190 - 230	22 - 24	45 - 55	15 - 20
6.0	5.0 - 6.0	1.2	250 - 280	26 - 29	40 - 50	15 - 20
9.0	6.0 - 7.0	1.2	280 - 300	29 - 32	35 - 40	15 - 20
12.0	7.0 - 8.0	1.2	300 - 340	32 - 34	30 - 35	20 - 25

(2) Example Welding Conditions of Down Fillet

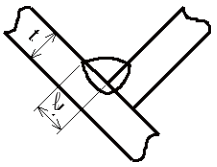


Plate thickness t (mm)	Leg length ℓ (mm)	Wire diameter (mmϕ)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)	CO_2 gas flow rate (ℓ/min)
1.2	2.5 - 3.0	1.0	70 - 100	18 - 19	50 - 60	10 - 15
1.6	2.5 - 3.0	1.0 - 1.2	90 - 120	18 - 20	50 - 60	10 - 15
2.0	3.0 - 3.5	1.0 - 1.2	100 - 130	19 - 20	50 - 60	15 - 20
2.3	3.0 - 3.5	1.0 - 1.2	120 - 140	19 - 21	50 - 60	15 - 20
3.2	3.0 - 4.0	1.0 - 1.2	130 - 170	20 - 22	45 - 55	15 - 20
4.5	4.0 - 4.5	1.2	200 - 250	23 - 26	45 - 55	15 - 20
6.0	5.0 - 6.0	1.2	280 - 300	29 - 32	40 - 50	15 - 20
9.0	6.0 - 8.0	1.2	300 - 350	32 - 34	40 - 45	15 - 20
12.0	10.0 - 12.0	1.2	320 - 350	33 - 36	25 - 35	20 - 25

9. WELDING PREPARATION (continued)

9.4 Welding Conditions (continued)

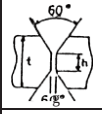
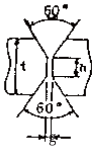
9.4.1 Example CO_2 Welding Conditions (continued)

(3) Example Welding Conditions of I Shape Butt without Backing Plate



Plate thickness t (mm)	Root gap g (mm)	Wire diameter (mmϕ)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)	CO_2 gas flow rate (ℓ/min)	Number of layers	
1.2	0.0	1.0	70 - 80	17 - 18	45 - 55	10	1	
1.6	0.0	1.0	80 - 100	18 - 19	45 - 55	10 - 15	1	
2.0	0.0 - 0.5	1.0	100 - 110	19 - 20	50 - 55	10 - 15	1	
2.3	0.5 - 1.0	1.0 - 1.2	110 - 130	19 - 20	50 - 55	10 - 15	1	
3.2	1.0 - 1.2	1.0 - 1.2	130 - 150	19 - 21	40 - 50	10 - 15	1	
4.5	1.2 - 1.5	1.2	150 - 170	21 - 23	40 - 50	10 - 15	1	
6.0	1.2 - 1.5	1.2	220 - 260	24 - 26	40 - 50	15 - 20	Front 1 Back 1	2
9.0	1.2 - 1.5	1.2	320 - 340	32 - 34	45 - 55	15 - 20	Front 1 Back 1	2

(4) Example Welding Conditions of Single and Double Grooves

Plate thickness t (mm)	Bevel shape	Root gap g (mm)	Root face h(mm)	Wire diameter (mmϕ)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)	CO_2 gas flow rate (ℓ/min)	Number of layers	
12		0.0 - 0.5	4 - 6	1.2	300 - 350	32 - 35	30 - 40	20 - 25	Front	2
							45 - 50		Back	
16							25 - 30		Front	
							30 - 35		Back	
16		0.0					30 - 35		Front	
							30 - 35		Back	

(5) Example Welding Conditions of Lap Fillet

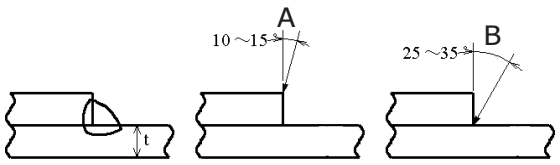


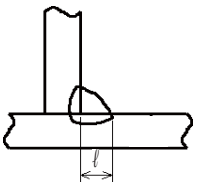
Plate thickness t (mm)	Wire diameter (mmϕ)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)	Aim position	CO_2 gas flow rate (ℓ/min)
1.2	1.0	80 - 100	18 - 19	45 - 55	A	10 - 15
1.6	1.0 - 1.2	100 - 120	18 - 20	45 - 55	A	10 - 15
2.0	1.0 - 1.2	100 - 130	18 - 20	45 - 55	A or B	15 - 20
2.3	1.0 - 1.2	120 - 140	19 - 21	45 - 50	B	15 - 20
3.2	1.0 - 1.2	130 - 160	19 - 22	45 - 50	B	15 - 20
4.5	1.2	150 - 200	21 - 24	40 - 45	B	15 - 20

9. WELDING PREPARATION (continued)

9.4 Welding Conditions (continued)

9.4.2 Example CO_2 Welding Conditions of Wire with Flux

● Example Welding Conditions of Horizontal Fillet



Leg length ℓ (mm)	Wire diameter (mmϕ)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)
4	1.2	250	27	50
5	1.2	270	29	50
6	1.2	270	29	45
7	1.2	280	30	40
8	1.2	300	31	30
9	1.2	320	32	30

9.4.3 Example Welding Conditions of MAG Short Arc

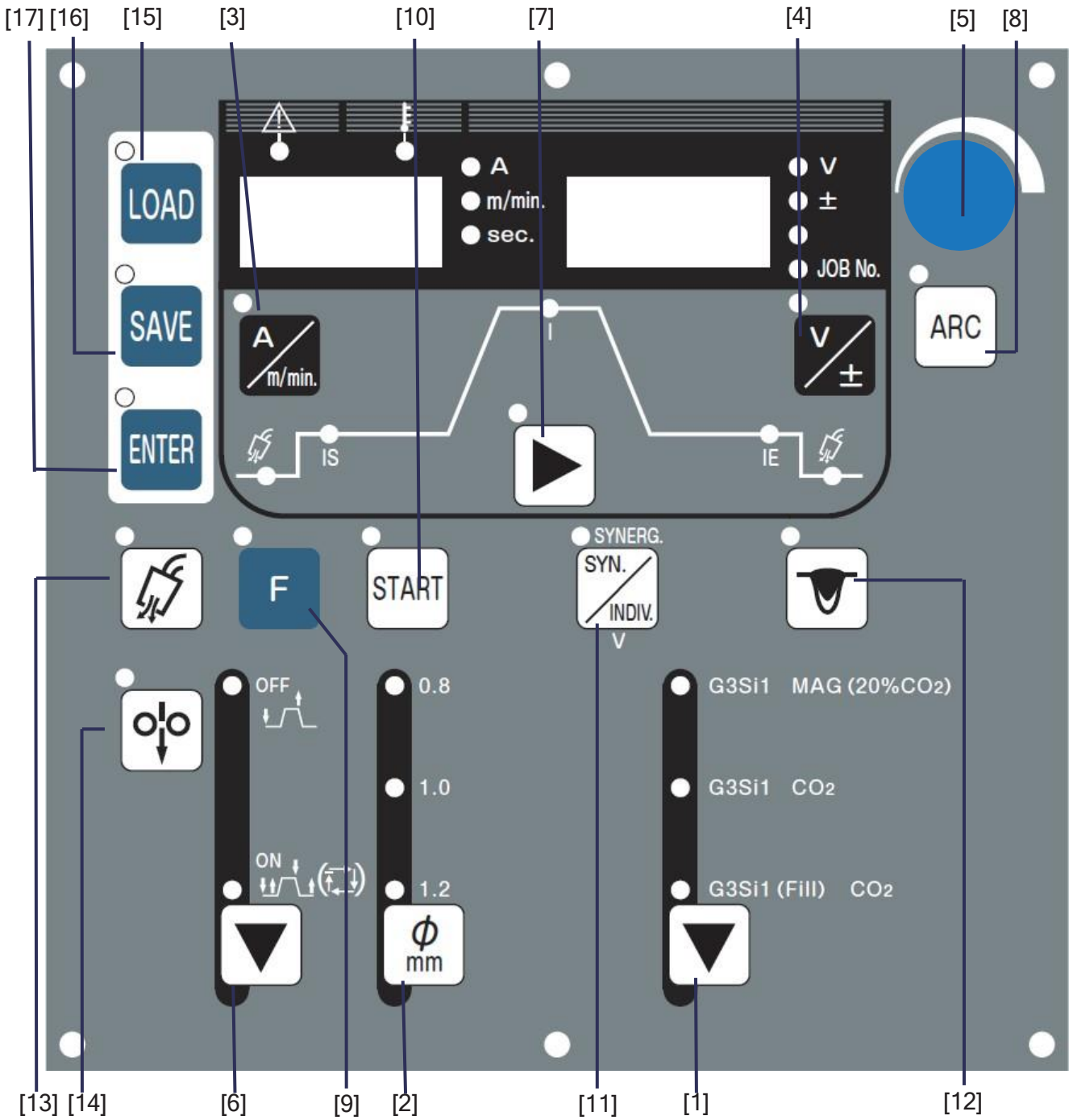
Material: Mild steel, Gas: Mixture gas of Ar + CO_2 (10－15 ℓ/min)

Joint Geometry	Plate thickness t (mm)	Wire diameter (mmϕ)	Gap (mm)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)
Butt	1.0	0.8 - 1.0	0.0	50 - 55	13 - 15	40 - 55
	1.2	0.8 - 1.0	0.0	60 - 70	14 - 16	30 - 50
	1.6	0.8 - 1.0	0.0	100 - 110	16 - 17	40 - 60
	2.3	1.0 - 1.2	0.0 - 1.0	110 - 120	17 - 18	30 - 40
	3.2	1.0 - 1.2	1.0 - 1.5	120 - 140	17 - 19	25 - 30
	4.0	1.0 - 1.2	1.5 - 2.0	150 - 170	18 - 21	25 - 40

10. OPERATION

● Use "Quick Manual" in the section 14. For reference.

Front Panel



[1] ▼ (WELDING METHOD) key	[10] START (INITIAL CURR.) key
[2] φ mm (WIRE DIA) key	[11] VOLT. CONTROL key
[3] A/m/min selector key	[12] CONSTANT PENETRATION key
[4] V/± selector key	[13] GAS CHECK key
[5] Parameter adjusting knob	[14] INCHING key
[6] ▼ (CRATER-FILL) key	[15] LOAD key
[7] ▶ (DISPLAY CHANGE) key	[16] SAVE key
[8] ARC (CONTROL) key	[17] ENTER key
[9] F (FUNCTION) key	

10. OPERATION (continued)

⚠ CAUTION
● This welding power source 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 power source 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 power source.

When reading the operating instructions described below, unfold Page 77 so that you can read them confirming the location of the keys on the front panel.

10.1 Basic Settings

10.1.1 Setting of Welding Mode

Choose the welding mode using the WELDING METHOD key [1] and the WIRE DIA (mmφ) key [2] in accordance with the welding method and wire diameter used. The selectable welding modes are shown in the table below.

WELDING METHOD		WIRE DIA. (mmφ)
TYPE OF WIRE	GAS	
G3Si1 (MILD STEEL SOLID)	MAG	0.8
		1.0*
		1.2*
G3Si1 (MILD STEEL SOLID)	CO_2	0.8
		1.0
		1.2
G3Si1 (Fill) (MILD STEEL CORED)	CO_2	1.2

NOTE:

- MAG gas is mixture gas of 80% argon and 20% carbon dioxide gas.
- * shows soft arc modes in standard. Refer to Section 10.2.1 (12), "Setting of Soft Arc Mode: F12" on page 38 for more information on soft arc mode.

When setting the welding mode, select the welding method using the WELDING METHOD key [1] first. Once the welding method is set, the available wire diameters are automatically decided according to the welding method. Then, set the wire diameter with the WIRE DIA (mmφ) key [2].

Selecting the proper combination of material and gas can cancel the error and activate the welding power source. Wrong combination of welding mode and wire diameter will cause "---"and "---" in the displays to blink, the LED lamps to light, and then the welding power source to stop.

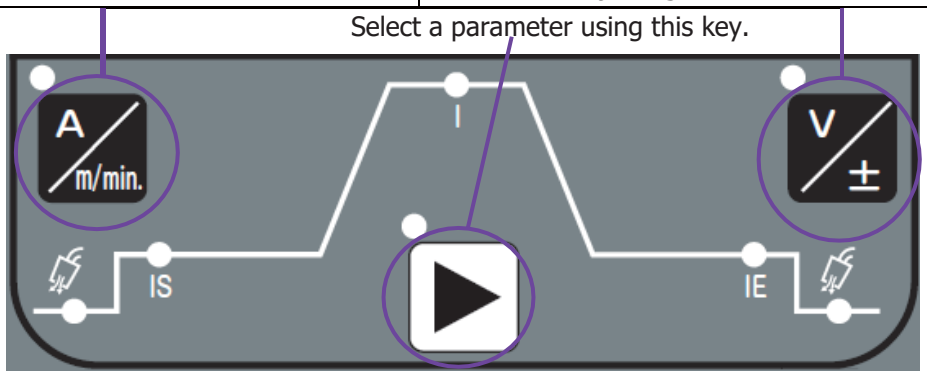
For example, when selecting "MILD CORED CO_2" while setting "MILD SOLID CO_2 φ1.0 " with the WELDING METHOD key [1], the " MILD CORED CO_2" lamp blinks, which means the preset combination is incorrect. In that case, select a wire diameter using the WIRE DIA (mmφ) key [2] or reset the welding method using the WELDING METHOD key [1].

10. OPERATION (continued)

10.1 Basic Settings (continued)

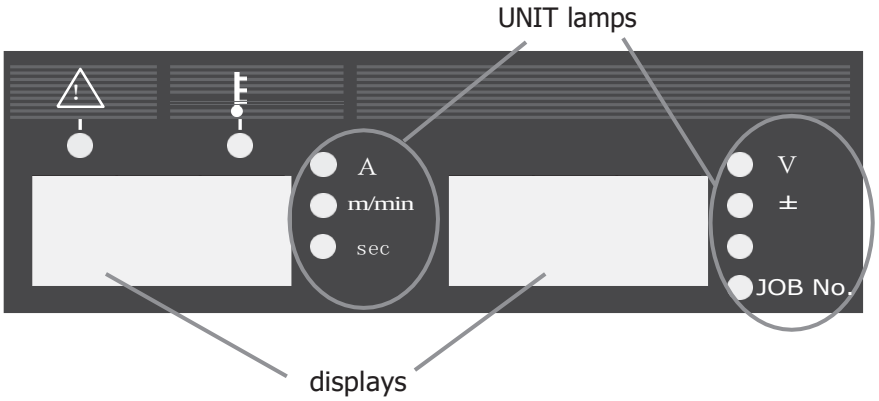
10.1.2 Setting the Parameter

Pressing the key while the A/m/min lamp (located at the upper left of the A/m/min selector key [3]) is lit changes over displays of current setting and wire feeding speed. Pressing the A/m/min selector [3] key while the A/m/min lamp is not lit causes the A/m/min lamp to light. While the A/m/min lamp is lit, current can be adjusted using the Parameter	Pressing the key while the V/± lamp (located at the upper left of the V/± selector [4] key) is lit changes over displays of voltage setting and SYNERGIC fine adjust. Pressing the V/± selector key [4] while the V/± lamp is not lit causes the V/± lamp to light. While the V/± lamp is lit, voltage can be adjusted using the Parameter adjusting knob [5].



[Parameter selector]

Choose a desired parameter using the DISPLAY CHANGE key [7]. Display in the displays are changed according to the parameters you select and the UNIT lamp of the parameter lights up.



[Parameter displays]

- When the wire feeding speed is displayed, you can not set to the maximum feeding speed using the Parameter adjusting knob [5] depending on the welding mode settings (especially for large diameter). You are only allowed to set the wire feeding speed to the value that can achieve the current setting determined by the rated output current.

- The values shown in the displays are not the actual data but the setting values of voltage, current, and wire feeding speed. Use the values in the displays as approximations.

10. OPERATION (continued)

10.1 Basic Settings (continued)

10.1.2 Setting the Parameter (continued)

(1) Pre-flow Time Setting

Once the pre-flow time is chosen, the setting value is displayed in the left display and the "sec." lamp lights. At this condition, you can set the pre-flow time while turning the Parameter adjusting knob [5]. The setting range of pre-flow time covers 0 to 10 seconds.

(2) Setting of the Initial Conditions

The initial conditions can be chosen only when initial current is ON. Once the initial conditions are chosen, the setting values of initial conditions are displayed in the displays.

(3) Setting of the Main Conditions

Once the main conditions are chosen, the setting values of the main conditions are displayed in the displays.

(4) Setting of the Crater Conditions

Only for ON or REPEAT crater, a crater condition can be selected. Once a crater condition is chosen, the setting values of the crater conditions are displayed in the display.

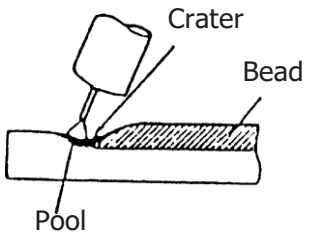
(5) Setting of the Post-flow Time

Once the post-flow time is selected, the setting value is displayed in the right display and the "sec." lamp lights up. At this conditions, the post-flow time can be set while turning the Parameter adjusting knob [5]. The setting range of post-flow time covers 0 to 10 seconds.

10. OPERATION (continued)

10.1 Basic Settings (continued)

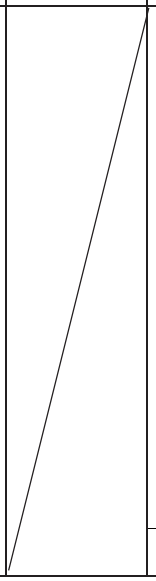
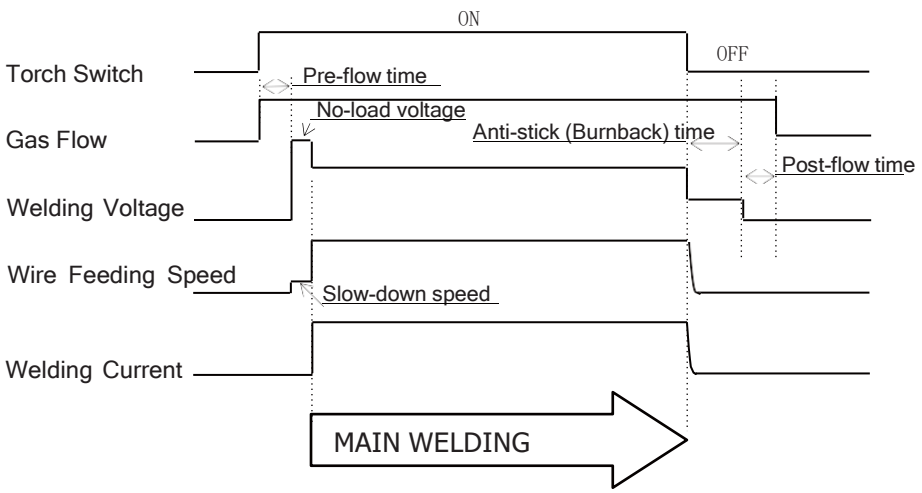
10.1.3 Setting of the CRATER-FILL Functions



Crater is a depression left at the termination of the weld. As it may cause cracks and poor welding, a crater treatment called crater-filler is used to fill in the depression.

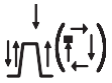
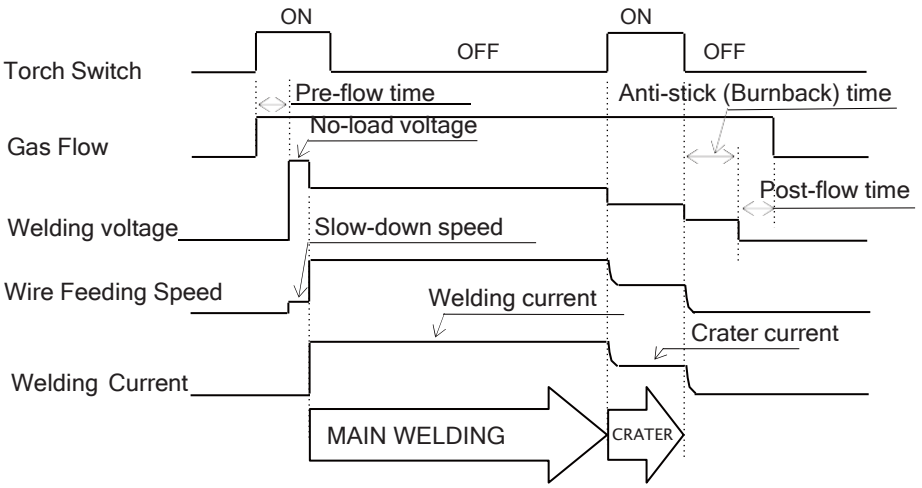
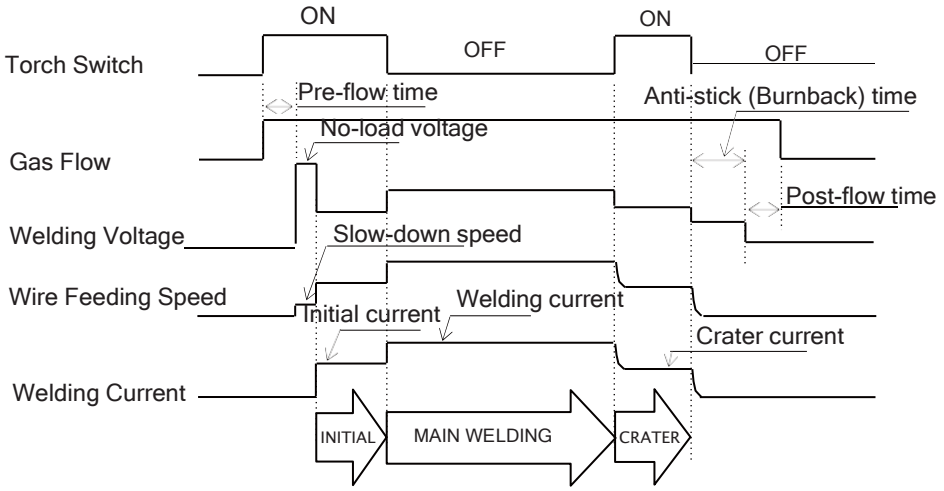
Pressing CRATER-FILL key [6] changes the crater-fill mode.

When giving a crater treatment, set the CRATER-FILL key [6] to "ON" .

Crater	Initial Current	Timing Chart
OFF 		
		● Keep the torch switch pressed and held during welding.

10. OPERATION (continued)

10.1 Basic Settings (continued)
10.1.3 Setting of the CRATER-FILL Functions (continued)

<table>
<tr><th>Crater</th><th>Initial Current</th><th>Timing Chart</th></tr>
<tr><td rowspan="3">ON
  </td><td>OFF</td><td> 
</td></tr>
<tr><td>ON</td><td> 
</td></tr>
<tr><td colspan="2">● Even if the torch switch is switched off during welding, start signal will be self-hold. The torch switch should be kept pressed and held during the INITIAL and CRATER period.
● Even if the CONSTANT PENETRATION switch is set to "ON" during the CRATER period, constant penetration will not be carried out.</td></tr>
</table>

10. OPERATION (continued)

10.1 Basic Settings (continued)

10.1.5 Adjusting Welding Voltage

Using the VOLT. CONTROL key [11] allows you to select one of the following voltage adjustment methods.

(1) Making the INDIVIDUAL Adjustment

The INDIVIDUAL adjustment can be achieved when the VOLT.CONTROL lamp (located at the upper left of the VOLT. CONTROL key [11]) is off. In the case of the INDIVIDUAL adjustment, welding current and welding voltage must be adjusted individually. When you want to set welding voltage, make sure that the VOLT. CONTROL lamp is lit, then adjust the welding voltage while turning the Parameter adjusting knob [5]. When changing the voltage adjustment method from INDIVIDUAL to SYNERGIC, the present voltage setting value is reflected. The voltage setting value after the voltage adjustment method is changed is not that of synergic center.

(2) Making the SYNERGIC Adjustment

The SYNERGIC adjustment can be achieved when the VOLT. CONTROL lamp (located at the upper left of VOLT. CONTROL key [11]) is on. For the SYNERGIC adjustment, the proper welding current for the current setting is automatically set. When the VOLT. CONTROL lamp is lit, welding voltage can be finely adjusted using the Parameter adjusting knob [5]. In addition, it is also possible to change over the display setting in the right display using the V/± selector key [4]. The selectable display settings are the INDIVIDUAL mode (V) and the SYNERGIC mode (± adjustment). In the SYNERGIC display mode, the standard value is 0. The setting range of welding voltage is -30 to +30. Even when changing the voltage adjustment method from SYNERGIC to INDIVIDUAL, the voltage setting value right before the voltage adjustment method is changed reflected.

The welding voltage at SYNERGIC control, etc. may be not adjusted properly with use of mixture gas other than the mixture ratio of the following gas

- MAG gas
  80% argon (Ar) + 20% carbon dioxide (CO_2)

10. OPERATION (continued)

10.1 Basic Settings (continued)

10.1.6 CONSTANT PENETRATION Function

For conventional CO_2/MAG welding, as the wire extension changes, welding current changes and base metal penetration depth and bead width change. By setting the constant penetration function to “ON”, wire feeding speed is automatically adjusted so that constant current is always obtained even when wire extension varies. As a result, effects of reducing change in penetration depth and in bead width of the base metal are able to be obtained. When penetration depth is particularly held constant, set the CONSTANT PENETRATION function to “ON” using the CONSTANT PENETRATION key [12].

Penetration control ON/OFF selection can be done by using the CONSTANT PENETRATION key [12]. When setting the CONSTANT PENETRATION function to “ON”, the CONSTANT PENETRATION lamp (located at the upper left of the CONSTANT PENETRATION key) lights up. When setting the CONSTANT PENETRATION function to “OFF”, the CONSTANT PENETRATION lamp goes out.

NOTE: The PENETRATION CONTROL function does not function during the INITIAL and CRATER period. When setting to Arc Spot, the PENETRATION CONTROL function can not be used. The PENTRATION CONTROL function is automatically set to “OFF”.

10.1.7 Arc Characteristics Function

When pressing the ARC CONTROL key [8] while the INITIAL CONDITION, MAIN CONDITION, or CRATER-FILL CONDITION is selected, the ARC CONTROL lamp (located at the upper left of the ARC CONTROL key [8]) lights up, the setting value is displayed in the right display, and the V/± lamp lights up. At that condition, it is possible to set arc characteristics by using the Parameter adjusting knob [5]. The setting range is -99 to +99. Pressing the ARC CONTROL key [8] again or pressing the DISPLAY CHANGE key [7] returns to the previous parameter setting. In addition, it is also possible to change over the display to a current-related parameter by using the A/m/min selector key [3] and to a voltage-related parameter by using the V/± selector key [4].

The standard setting value of arc characteristic is 0. As the setting value of the arc characteristic is set in the negative direction (down to -99), arc condition becomes harder. As the setting value of the arc characteristic is set in the positive direction, arc condition becomes softer (up to 99). When you use the welding power source in the low current range, set the setting value of the arc characteristic in the positive direction to obtain good welding results. When you use the welding power source in the high current range, set the setting value of the arc characteristic in the positive direction to obtain good welding results. If you cannot obtain optimum arc condition due to use of the extension cables, set the setting value of the arc characteristic in the negative direction.

10.1.8 GAS CHECK Function (with gas save function)

This function is used when opening the discharge valve of the shielding gas and when adjusting the gas flow rate. When pressing the GAS CHECK key [13] once, the GAS CHECK lamp (located at the upper left of the GAS CHECK key) lights up and allows gas to flow. Pressing the GAS CHECK key [13] again turns off the GAS CHECK lamp and stops discharging gas. In more than two minutes after the GAS CHECK key [13] is pressed, gas discharge automatically stops and the GAS CHECK lamp goes out. In the event that the machine is started while gas is being checked, gas stops flowing after welding is completed (upon completion of post-flow) and gas does not even continue to flow during down period.

10. OPERATION (continued)

10.1 Basic Settings (continued)

10.1.9 INCHING Function

When pressing the INCHING key [14], the INCHING lamp (located at the upper left of the INCHING key) light up and begins feeding wire. Releasing the key stops wire feeding and the INCHING lamp to go out. When changing the wire feeding speed by turning the Parameter adjusting knob [5], make sure that the INCHING lamp lights up. When connecting to the analog remote control (optionally available), the INCHING key [14] on the front panel cannot be used for inching operation. When connecting to the analog remote control, use the inching switch on the remote control to activate the INCHING function.

10.1.10 Verifying the Parameters in the Displays

The displays on the front panel provides the following functions:

(1) Display of Parameter Setting Value

When setting to “parameter setting values display” mode during down period (excluding the result display period right after the completion of welding) and during welding, values of parameters under adjustment are displayed.

(2) Display of Output Current During Welding

The parameters shown in the displays automatically change to average values of output current and output voltage according to the output conditions every about 0.5 seconds. When you want to change the parameters during welding, press the DISPLAY CHANGE key [7] to go to the “parameter setting values display” mode. When no welding operation is not carried out for about 5 seconds or the DISPLAY CHANGE key [7] is held down, the display mode automatically returns to the “average parameter setting values display” mode. When the TORCH key is pressed, the LED lamps of the sequence parameters go on sequentially according to the welding operations. When the display setting is switched to the "parameter setting values display" mode, each LED lamps (located at the sequence parameter setting section) of the sequence that is currently outputting begin blinking. Refer to Section 10.1.11, “Using the Parameter Adjusting Knob” for the parameters that can be adjusted using the Parameter adjusting knob [5] during welding.

(3) Display of Welding Results after Completion of Welding

Upon completion of welding, the average output current and voltage for last one second blink for about 20 seconds (however, the output conditions of crater fill are ignored). Therefore, the operators can verify the welding conditions right after the completion of welding and can use them as approximates when adjusting the welding conditions. This display is cancelled by starting the next welding or pressing any key on the front panel without waiting 20 seconds after the completion of welding. The result display time can be preset to F8 by using the F key [9]. The setting value is displayed in the left digital and the "sec" lamp lights up. The setting range of the result display time is 0 to 60 seconds.

NOTE: In the case where the less than one-second welding such as tack welding, etc. is performed, the correct results of the welding are not displayed.

(4) Display of Error Message

If an error is detected in the power source of electric welding, an error number indicating error messages blinks. See Section 11.1, " How to Solve an Error ".

NOTE: The average output values shown in the displays are processed by software and are not guaranteed as control data of measuring instruments.

10. OPERATION (continued)

10.1 Basic Settings (continued)

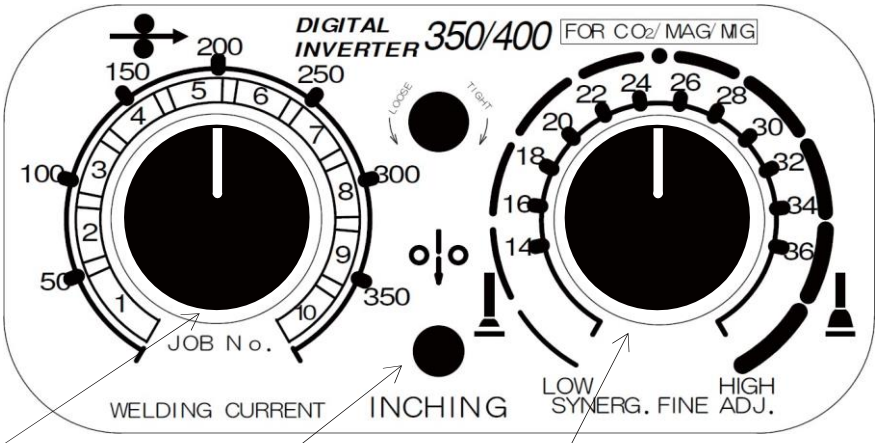
10.1.11 Using the Parameter Adjusting Knob

When adjusting parameters using the Parameter adjusting knob [5] during welding, change over the display mode to the “parameter setting value display” mode by pressing the DISPLAY CHANGE key [7]. The initial conditions, the main conditions, and the crater fill conditions can be changed during the INITIAL welding, MAIN welding, and CRATER welding respectively. Pressing the ARC CONTROL key [8] after changing to the “parameter setting value display” mode adjusts the pulse arc characteristics.

10.1.12 Using the Analog Remote Control K5416Z (optional accessory)

The welding power source automatically recognizes the analog remote control when the power switch is turned on. When the analog remote control is connected to the welding power source, the analog remote control is recognized first. Therefore even when selecting welding current/voltage, the welding current/voltage cannot be adjusted by using the Parameter adjusting knob [5] on the front panel. When the analog remote control is connected, adjust the parameter while turning the WELDING CURRENT/VOLTAGE knobs on the analog remote control. It is possible to verify the parameter setting values which are preset at the analog remote control, in the displays of the front panel. Once the analog remote control is disconnected, the setting values preset at the remote control are deleted.

NOTE: With the power switch turned off, connect or disconnect the analog remote control.



WELDING CURRENT knob

To set welding current.

INCHING button

Pressing this switch feeds wire only. The wire feeding speed changes by turning the WELDING CURRENT knob on the

WELDING VOLTAGE knob

< INDIVIDUAL adjustment>
Set welding voltage.
< SYNERGIC adjustment >
Aligning to mark “●” achieves the standard setting. Turn the knob in the "HIGH" direction to increase voltage and in the "LOW" direction to decrease voltage.

10. OPERATION (continued)

10.1 Basic Settings (continued)

10.1.12 Using the Analog Remote Control K5416Z (optional accessory) (continued)

- When making the INDIVIDUAL adjustment:
  Selecting the "INDIVIDUAL" adjustment allows you to set welding current and welding voltage individually.

- When making the SYNERGIC adjustment:
  When selecting the "SYNERGIC" adjustment, welding voltage is automatically adjusted only by turning the WELDING CURRENT knob. To finely adjust welding voltage, use the VOLTAGE. knob.

  NOTE: It is possible to adjust low-current region, where a small-diameter wire is used for weld, and to finely adjust welding current by replacing with the full-scale 200A plate (supplied). When replacing the scale plate, press the F key [9] and change the initial value of F9 to 200. Refer to Section 10.2.1(9), “Selection of Scale Plate of Analog Remote Control”.

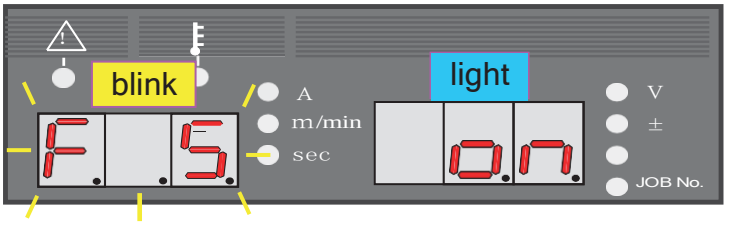
10. OPERATION (continued)

10.2 Applied Settings

10.2.1 Using Internal Functions

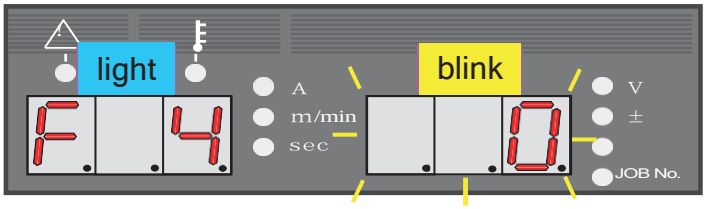
● How To Use Internal Functions

① When holding down the F key [9] for a few seconds, the function number in the left-side display blinks, and the status of function assigned to the function number lights up and is displayed in the right-side display. Under this condition, a function number can be selected by using the Parameter adjusting knob [5].



The above example indicates that F5 is set to "on".

② When pressing the F key [9] again after selecting the desired function number, the function number lights and the function conditions blinks. Under this condition, functions can be set by using the Parameter adjusting knob [5].



The above example indicates that F4 is set to "0".

③ Pressing the F key [9] again causes the function number to light up and returns to the step. To leave the function mode, hold down the F key [9] for a few seconds.

NOTE: In the function mode, no confirmation for changing the function is carried out when it is changed. Upon change of the setting by using the Parameter adjusting knob [5], the change becomes valid. Therefore, before changing a function setting, make sure that the correct function number is selected and that the proper setting value for the function number is set.

10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2.1 Using Internal Functions (continued)

The following functions can be adjusted by using the F key [9].

(1) Fine Adjustment of Anti-Stick (Burnback) Time: F1

Anti-stick (Burnback) time means the processing time to prevent electrode wire from fusing to base metal when welding is completed. Anti-stick (Burnback) time is preset to proper conditions according to welding methods and wire diameters at shipment, but it can be finely adjusted by activating F1. The standard Anti-stick (Burnback) time is preset to "0", time decreases in the negative direction and increases in the positive direction. The fine adjustment range is -50 to +50 and the unit is 0.01 seconds.

Ex. 1) When the setting value of Anti-stick (Burnback) time is "25",0.25 seconds is added to the standard Anti-stick (Burnback) time.

Ex. 2) When the setting value of Anti-stick (Burnback) time is "-10",0.1 seconds is subtracted from the standard Anti-stick (Burnback) time.

(2) Fine Adjustment of Anti-stick (Burnback) Voltage: F2

Anti-stick (Burnback) voltage means the voltage which is output when processing is carried out to prevent electrode wire from fusing to base metal at the end of welding. Anti-stick (Burnback) voltage is preset to proper conditions according to welding method and wire diameter at shipment, but it can be finely adjusted by activating F2. The standard Anti-stick (Burnback) voltage is preset to "0". When the voltage is set in the negative direction, it decreases. When the voltage is set in the positive direction, it increases. The fine adjustment range is -9.9 to +9.9V.

(3) Fine Adjustment of Slow-down Speed: F3

Slow-down speed means the speed to feed wire that is slower than the feeding speed at normal welding during the period from startup to arc start. The slowdown speed is preset to proper conditions according to welding methods and wire diameters at shipment, but it can be finely adjusted by activating F3. The standard slowdown speed is preset to "0". When the slowdown speed is set in the negative direction, it decreases. When the slowdown speed is set in the positive direction, it increases. The fine adjustment range is -1.0 to +1.0 m/min. When poor arc start occurred, lower the slowdown speed. Even when arc start is good, the slow-down speed can be increased to shorten tact time.

NOTE: The minimum slow-down speed is 0.4 m/min.

10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2.1 Using Internal Functions (continued)

(4) Selection of Auto/Semi-automatic: F4

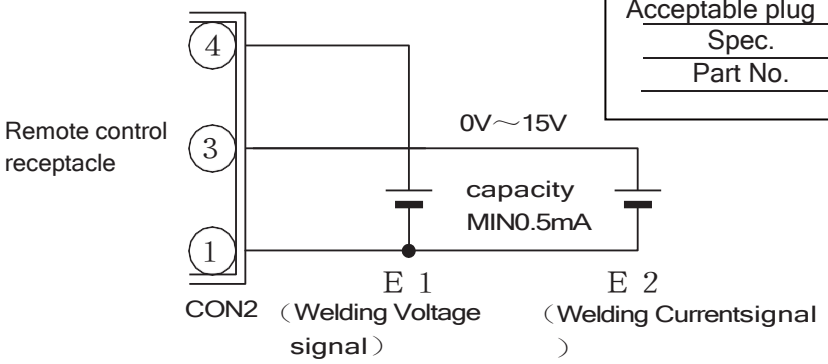
"Automatic machine mode" and "Semi-automatic mode" can be switched by using F4.
Welding power source has two Automatic modes. Settings and functions of each mode are listed below.

F4	0 (factory setting)	1	2
Mode	Semi-automatic	Automatic 1	Automatic 2
Return from error	By turning on the power supply again	The operation stop terminal (Open → Short-circuit) Or by turning on the power supply again	
Return from operation stop	By turning on the power supply again	By short-circuiting the operation stop terminal	
Stuck wire removal voltage	Not applied	Applied for approx. 0.2 seconds after the anti-stick completion	
Welding current and voltage setting	By panel, analog remote control or digital remote control	By external voltage (*1)	By panel, analog remote control or digital remote control
Inching from interface (*2)	Unusable	Usable	

*1: The current and the voltage of main condition cannot be set with the Parameter adjusting knob [5] on the front panel.
*2: This is a case for short-circuited between 5 and 6 of CON2 without using analog remote control.

● Automatic 1 mode

For combination with the robot etc., this is used when the current and the voltage setting are input by using an external voltage. And connection is shown in the figure below. For connection, current capacity of an external power source must be 0.5mA or more.



Acceptable plug

Spec.	DPC25-6A
Part No.	4730-009

⚠ CAUTION

- Supply 0 to 15V to E1 and E2. Exceeding 15V may result in damage to the control circuit of the welding power source.
- Be sure to finish setting and inputting before 100 msec when starting signal is input. Inputting after starting signal is input or at starting signal may result in unstable start.

● Automatic 2 mode

Use this mode when setting all settings from front panel or JOB memory function, even though you use the welding power source with an automatic machine.
Use this mode when you combine digital remote control with an automatic machine.

10. OPERATION (continued)

10.2 Applied Settings (continued)

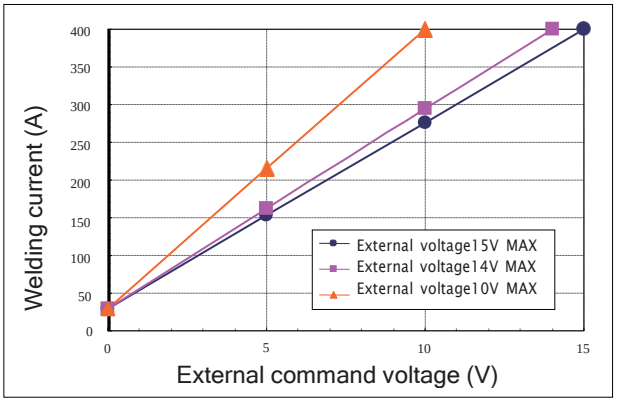
10.2.1 Using Internal Functions (continued)

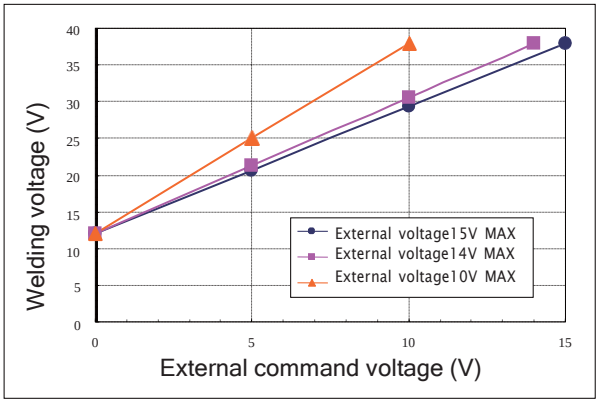
(5) External Input Voltage : F5

Activate F5 when using the welding power source in combination with a robot or an automatic machine, and also the maximum command voltage output by the robot is up to 10 or 14V. Factory setting is set to "15.0". For changing the setting, set F5 to "14.0" or "10.0" to activate the function.

* It is necessary to set F4 to "Automatic 1 mode" to make this function valid.

The relationship between external current command voltage, external voltage command voltage, welding current, and welding voltage is shown as follows. Use these graphs as guidelines only as the values (of welding current and welding voltage corresponding to welding conditions setting voltage) may differ from the indications in the graphs due to wire extension length and dragging of output cable.





※External command voltage 15V MAX. : When setting [F5] to [15.0] (At factory setting)
※External command voltage 14V MAX. : When setting [F5] to [14.0]
※External command voltage 10V MAX. : When setting [F5] to [10.0]

(6) Setting of Up-slope Time: F6

Upslope time means the time for increasing welding conditions stepwise when initial current is changed to main current. The upslope time at shipment is set to 0 seconds, but can be adjusted by using F6. The setting range is 0 to 10 seconds. This function is used when wire burns up while conditions are changed over due to the great difference of setting between initial current and main current.

(7) Setting of Down-slope Time: F7

Down-slope time means the time for decreasing welding conditions stepwise when main current is changed to crater current. The down-slope time at shipment is set to 0 seconds, but it can be adjusted by using F7. The setting range covers 0 to 10 seconds. This function is used when wire crashes into the base metal while the conditions are changed over due to the great difference of setting between main current and crater current.

(8) Setting of Result Display Holding Time: F8

After completion of welding, the average value of output current and output voltage for last one second blinks for about 20 seconds, but the result display holding time can be set by F8 using F key [10]. The setting range of result display holding time is 0 to 60 seconds.

10. OPERATION (continued)

10.2 Applied Settings

10.2.1 Using Internal Functions (continued)

(9) Selection of Scale Plate of Analog Remote Control: F9

When the analog remote control (optional accessory) is used, it is possible to finely adjust a low-current region where a small-diameter wire is used for weld by replacing the full-scale 350A scale plate with the full-scale 200A scale plate (supplied). The analog remote control scale plate is changed over by using the F key [9]. Set to "200" by using F9.

(10) Setting of Feed Motor Load Current Error Detection Level: F10

In the event that contact resistance is applied to the wire feed line section due to worn liners, defective tips, etc., the current supplied to the motor increases (when feed roll lacks smooth movement). Monitoring current of this motor can detect defective feed. The motor load current detection level at shipment is 70% (2.0A) of the rated motor current 2.8A (continuous), and if the current exceeds the setting value, "E-" and "820" in the displays are displayed after welding. In that case, the welding power source does not stop operation immediately. And it self-restores by re-welding. This detection level can be changed by changing the setting of F10 using F key [9]. The setting range of motor load current trouble detection level is 20 to 150%.

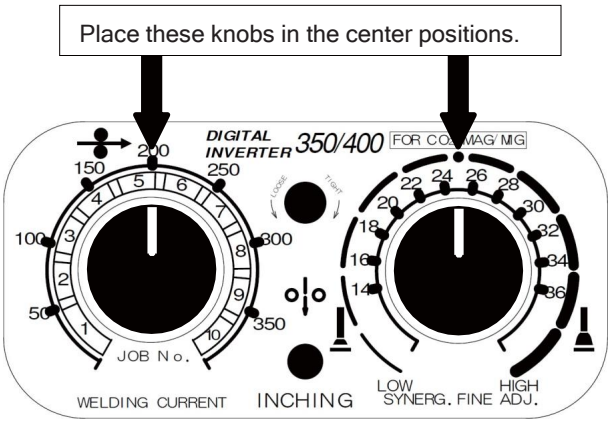
NOTE: Adjust the detection level optionally and use it in the best detection level, because the application environment and judgment criteria vary depending on wires and torches and customers respectively.

(11) Setting of Job Memory Fine Adjustment: F11

Under the welding conditions already stored in JOB MEMORY, current can be finely adjusted with the WELDING CURRNET knob located on the optional analog remote control and voltage with the VOLTAGE knob. The initial setting of F11 is “oFF”. In case of changing this function to valid, set the F11 to numeric values other than “oFF”. The JOB MEMORY fine adjustment can be activated by F11 using F key [9]. The function is preset to “oFF” at shipment. Setting both CURRENT and VOLTAGE knobs to the center of the scales allows the machine to work under the conditions already stored in the JOB MEMORY. To increase welding current slightly, turn the knob clockwise. To decrease slightly, turn it counter-clockwise. Welding voltage can be adjusted in the same manner. F11 performs the fine adjustment. The setting range is from ±1 to ±30% .

NOTE:

- When no data is stored in the JOB MEMORY, the function cannot be activated.
- For the conditions stored in memory in synergic mode, adjust them in individual mode.



(12) Setting of Soft Arc Mode: F12

The welding power source features SOFT ARC mode. Use of the SOFT ARC mode enables you to obtain softer arc. To switch the arc mode from STANDARD to SOFT, set F12 to “on”. When setting a wire method to CO_2 MILD STEEL SOLID and a wire diameter to 1.2/1.0, the ARC CONTROL lamp (located at the left upper side of the ARC CONTROL lamp) lights up. The mode can be held in memory for each welding condition number.

10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2.1 Using Internal Functions (continued)

(13) Changeover to Wire feeding speed Setting: F15

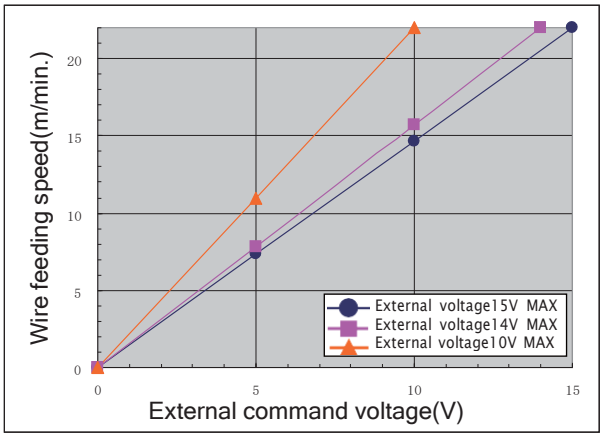
When F15 is set to "oFF", welding condition can be set by current setting. Meanwhile, when F15 is set to "on", welding condition can be set by wire feeding speed.

● Characteristics : [F15][oFF]

- ■ Wire feeding speed is changed depending on each welding mode even if current setting value is the same.
- ■ Refer to Section 10.2.1(4) "External Input Voltage" for details regarding external command voltage and setting current.

● Characteristics : [F15][on]

- ■ Output current is changed depending on each welding mode even if wire feeding speed setting is the same.
- ■ See the relation between external voltage and wire feeding speed indicated below.



※External command voltage 15V MAX. : When setting [F5] to [15.0] (At factory setting)
※External command voltage 14V MAX. : When setting [F5] to [14.0]
※External command voltage 10V MAX. : When setting [F5] to [10.0]

※When command voltage is the maximum, maximum wire feeding speed is 22m/min. However, it may not reach to the maximum depending on the welding mode.
※Minimum wire feeding speed is about 1.1-2.8m/min. (It depends on the welding mode.)
Minimum wire feeding speed does not change if command voltage is supplied, which may be in 1.1-2.8m/min. or below.

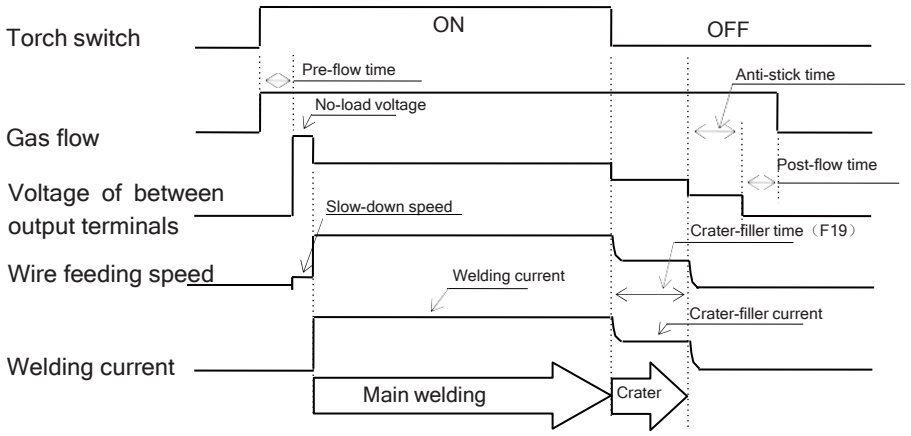
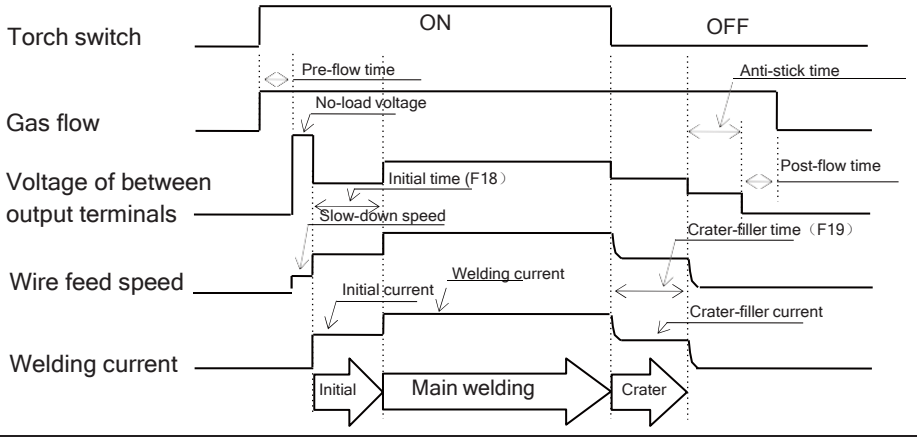
10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2.1 Using Internal Functions (continued)

(14) Change of a peculiarly crater-filler sequence: F17
Setting of initial time: F18
Setting of crater-filler time: F19

INITIAL condition and CRATER-FILL. condition can be outputted by using Crater ON. In case of connecting to an automatic machine, it is necessary that torch switch signal of crater-sequence is generated by external sequence. If this function is activated, INITIAL condition and CRATER-FILL. condition can be outputted by torch switch signal sequence which is the same as Crater OFF.
INITIAL and CRATER times can be set with F18 and F19. The setting range is 0 to 10 seconds.
The INITIAL and CRATER-FILL. conditions can be set from the front panel. The INITIAL condition can be selected when INITIAL is "ON".
"OFF" LED of Crater-filler blinks by turning F17 to "on" in case that crater-filler is "OFF". If this function is valid, CRATER-FILL. key [6] cannot be used.

Initial condition	Timing chart
OFF	
ON	

- In case that the INITIAL condition is "ON" and the torch switch is turned on and current is flown, the INITIAL condition is outputted and measurement of initial time starts. The condition shifts to main condition after the initial time.
- When the torch switch is turned "OFF" while the INITIAL condition is outputting, CRATER-FILL. condition is not outputted. Continue to operate anti-stick and finish welding.
- When the torch switch is turned "OFF" during welding, CRATER-FILL. condition is outputted and measurement of CRATER time starts. Carry out anti-stick after finishing crater-filler time.
- In case of using this function, be sure to use "operation stop" signal without fail. If you want to stop outputting during crater-filler, open the "operation stop" signal.

10. OPERATION (continued)

10.2 Applied Settings (continued)

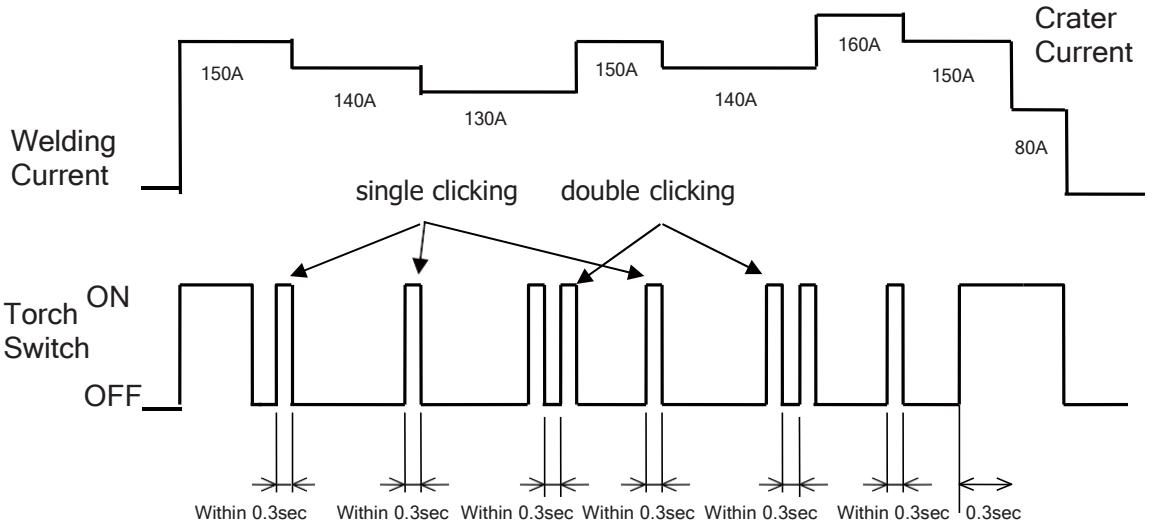
10.2.1 Using Internal Functions (continued)

(15) Current adjustment by torch switch: F20

Function No. "21": The current change amount is set up by single clicking.
Function No. "22": The current change amount is set up by double clicking.

By turning Function No.20 "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.
The current change amount setup range is –50 to +50A.

(Example)
Crater-ON, no initial current, welding current 150A and crater current 80A
F21: -10A, F22: 20A



NOTE: It is necessary to press the switch for as long as 0.3 sec. or more during transfer to crater at startup.

(16) Initial current and crater current setting in percentage (%): F23
Setting of initial current in percentage: F24
Setting of crater-filler current in percentage: F25

By turning Function No.23 "ON", It becomes possible to set the initial current and the crater current by the percentage to the welding current.

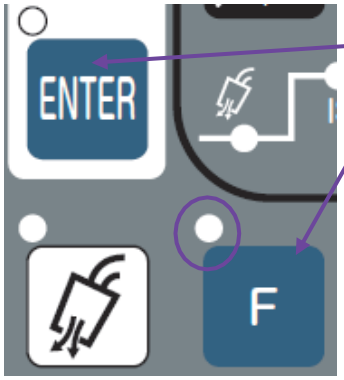
The setup range of F24 and F25 is 10 to 300%.

10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2.2 Key Lock

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 parameters and modes can be protected. However, the settings can be checked and confirmed by using the DISPLAY CHANGE key [7].



Holding down both the F key [9] and ENTER key [17] simultaneously

Holding down both the F key [9] and ENTER key [17] 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.

10.2.3 Key Lock with the password

The primary purpose of Key lock is to avoid changing welding conditions accidentally. In other words, everybody can un-lock it easily. On the other hand, this Key Lock with the Password make possible to avoid any change by those who does not know the password.
The basic operation is the same as the standard Key Lock. If the password was entered, the welding power source will ask the password to un-lock. Until you enter the correct password, the welding power source never un-lock itself.

NOTE: If the Key Lock with the Password is activated, entering the correct password is the only way to un-lock the welding power source. Neither Initialize process nor power-on reset can un-lock it. If you want to enter a new password, you have to enter the current password first.
Therefore, please manage the password well and never forget it.
In the password setting and entering stage, the welding power source disregards for the torch switch (start signal).

10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2.3 Key Lock with the password (continued)

There are two (2) modes in the key lock with the password.

Listed below is the description of each option:

Option	Description
Mode #1 (OP1) Prohibit welding	When OP1 is "on", the welding power source asks the password at every power-on. The welding power source can start welding after the correct password is entered. If the password is incorrect, the welding power source never starts welding. NOTE: If the password is not set (indicated "000"), this option does not mean anything. To activate this, please make sure to set the password except "000".
Mode #2 (OP2) Prohibit to change the welding conditions	When OP2 is "ON" during key lock, it is impossible that changing the welding condition by external setting voltage and job memories save or load. NOTE: Job change by “EXT in” can work even OP2 is on.

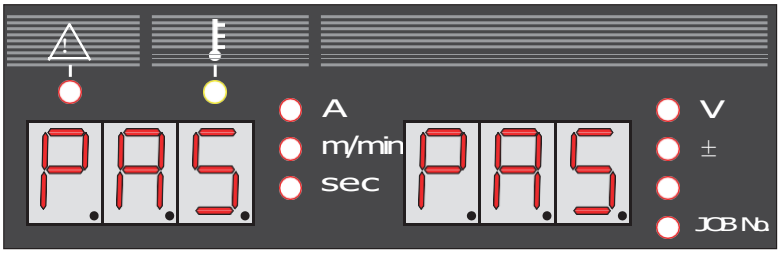
OP1 Prohibit welding	ON	OFF
Welding start	Impossible until entering the correct password at power-on.	Valid

OP2 Prohibit to change the welding conditions	ON	OFF
Parameter adjusting knob, variety of welding setting	Invalid	Invalid
External setting voltage including analog remote control	Invalid	Valid
Welding condition memory	Invalid	Valid
Inching	Valid	Valid
Gas check	Valid	Valid

NOTE: Both OP1 and OP2 are activated at the same time.
OP1 works even the standard Key Lock described in previous section is not activated.
OP2 works only when the standard Key Lock is activated.

① Procedure to set the password and the lock option

(1) Turn off the welding power source and back on with pressing F key [9] and ENTER key [17] together. After the power source are properly turned on, Digital Meters show "PAS PAS" as per below.
If the password is not set or the password is "000", go to (2) which is the next step.
If the password was already set, go to 2. (2) to clear the current password.

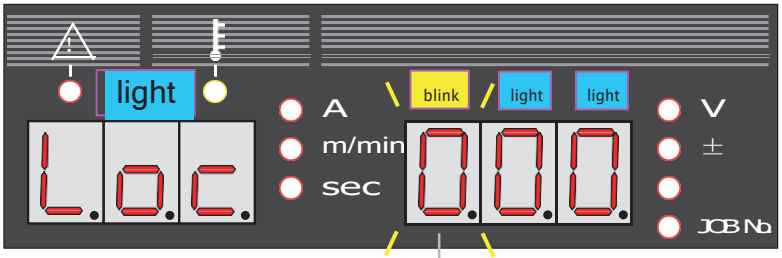


10. OPERATION (continued)

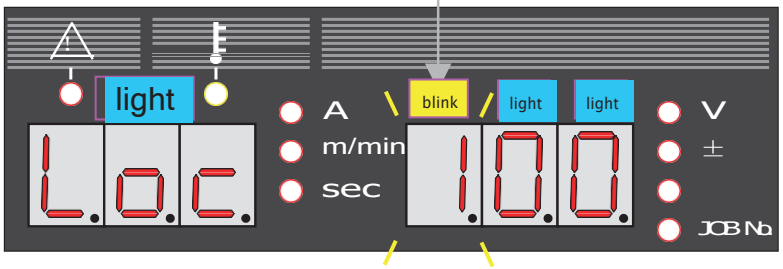
10.2 Applied Settings (continued)

10.2.3 Key Lock with the password (continued)

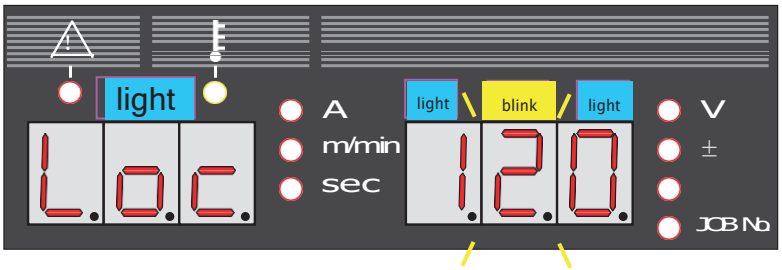
(2) After digital meter shows "PAS PAS" in a few seconds, the power source enters the password setting mode and shows "Loc 000". Left digit (hundred's place) of right meter blinks as per below. Rotate the Parameter adjusting knob [5] to set the hundred's place of the password.
Following description sets the password "123" as an example.



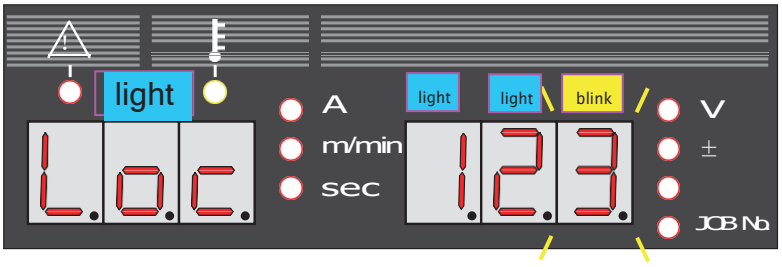
The number of blinking place can be set by the Parameter adjusting knob [5].
The range is from 0 to 9.



(3) Move to next digit (place) by pressing DISPLAY CHANGE key [7]. Then the center digit (ten's place) can be set by the Parameter adjusting knob [5].



(4) Move to next digit (place) by pressing DISPLAY CHANGE key [7]. Then the right digit (one's place) can be set by the Parameter adjusting knob [5]. If the DISPLAY CHANGE key [7] is pressed again, the digit to set will be back to left again.

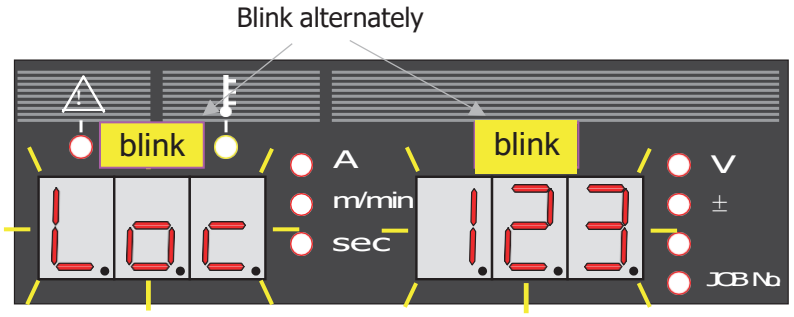


10. OPERATION (continued)

10.2 Applied Settings (continued)

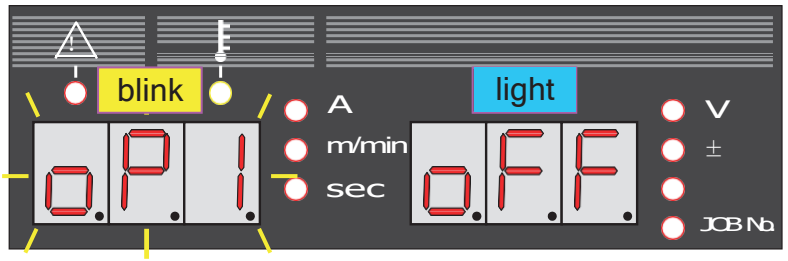
10.2.3 Key Lock with the password (continued)

(5) Finish the password setting by pressing ENTER key [17]. To confirm the password, the Digital Display blinks "Loc" on the left meter and the password on the right meter alternately. If the password is NOT correct, press any key except ENTER key [17]. It will be back to the previous stage to re-set the password.
If the password is correct, press ENTER key again to activate the password.



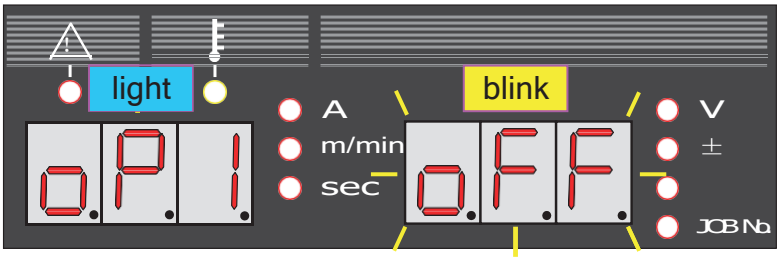
(6) If there is no correction in the password, the password is fixed by pressing the ENTER key [17] again and the lock option setting mode is displayed.
"OP1" on left meter display and the condition on right meter display are displayed.

(a)



Condition (a) or (b) can be selected by pressing DISPLAY CHANGE key [7]. The parameter of blinking side can be changed by the Parameter adjusting knob [5].

(b)



(7) To finish setting password, press ENTER key [17]. At this point, the condition is not locked.
For locking, push F key [9] and ENTER key [17] at the same time for a while (if password is not set, it is key lock state), and upper left of the F selection key blinks.

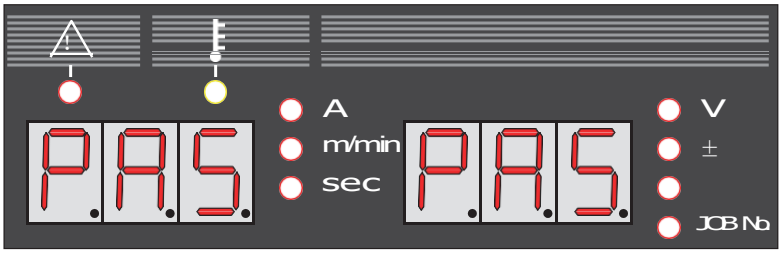
10. OPERATION (continued)

10.2 Applied Settings (continued)

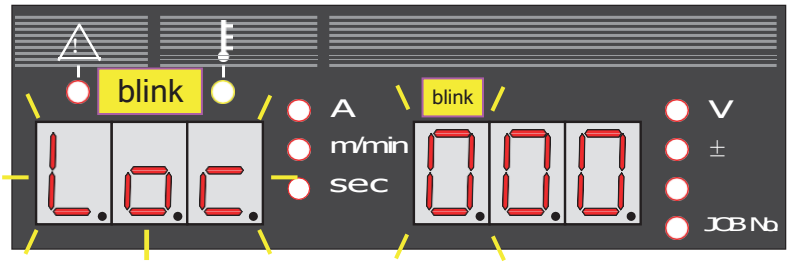
10.2.3 Key Lock with the password (continued)

② The way to input the password to clear the Key Lock with the password

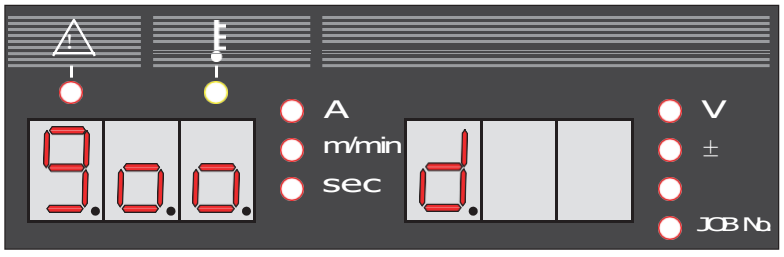
(1) When the lock is released by pushing F key [9] and ENTER key [17] at the same time for a while from the state of the lock with the password, when the power is turned on during lock option 1 is 'on', and when the password has already been set during the password setting; the welding power source becomes password input mode, 'PAS' 'PAS' is displayed in a digital meter as shown in the figure below.



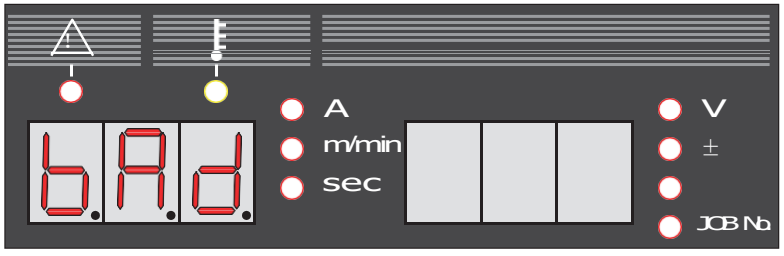
(2) After Digital Meter shows "PAS PAS" in a few seconds, the power source enters the password request mode and shows "Loc 000". "Loc" on the left meter and the left digit (hundred's place) of right meter blinks as per below. Rotate the Parameter adjusting knob [5] to set the hundred's place of the password. To change the digit, press DISPLAY CHANGE key [7]. The value of the blinking digit can be changed by the Parameter adjust knob [5].



(3) After entering the correct password, press ENTER key [17]. If the password is correct, the Digital Display shows "good" and the power source is unlocked. If the power source is in the password setting mode, go back to ① (2).



If the password was incorrect, the Digital Display shows "bAd" and the power source is NOT unlocked.



10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2. 3 Key Lock with the password (continued)

③ The way to cancel entering or setting the password

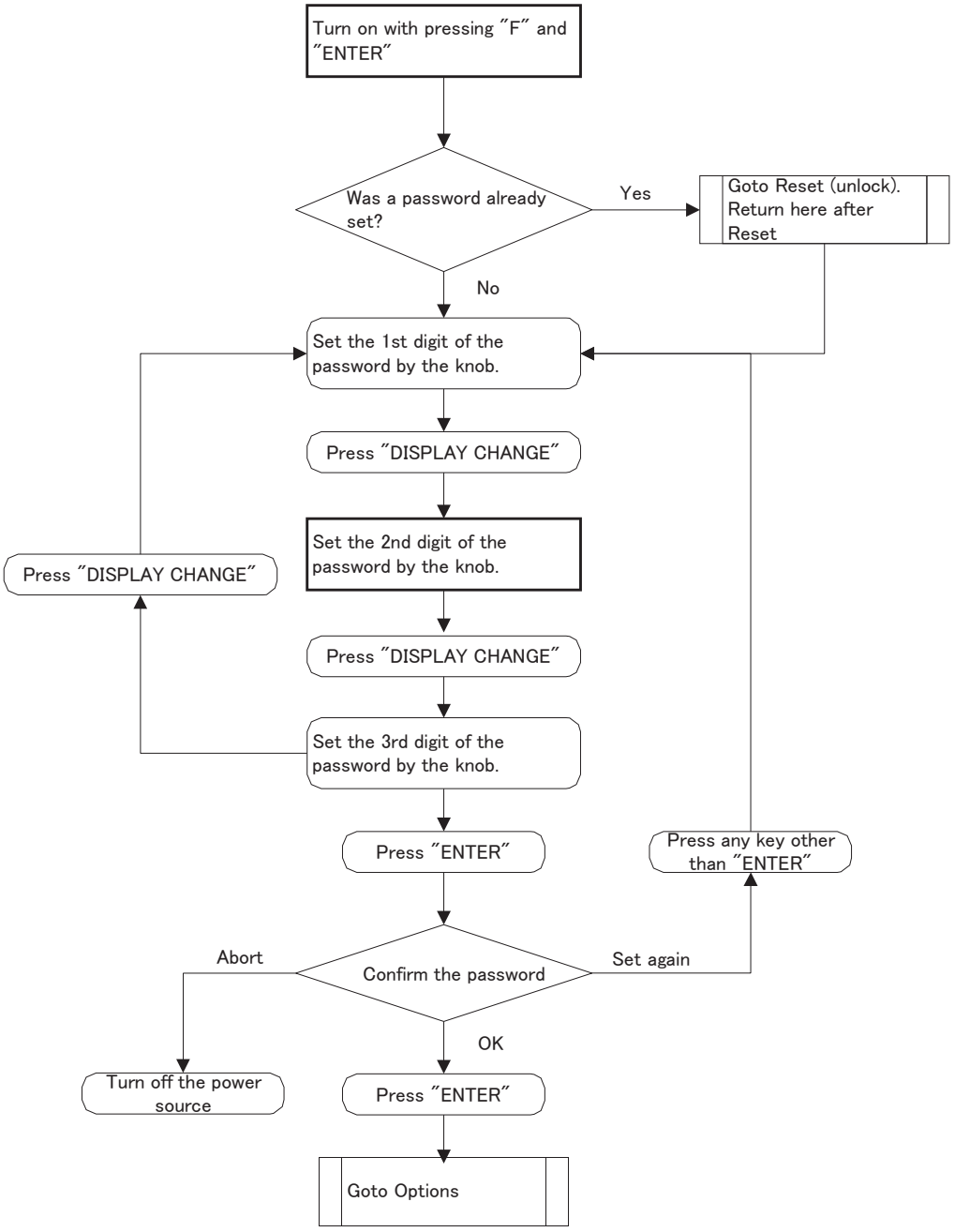
- If the power source is in the password setting mode, just turn it off. In this case, the password can not be set.
- If the power source is in the password setting mode, press F key [9]. In this case, the Key Lock with the password can not be cleared.
- In case of the password option1 (OP1) was activated, the power source can not work until entering the correct password.

10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2.3 Key Lock with the password (continued)

● The flow chart of the password setting

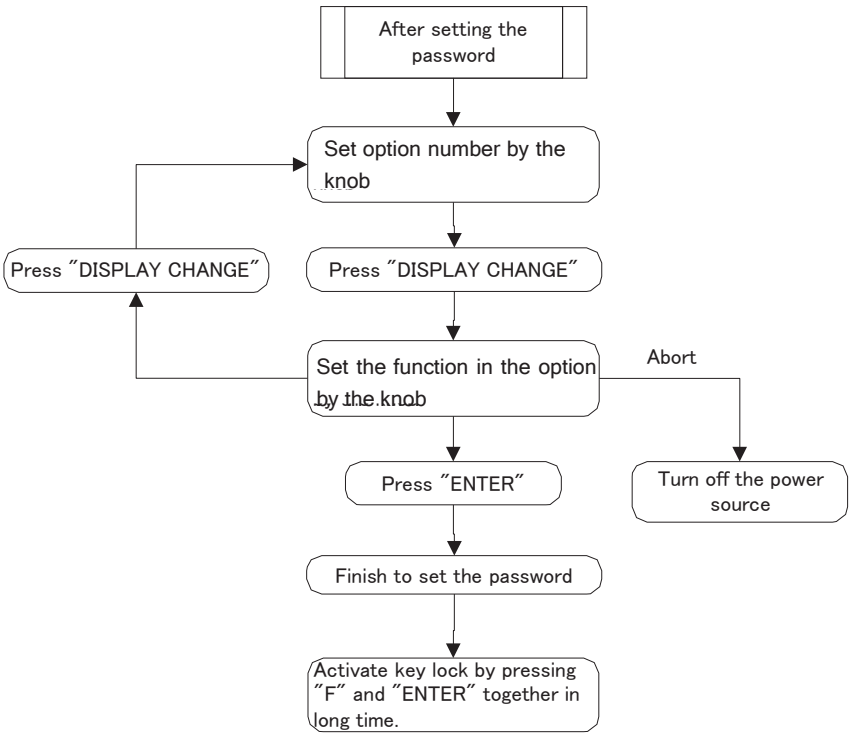


10. OPERATION (continued)

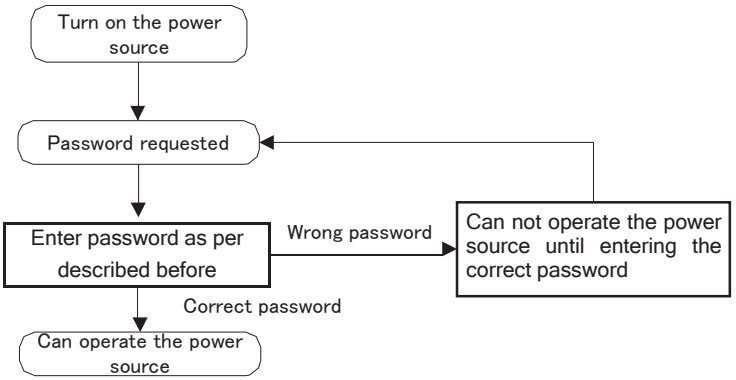
10.2 Applied Settings (continued)

10.2.3 Key Lock with the password (continued)

● The flow chart of the password option setting (continue from the password setting)



● The flow chart when the power source is turned on in case of OP1 is on

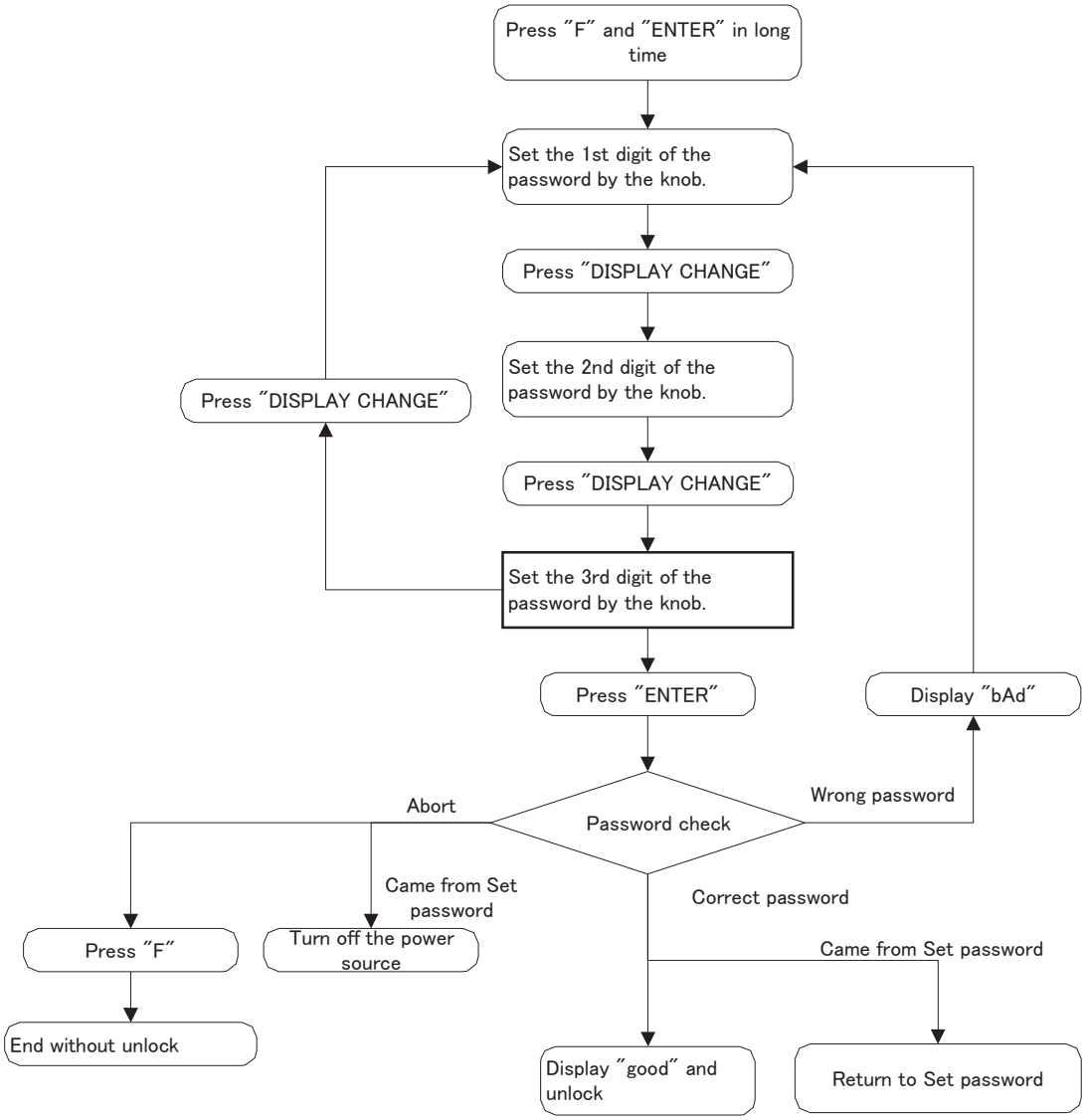


10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2.3 Key Lock with the password (continued)

● The flow chart of unlock



10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2.4 JOB MEMORY Function

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 30.

NOTE: The parameters of F functions can not set by using the JOB MEMORY function.

⚠ CAUTION
● The welding conditions (electronic data) 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 DATA. ● Please note that we shall not assume any responsibility for any change or loss of electronic data resulting from repair.

Once the machine enters the memory mode and read-out mode, only the SAVE key, LOAD key, and ENTER key can be operated. To exit the mode, press the LOAD key [15] if it is in the memory mode and the SAVE key [16] 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 set at the analog remote control are valid.

10. OPERATION (continued)

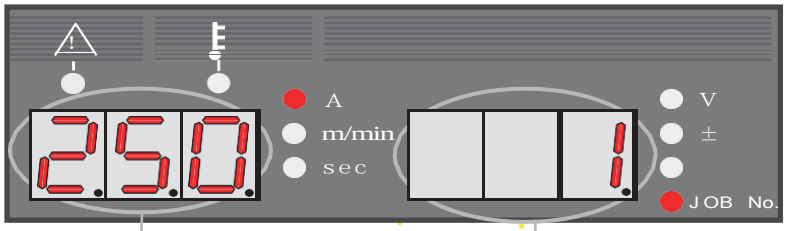
10.2 Applied Settings (continued)
10.2.4 JOB MEMORY Function (continued)

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

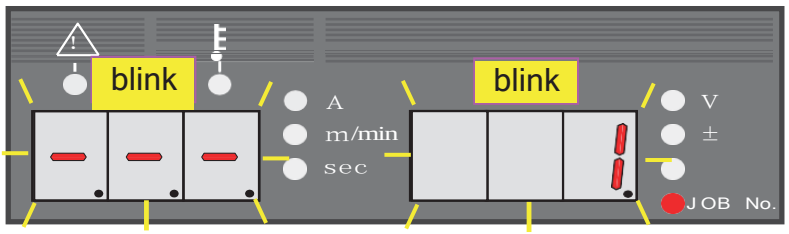
(1) When pressing the SAVE key [16], the machine enters memory mode, the SAVE lamp (located at the upper left of the SAVE key) lights up. See the following figure. In the right display, condition number “1” blinks and the LED lamp of the welding condition number lights up. In the left display, the setting 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 [5].



Welding Current setting value stored in memory

Condition number blinks

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).



(2) When pressing the ENTER key [17] 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 DISPLAY CHANGE key [7]. The setting value of the parameter you selected blinks.

NOTE: You are not allowed to change the welding condition number or select a welding method, etc. To reset the welding condition number, press the SAVE key [16], then return to the step (1). To quit the setting and exit from the memory mode, press the LOAD key [15].

(3) Pressing the ENTER key [17] again holds the data in memory and allow you to exit from the memory mode.

10. OPERATION (continued)

10.2 Applied Settings (continued)
10.2.4 JOB MEMORY Function (continued)

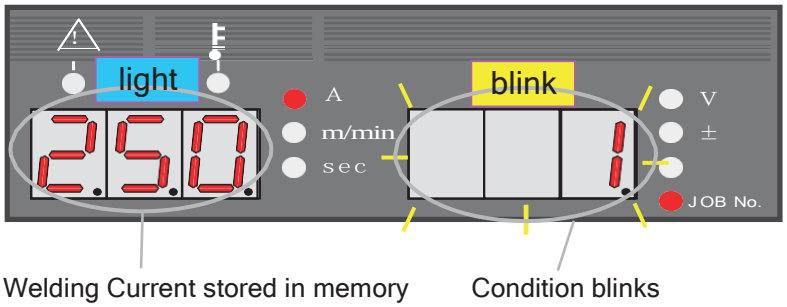
② LOAD Function

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

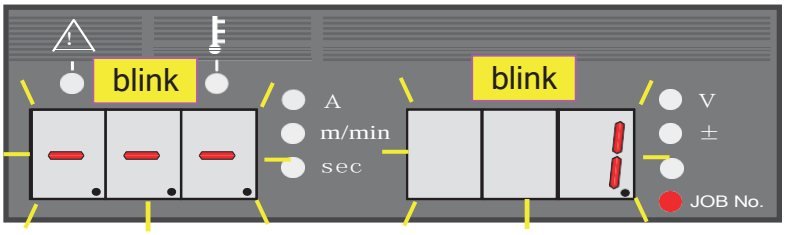
NOTE: The welding conditions currently used are overwritten with the welding conditions that are read out. When you want to save the welding conditions that have been used until now, set the welding conditions to any condition number, then carry out readout.

● Reading out the preset welding conditions

(1) When pressing the LOAD key [15], 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 [5].



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 [17] 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 DISPLAY CHANGE key [7]. The setting of the parameter you selected blinks.

NOTE: You are not allowed to change the welding condition number or select a welding method, etc. To reset the welding condition number, press the LOAD key [15], then return to the step (1). To quit the setting and exit from the readout mode, press the SAVE key [16].

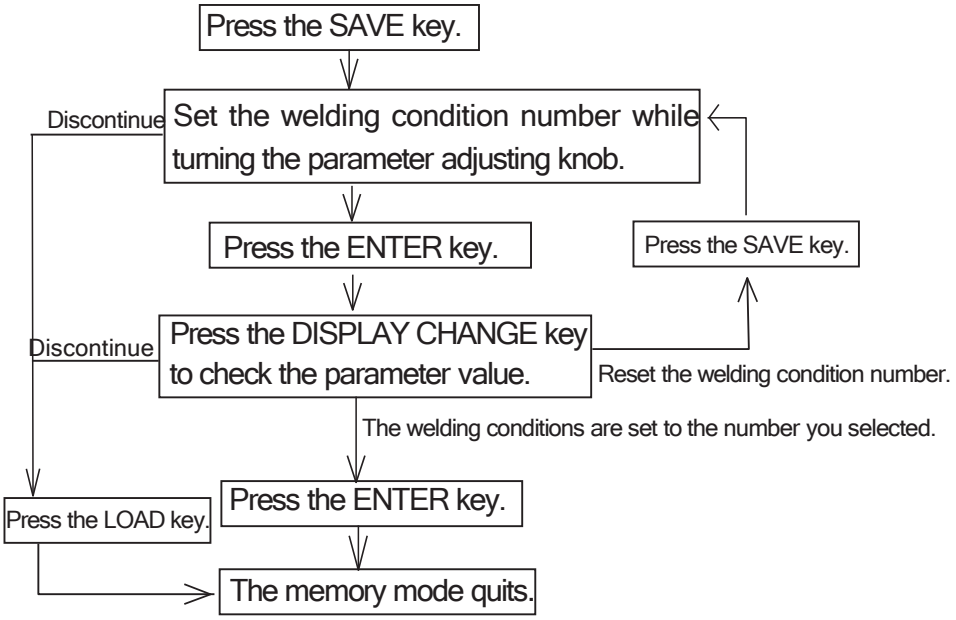
(3) When pressing the ENTER key [17] again, you can read out the preset welding conditions and exit from the readout mode.

10. OPERATION (continued)

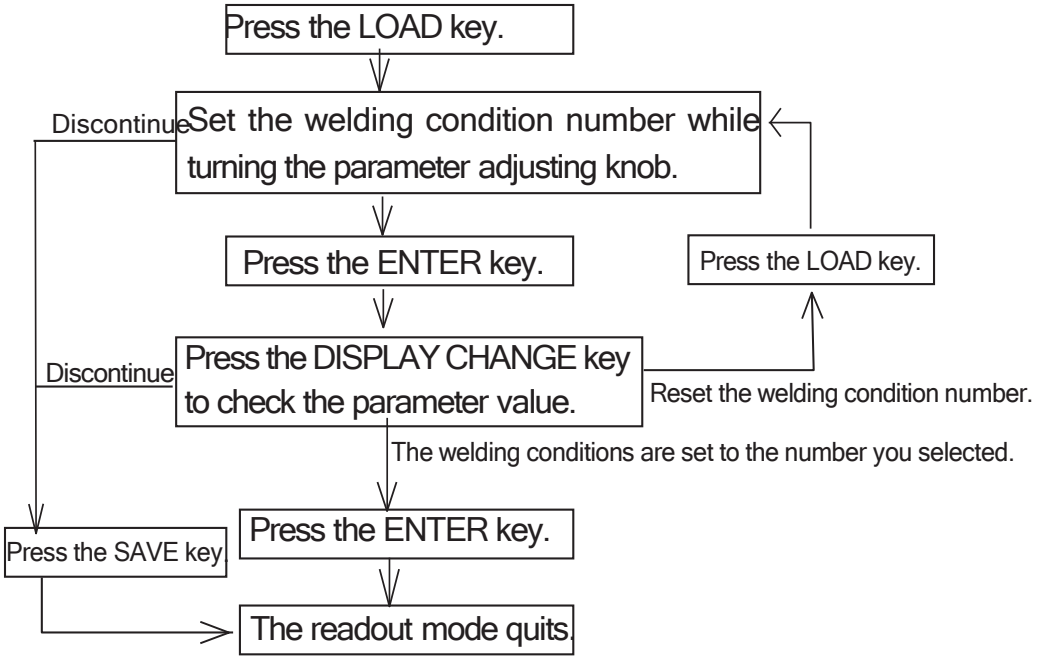
10.2 Applied Settings (continued)

10.2.4 JOB MEMORY Function (continued)

- Memory mode operation



- Readout mode operation



10. OPERATION (continued)

10.2 Applied Settings (continued)

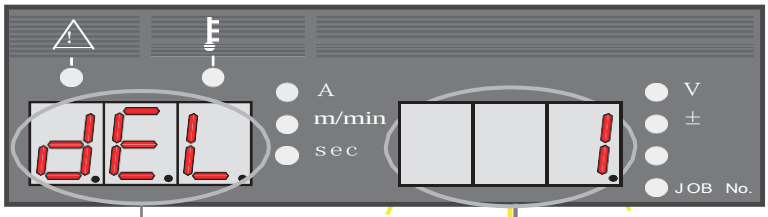
10.2.4 JOB MEMORY Function (continued)

③ Deleting the Welding Conditions

When you delete the welding conditions stored in memory, you can select either deleting all or deleting one.

● Deleting the welding conditions

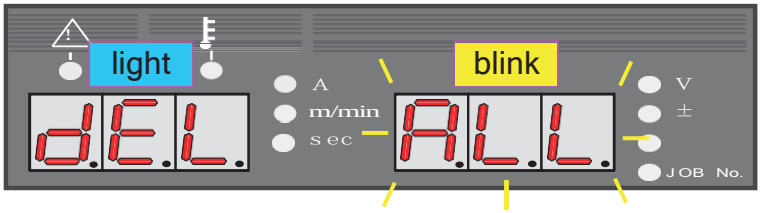
(1) Turn off the power switch and turn on the power switch with both the LOAD key [15] and SAVE key [16] pressed. Release the keys after turning on the power switch, and then "dEL" appear in the left-side display. See the figure below.



"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 [5]. When turning the knob counterclockwise, "ALL" appears in the right-side display as illustrated below and you can delete all the welding conditions.



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 [17] blinks "dEL." Confirm the condition number again and if you want to cancel deleting of the condition number, press any key other than the ENTER key [17] to return to step (2). To quit the delete mode, turn off the welding power source.

(4) Pressing the ENTER key [17] 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 power source.

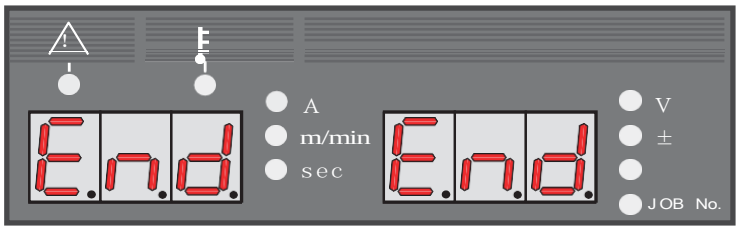
NOTE: When pressing the ENTER key [17] twice in the deletion mode, you can not recover the deleted welding conditions. When you attempt to delete a welding condition that is held in memory, make sure that the condition number you want to delete is surely selected.

10. OPERATION (continued)

10.2 Applied Settings (continued)

10.2.5 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 stored 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 [9] and GAS CHECK key [13] 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 figure below.



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

10.2.6 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 [9] held down. After powering the welding power source, the version number appears in the display.

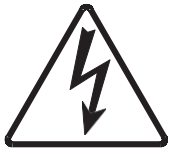
(Example)
Right and left displays: "P30190" ← Software number (P30190) is displayed.
↓ Press the F key [9].
Left display: "001" ← Main software version (Ver. 001) is displayed.
Right display: "000" ← Sub software version is displayed.
↓ Press the F key [9].
Left display: "- - -"
Right display: "002" ← Combination is displayed.
↓ Press the F key [9].
The welding power source starts up as usual and gets ready to perform welding.

10.2.7 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.

11. APPLIED FUNCTION

11.1 How to Solve an Error

WARNING	
	Observe the following to prevent electrical shock.
When touching live electrical parts, critical electric shock and burn may occur. ● Do not touch live electrical parts inside or outside the welding power source. ● Grounding to the case of the welding power source should be performed by persons qualified electric work and according to the laws and regulations in your area. ● When touching the parts inside the welding power source, wait more than three minutes after powering off all input power supply by turning off the line disconnect switch in the switch box.	

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.
When using this product with a robot of our company, refer to "Application" in owner's manual of the robot.

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 -	2 1 0	Error in the voltage detection
6	E -	3 0 0	Thermal overload
7	E -	5 1 0	Lack of water pressure
8	E -	6 0 0	Battery low (warning)
9	E -	7 0 0	Output over current
10	E -	7 1 0	Lack of phase
11	E -	8 0 0	Encoder in the wire feeder error
12	E -	8 1 0	Thermal overload in the governor circuit
13	E -	8 2 0	Motor over current (warning)
14	E -	8 3 0	Motor over current (error)
15	E -	9 X X	Microcomputer error

11. APPLIED FUNCTION (continued)

11.1 How to Solve an Error (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 display 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 143) 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: If error occurs, open between the operation stop terminals once and short-circuit them again. All errors will be released.
However, if abnormal condition has been continuing, the error is not be released and an error code will be displayed. Refer to Section 10.2.1 (4) “Selection of Auto/Semi-automatic”.

(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 P10327U are surely connected.

(5) E-210 Display

If “E-” and “210” in the displays blink, it indicates the “Error in the voltage detection”.
If there is an error in the plus voltage detection line (+), the warning lamp will light up, “E-” and “210” in the displays will blink, then the welding power source will stop automatically. In this case, after checking to make sure that the wire feeder control cable (10P) is not damaged and that CN3 and CN6 on the printed circuit board P10264T are surely connected.

(6) 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 power source. Refer to Section 3.1, “Rated Duty Cycle” for the rated duty cycle of the welding power source.

11. APPLIED FUNCTION (continued)

11.1 How to Solve an Error (continued)

(7) E-510 Display

If "E-" and "510" in the displays blink, it indicates the "Lack of water pressure".
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 "Battery low (warning)".
This welding power source uses battery 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 battery 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 battery run down, the preset welding condition functions and the settings of functions are all deleted. The last welding conditions before power is applied to the welding power source 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 battery" for details.

(9) E-700 Display

If "E-" and "700" in the displays blink, it indicates the "Output over current".
If an overcurrent or short circuit on the secondary output continues for more than one second during welding, the WARNING lamp lights up, "E-" and "700" in the display blink, then the welding power source stops automatically. In this case, turn off the control power switch and check to make sure that the welding current does not exceed the rated output value, or that there is no short circuit on the output side such as a contact between the tip and the base metal, or a short circuit of the output cables.

(10) E-710 Display

If "E-" and "710" in the displays blink, it indicates the "Lack of phase".
If a lack of phase is detected at the primary input, the warning lamp will light up, "E-" and "710" in the displays will blink, and then the welding power source will stop automatically. In this case, make sure that there is no lack of phase in primary input voltage.

(11) E-800 Display

If "E-" and "800" in the displays blink, it indicates the "Encoder in the wire feeder error".
If there is an error in an encoder feedback signal for detecting the feeding rate of wire feeder, the warning lamp will light up, "E-" and "800" in the displays will blink, and then the welding power source will stop automatically. In this case, make sure that there is no damage in the encoder connector (4P) on the top of the motor inside the wire feeder, the control cable for the wire feeder (10P), and the printed circuit board P10261Q.

(12) E-810 Display

If "E-" and "810" in the displays blink, it indicates the "Thermal overload in the governor circuit".
If thermal overload in governor circuit (printed circuit board P10261Q) is detected, the WARNING lamp will light up, "E-" and "810" in the displays will blink, and then the welding power source will stop automatically. In this case, check for printed circuit board P10261Q, short circuit on the motor power supply lines, rough feeding of wire, and error in the torch or the wire feeder.

11. APPLIED FUNCTION (continued)

11.1 How to Solve an Error (continued)

(13) E-820 Display

If "E-" and "820" in the displays blink, it indicates the "Motor over current (warning)".
Contact resistance to the feeding parts causes motor current to increase. If the motor current exceeds 70% of the rated motor current, "E-" and "820" in the displays will blink only while no operation at the front panel is carried out. When pressing any key or starting welding again, "E-" and "820" in the displays will disappear (, but welding power source does not stop automatically). In this case, check for short circuit in the motor power transmission line, rough feeding of wire, and an error in the torch or the wire feeder. Refer to Section 10.2.1(10) "Setting of Feed Motor Load Current Error Detection Level".

(14) E-830 Display

If "E-" and "830" in the displays blink, it indicates the "Motor over current (error)".
If short circuit in the power line to the motor or motor overload happens, "E-" and "830" in the displays will blink and the welding power source will automatically stop. In this case, check for short circuit in the power supply line, rough feeding of the wire, and an error in the torch or the wire feeder.

(15) E-9XX Display

If "E-" and "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 live electrical parts inside or outside the welding power source. ● Grounding to the case of the welding power source should be performed by persons qualified electric work and according to the laws and regulations in your area. ● When touching the parts inside the welding power source, wait more than three minutes after powering off all input power supply by turning off the line disconnect switch in the switch box.

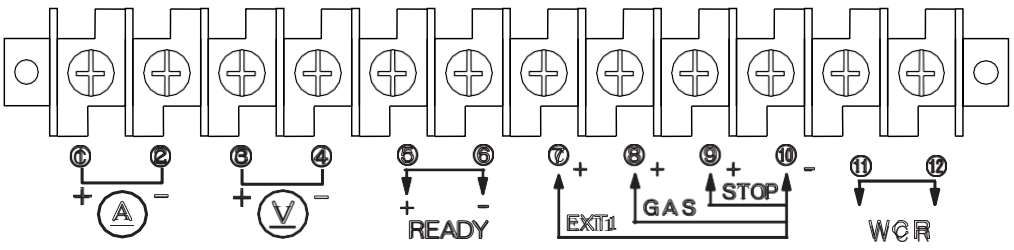
⚠ CAUTION
● Try to move the control cable which is pulled out from the automatic connection terminal on the chassis further away from the welding power cable or the torch cable when making an external connection. Otherwise, equipment failure may be caused by noise, etc., during welding operation. ● Do 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 for the automatic machine

When taking off the upper cover of the welding power source, you will find there is a 12P terminal block (TM1) on the chassis. Use the 12p terminal block to connect with an automatic machine. Refer to Section 12, "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.

NOTE: Break the grommet with film located on the rear side of the welding power source to lead in the external connecting wires. When leading in the external connection wires, do not touch the parts on the printed circuit board and the edges of the steel plate.



[12P terminal block]

11. APPLIED FUNCTION (continued)

11.2 External connection for the automatic machine (continued)

12P terminal block (TM1)

Pin No.	Signal name	Function	
Ⓒ+ – Ⓒ-	AMMETER	Terminals for connecting an ammeter. Use the ammeter (400A/60mV, part number: 4403-057).	
Ⓒ+ – ④-	VOLTMETER	Terminals for connecting a voltmeter. Use the voltmeter (full scale 75V, part number: 4401-016).	*4
⑤+ – ⑥-	READY (OUTPUT) Ready Power	The terminals used for ready power for prep. relay. When there is not any error such as open phase, Operation Stop, output overcurrent, and thermal overload, the terminals work, etc. while the power switch is on, ⑤ and ⑥ terminals are short-circuit through the output transistor.	*1
Ⓒ+ – ⑩-	EXT1 (INPUT) Extra Input Signal 1	The terminals used for special specifications. These terminals should not be used for normal use.	*2
⑧+ – ⑩-	GAS (INPUT) Solenoid Valve Control	The terminals used for controlling the gas solenoid valve by external signals. (If the terminals are short-circuited, the gas valve will open.)	*2
⑨+ – ⑩-	STOP (INPUT) Operation Stop	To stop welding externally. Release the wiring between two terminals to run Operation Stop. Welding power source 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. All error codes can be released by short-circuiting terminals again.	*2
⑪ – ⑫	WCR(OUTPUT) Welding Current Detection	Contact Output of welding current relay used for detection of welding current. The contacts close while welding current is flowing.	*3

NOTE: 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 below. 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 below. 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 (75V or less) is applied to between the terminals during welding.

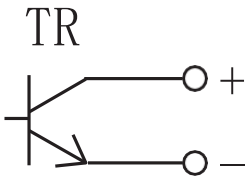


Figure 1

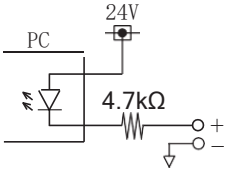


Figure 2

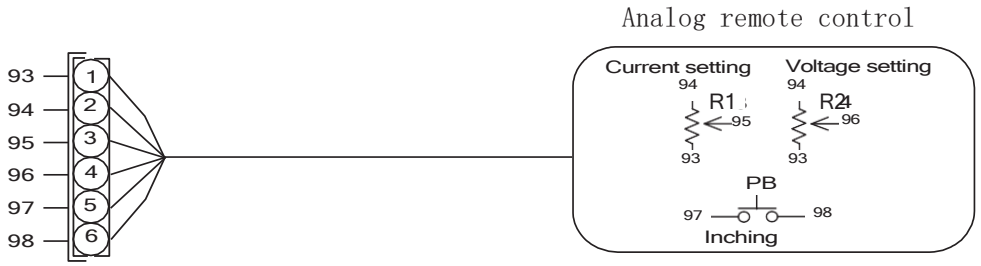
11. APPLIED FUNCTION (continued)

11. 3 Combining with an Automatic Machine

When combining with an automatic machine, use the external receptacles and the sockets for remote control or for wire feeder. Refer to Section 11.2, "External connection for the automatic machine" for the details of the terminal block inside the welding power source.

(1) Current/Voltage Settings and Inching Signal

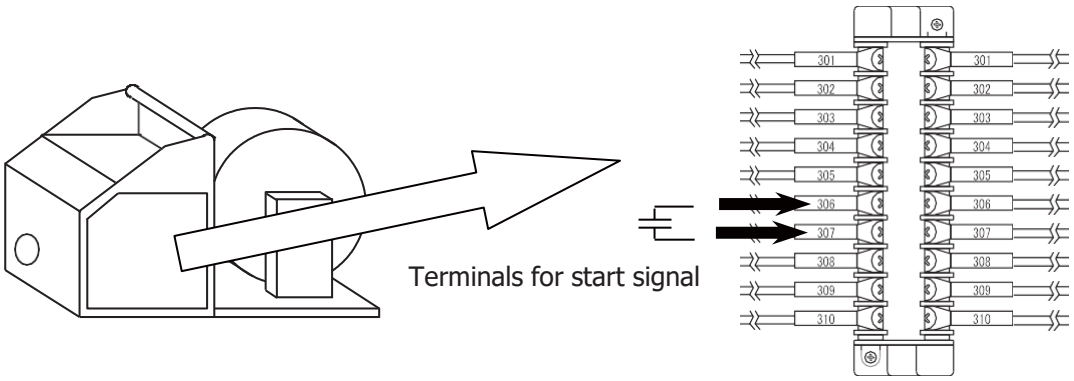
As the analog remote control (optionally supplied) is replaced in use, resistor R1 for current setting, resistor R2 for voltage setting, and switch PB for inching, which are all listed in Section 13. "Parts List", should be used. For setting current/voltage on external voltage, refer to Section 10.2.1(4), "Selection of Auto/Semi-automatic".



(2) Start Signal

When removing the right-side plate of the wire feeder, you will find a 10P terminal block. See the figure below. Welding is carried out by the start signal when terminals of wiring numbers 306 and 307 are closed. Welding stops when the terminals are open.

*Outgoing lines of start signal and direct detection signal are located next to the 10P control cable. Break the grommet with film.



11. APPLIED FUNCTION (continued)

11.4 Optional Accessories

11.4.1 Other Optional Accessories

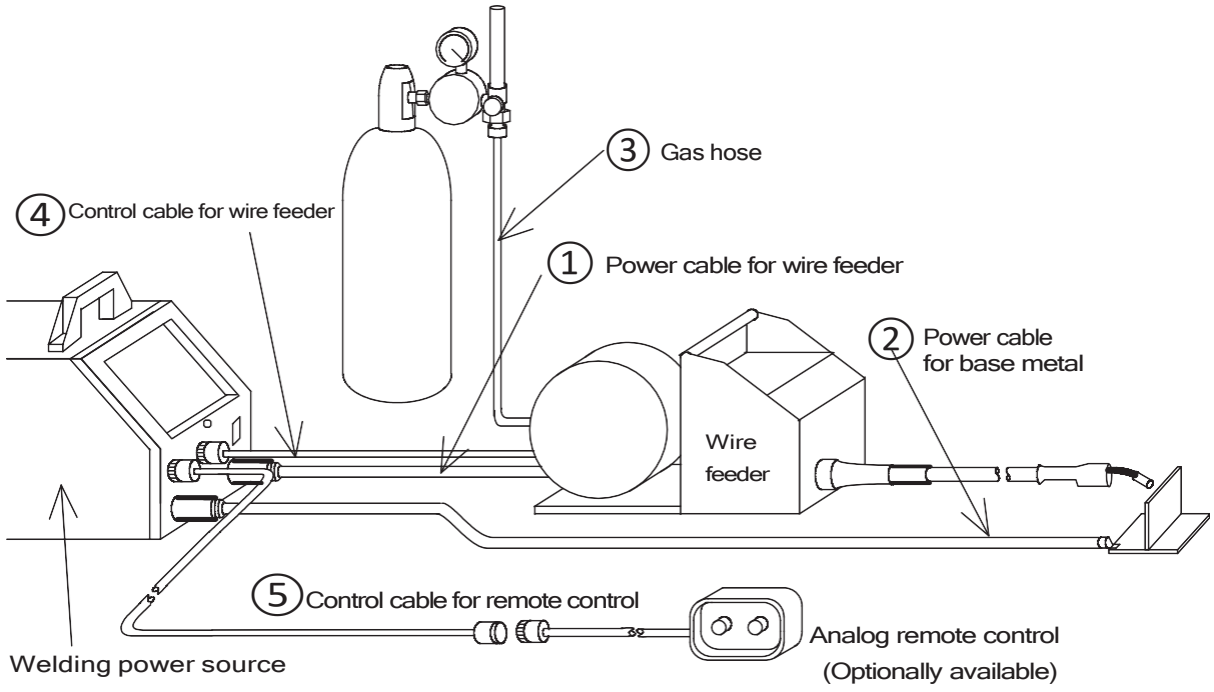
Description	Part No.	Remarks
Analog remote control	K5416Z00	With a 3m cable
Digital remote control	E-2454	Not including a cable
CAN I/F board	K5422C00	
CAN communication cable	BKCAN-04XX	XX: 05 (5m),10 (10m),15 (15m),20 (20m)
Wheel kit	K5416B00	

11.4.2 Extension Cable/Hose (Extension of Work Space)

⚠ CAUTION

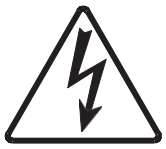
- Do not connect an unnecessarily long extension cable.
- When using an extension cable, roll it out. Failure to observe the demand may result in unstable arc.

Choose a proper torch cable (separately sold) for work space. When extending the work space, use other extension torch cables/hoses (separately sold) that match the work space.



11. MAINTENANCE AND TROUBLESHOOTING

⚠ WARNING



To avoid electric shock, follow the below instructions.

- Do not touch live electrical parts inside or outside the welding power source.
- Turn off all of the line disconnect switches before touching the parts inside the welding power source.
- Perform the maintenance checks periodically. If any damaged parts are found, only use the welding power source after troubleshooting or repairing.
- Only certified operators should maintain, inspect, or repair the welding power source.
- 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 power source to keep away others from the welding power source.

⚠ CAUTION



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

- Only certified operators should maintain, inspect, or repair the welding power source.
- Install a fence around the welding power source 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 data) 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 deleted. We recommend taking notes of important data.
- We shall not assume any responsibility for any change or loss of the electronic data resulting from repair.

⚠ CAUTION

- Do not use moisture-free compressed air for cleaning the fan. Dust may penetrate into fan by compressed air pressure, or fan blades may be rotated at excessive rotation speed. It causes an abnormal wear in the bearing and fan failure. Use soft cloth for removing dust.
- Do not vacuum the space between main body and rotating part. Otherwise the grease may be vacuumed up and result in damage to fan.

12. MAINTENANCE AND TROUBLESHOOTING (continued)

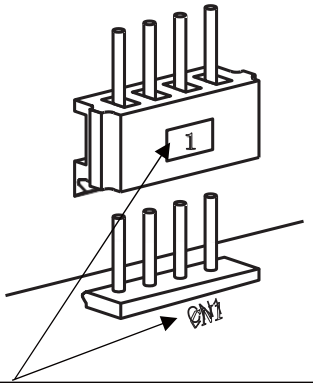
12.1 Carrying out Maintenance on the Welding Power Source

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 securely made.
  - There are 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.)
  - There is no trouble in crack and the like on the front panel.
- 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 equipments. 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.
- Replacement of High voltage electrolytic capacitor:
  The high voltage electrolytic capacitor supplies stable D.C. to the Primary inverter transistor and tries to improve the operation stabilization of the welding power source.
  However, it is an enclosed electrolyte with battery and the electrolyte may be leak from the capacitor. Therefore it is recommended that this is changed every 5years. If use continues without changing this part, it may result in damage with high voltage electrolytic capacitor and other parts. Replace PCB6 (Part No.P10538M00).

12.2 Precaution for Replacement of the Printed Circuit Board

- 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 the welding .

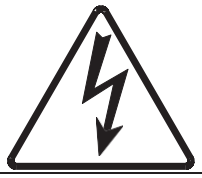


NOTE: Match the number on the printed circuit board with that on the connector.

- 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 power source. Deformation and flaw may result from the adherence of the organic solvent.

12. MAINTENANCE AND TROUBLESHOOTING (continued)

12.3 Insulation Resistance Test

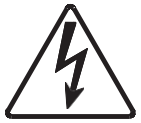
⚠ WARNING	
	Observe the following to prevent an electrical shock.
When touching live electrical parts, a critical electric shock and burn may occur. ● Have qualified operators or the persons familiar with this welding power source measure insulation resistance and test withstand voltage . And install a protective wall around the welding power source to keep away others from the welding power source. 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 DC side of DR1.
(3) Short-circuit between TR1 (C1) and (E1), TR2(C2) and (E2), TR3(C2) and (E2).

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

12.4 Replacement of Battery

⚠ WARNING	
	Observe the following precautions listed below without fail, in order to prevent fire, explosion and rupture.
● Do not charge, short-circuit, disassemble, heat, deform and/or solder batteries. Do not throw batteries into a fire. ● Make sure the positive and negative polarity is correctly connected. ● Make sure battery terminals are insulated with insulation tapes when disposing batteries. Otherwise, if batteries come in contact with other metal or batteries, generation of heat, rupture or ignition may occur. ● Batteries must be replaced by an experienced repairman or engineer.	

This welding power source uses lithium battery to hold welding conditions in memory. The life of the battery differs depending on the environments. "E-" and "600" shown in the displays on the front panel blinks when the battery gets low. Replacement of the battery every 5 years or so are recommended even when "E-" and "600" do not blink. Replace the battery 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 P.C.B.P10533R to replace the printed circuit board. Refer to the position for "Rear side of the front panel" in Section 12.7, " Parts Layout".
(4) Insert the disconnected connectors into the P.C.B.P10533R.
(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 PL1 does not light.	When turning on the power switch, the displays light.	Trouble with PL1.	Inspect PL1.
		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 PL1 does not light.	Refer to No.2 in this list.	
		PL1 lights.	Shortage of the input voltage	Check for proper input voltage.
			Trouble of 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	Shielding 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 of 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 306 and 307.
6	Shielding 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-load voltage is not output but shielding gas is generated.		Trouble with the inverter main circuit	Turn off the power switch, then contact your dealer.
			Trouble with the control circuit	After inspecting PCB P10492P or P10327U replace it if necessary.

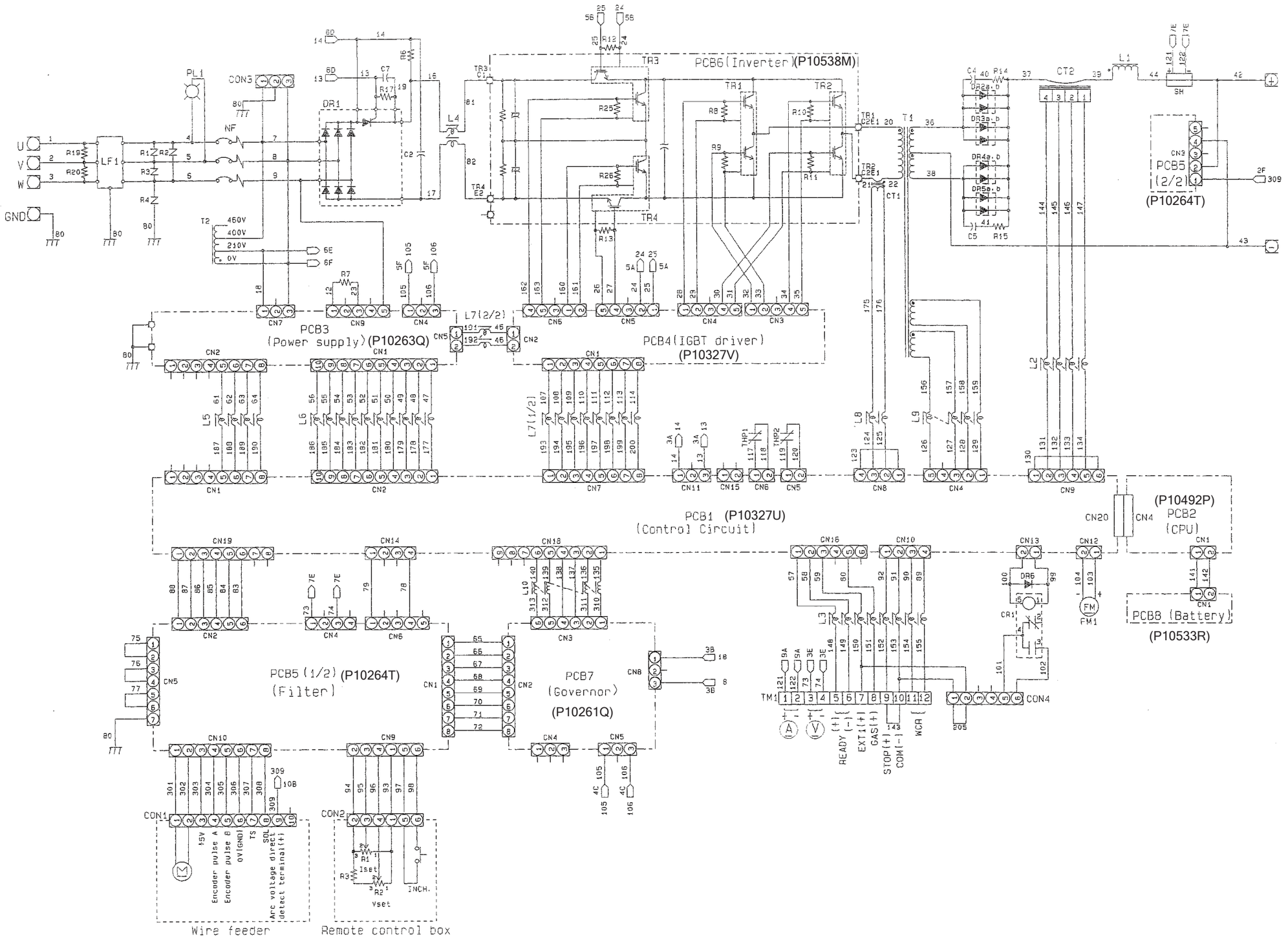
12. MAINTENANCE AND TROUBLESHOOTING (continued)

12.5 Troubleshooting

No.	Trouble	Cause	Solution
8	Current and voltage can not be set.	Trouble with the control circuit	After inspecting PCB P10492P or P10327U and replace it if necessary.
		Trouble with the filter circuit	After inspecting PCB P10264T, replace it if necessary.
		Trouble with the remote control	After inspecting the cable/plug for remote control or the remote control, replace them if necessary.
		Error in wire voltage detection	Inspect connections of CN4 on PCB P10327U.
9	Wire is not fed.	Incomplete insertion or breaking of the control cable for wire feeder	After inspecting the contacts of the plug and cable, replace them if necessary.
		Trouble with the motor control circuit	After inspecting PCB P10261Q, replace it if necessary.
		Trouble with the filter circuit	After inspecting PCB P10264T, replace it if necessary.
10	WCR keeps working.	Trouble with the hole current detector CT2	Inspect the hole current detector CT2.
		Trouble with the WCR circuit	After inspecting PCB P10492P, replace it if necessary.

12. MAINTENANCE AND TROUBLESHOOTING (continued)

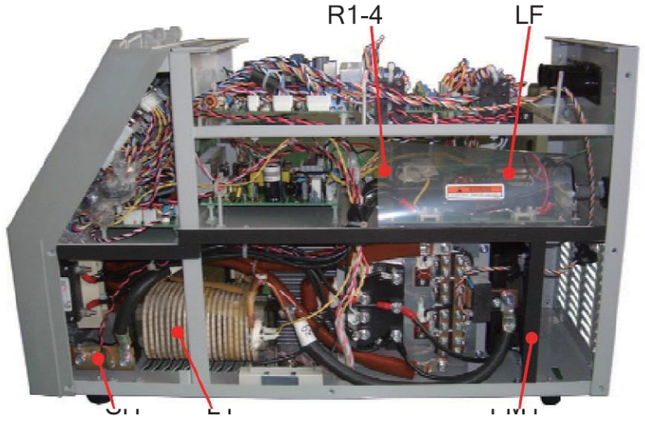
12.6 Schematic Diagram



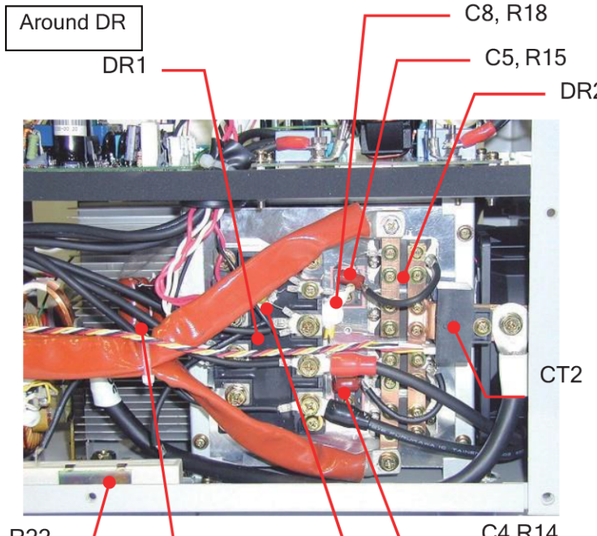
12. MAINTENANCE AND TROUBLESHOOTING (continued)

12.7 Parts Layout

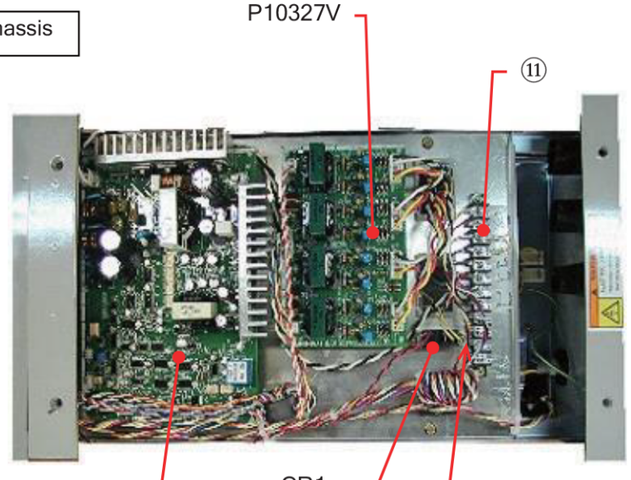
Right Side



Around DR



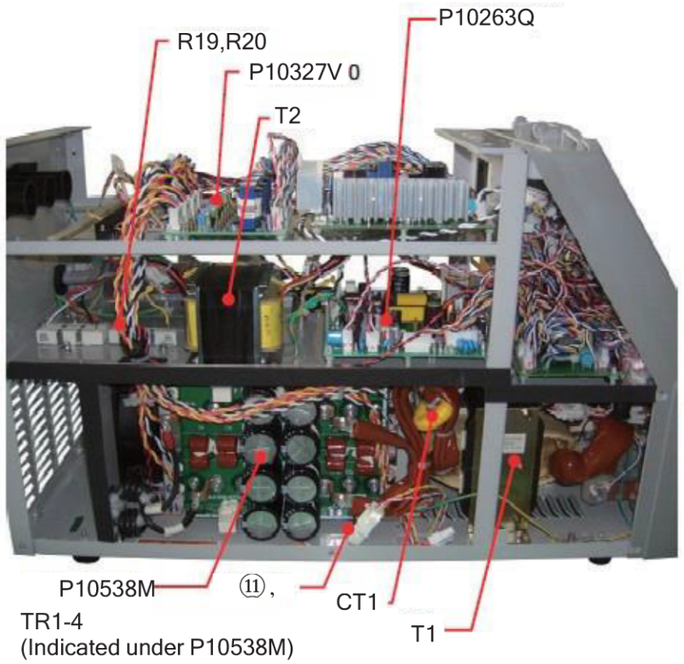
Chassis



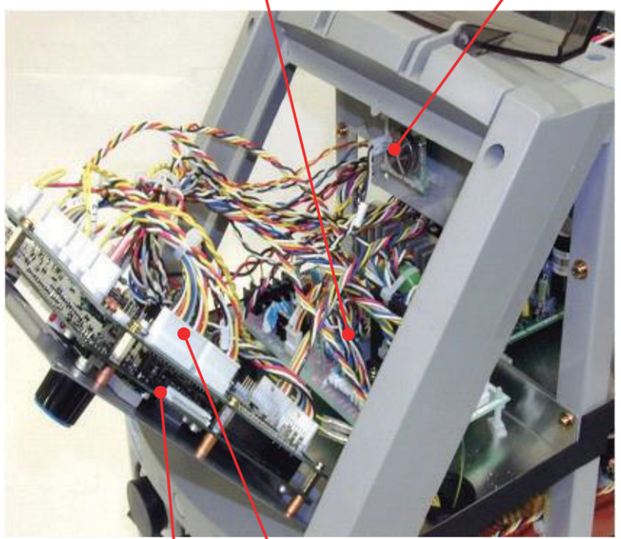
Rear Side

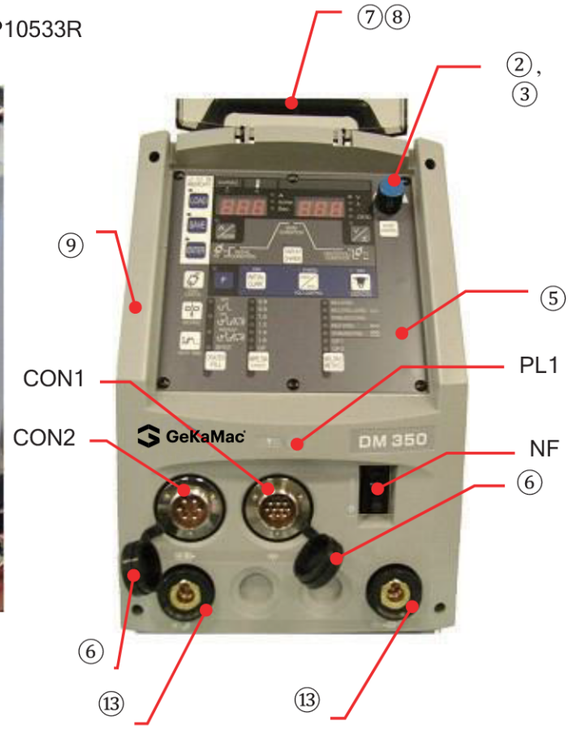


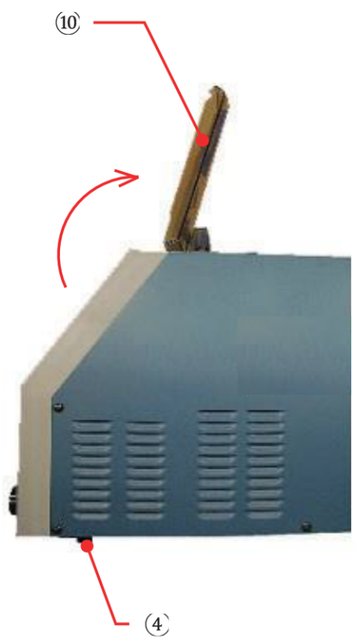
Left side



Back Side of Front Panel







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-XO-10-072-42D-C	1	
LF	4519-022	Line filter	CF3030C-DJ	1	
PL1	100-0171	Pilot lamp	N46010A7KW-01(RoHS)	1	
DR1	4531-204	Diode module	DFA75BA160	1	
DR2 – 5	4531-308	High speed diode module	DBA200UA60	4	
DR6	100-0188	Silicon diode	D1N60-5060	1	
TR1 – 4	4534-407	IGBT module	2MBI150TA-060-50	4	
CT1	4810-030	Current transformer	W-W03029	1	
CT2	4406-009	Hole current detector	HA400S3EH	1	
T1	P10538B00	Inverter transformer	P10538B00	1	
T2	4810-916	Auto transformer	W-W02936	1	
L1	P10538C00	DC reactor	P10538C00	1	
L2,3,7	4739-497	Ferrite core	E04RA400270150	3	
L4	4739-497	Ferrite core	E04RA400270150	2	
L5,6,8,9	4739-543	Ferrite core	E04RA310190100	4	
L10	4739-358	Ferrite core	RI-17.5-28.5-10.7	1	
THP1	100-0123	Thermostat	US-602SXTTAS 130˚C	1	
THP2	4615-057	Thermostat	67L080	1	
FM1	4805-074	Fan	4715SL-05W-B60-D00	1	
CR1	4341-139	Relay	G2R-1-T DC24V	1	
SH	4403-116	Meter shunt	KY400A 400A/60mV	1	
R1 - 4	100-1528	Surge absorber	TND14V-911KB0LLAA0	4	
R6	4509-918	Cement resistor	40SH 200ΩJA	1	
R7	4509-825	Cement resistor	20SH 15kΩJA	1	
R8 – 13, 17,25,26	100-0234	Carbon resistor	RD20S 1kΩJ (RoHS)	9	
R14,15	4509-138	Metal film resistor	RNP－50SA 5ΩJ	2	
R19,20	4509-905	Cement resistor	MHR20A513JI	2	
R23,24	4501-039	Carbon variable resistor	RV24YN20SB 5kΩ	2	
C2a, b	4518-515	Film capacitor	FKS1600VDC683JSL	2	
C4,5	4518-542	Film capacitor	US20X472JAASA	2	
C7	100-0227	Film capacitor	0.47μF 50V (QYX1H474JTP)	1	
CON1	100-1435	Metal socket	DPC25-10BP	1	
CON2	100-0178	Metal socket	25-6BK-Z	1	
TM1	4739-505	Terminal block	TB10-01-12P	1	

13. PARTS LIST (continued)

Symbol	Part No.	Description	Specifications	Q'ty	Remarks
PCB1	P10327U00	Printed circuit board	P10327U00	1	
PCB2*	P10492P00	Printed circuit board	P10492P00	1	Refer to "NOTE" below.
PCB3	P10263Q00	Printed circuit board	P10263Q00	1	
PCB4	P10327V00	Printed circuit board	P10327V00	1	
PCB5	P10264T00	Printed circuit board	P10264T00	1	
PCB6	P10538M00	Printed circuit board	P10538M00	1	
PCB7	P10261Q00	Printed circuit board	P10261Q00	1	
PCB8	P10533R00	Printed circuit board	P10533R00	1	
①	4739-604	Grommet with film	C-30-SG-32A	3	
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	P10325W02	Control panel sheet	P10325W02	1	
⑥	4739-476	Cap	W-W02814	2	
⑦	P5801G03	Carrying Handle	P5801G03	2	
⑧	P10263G12	Bush	P10263G12	4	
⑨	P10260J01	Front cover	P10260J01	1	
⑩	P10263J02	Control panel cover	P10263J02	1	
⑪	P10329X02	Cable with 3P connector	P10329X02	1	
⑫	P10538X04	Cable with 6P connector	P10538X04	1	
⑬	4734-007	Machine socket	DIX BE 50/70	2	Output terminal
	4734-016	Power cable connector	DIX SK 50	1	For ⑬

*NOTE: When ordering a printed circuit board P10492P00, provide the software version on a label below a nameplate attached to the rear side of the welding power source.

P30190 Ver. ###.###.000

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

Parts list for analog remote control (optional accessories)

Symbol	Part no.	Description	Specifications	Q'ty	Remarks
R1,2	4501-039	Carbon variable resistor	RV24YN20SB 5KΩ	2	
R3	100-0487	Resistor	RD20STP-52 12ΩJ	1	
PB	4250-077	Push button switch	A2A-4R	1	
	100-0102	Metal socket plug	DPC25-6A-Z	1	
	4735-007	Knob	K-2195 (large)	2	
	K5416Z02	350/500A scale plate	K5416Z02	1	

14. SPECIFICATIONS

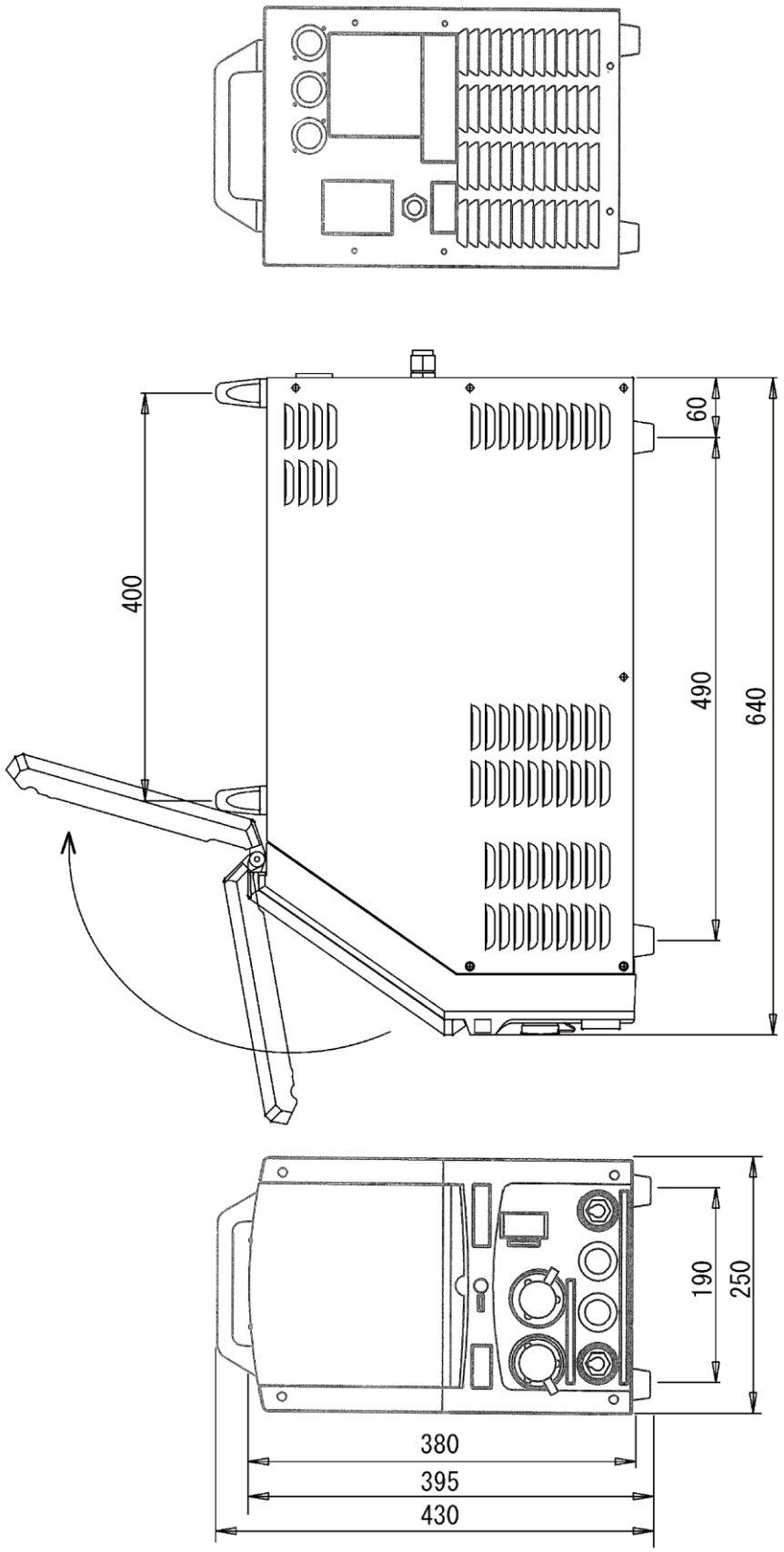
14.1 Welding power source

Specifications \ Model	PoWer MIG GS 380 S
Number of phase	3 phase
Rated frequency	50 / 60Hz
Rated input voltage	400V±15%
Rated input power	17.1kVA, 15.1kW
Rated output current	380A
Rated load voltage	34.0V
Rated output current range	30 – 380A
Rated output voltage range	12 – 36V
Maximum no-load voltage	58V
Rated duty cycle	50%
Number of welding condition	30
Usable temperature range	-10 – +40˚C
Usable moisture range	20 – 80% (without dew condensation)
Storage temperature range	-20 – +55˚C
Storage moisture range	20 – 80% (without dew condensation)
External dimensions(W x D x H)	250mm x 640mm x 430mm (without the carrying handle)
Degree of protection	IP 21
Mass	30kg

The welding power source complies with the requirements of IEC60974-1, IEC60974-10 and directive 2011/65/EU (RoHS).

14. SPECIFICATIONS (continued)

14.2 External View



14. SPECIFICATIONS (continued)

●Initial Values and Setting Range of Parameter

		Initial value	Setting range
Pre-flow time		0.1 seconds	0 - 10 seconds
● Initial condition ● Main condition ● Crater filler condition	Current	30 A	30 - 400 A (0.4 - 22.0 m/min.)
	Voltage	10 V	12 – 38 V
	Fine adjustment of voltage	0	-30 – 30
Post-flow time		0.1 seconds	0 - 10 seconds
Arc spot time		3 seconds	0.1 - 10 seconds
Arc characteristic		0	-99 – 99
Welding conditions numbers		1	1 – 30

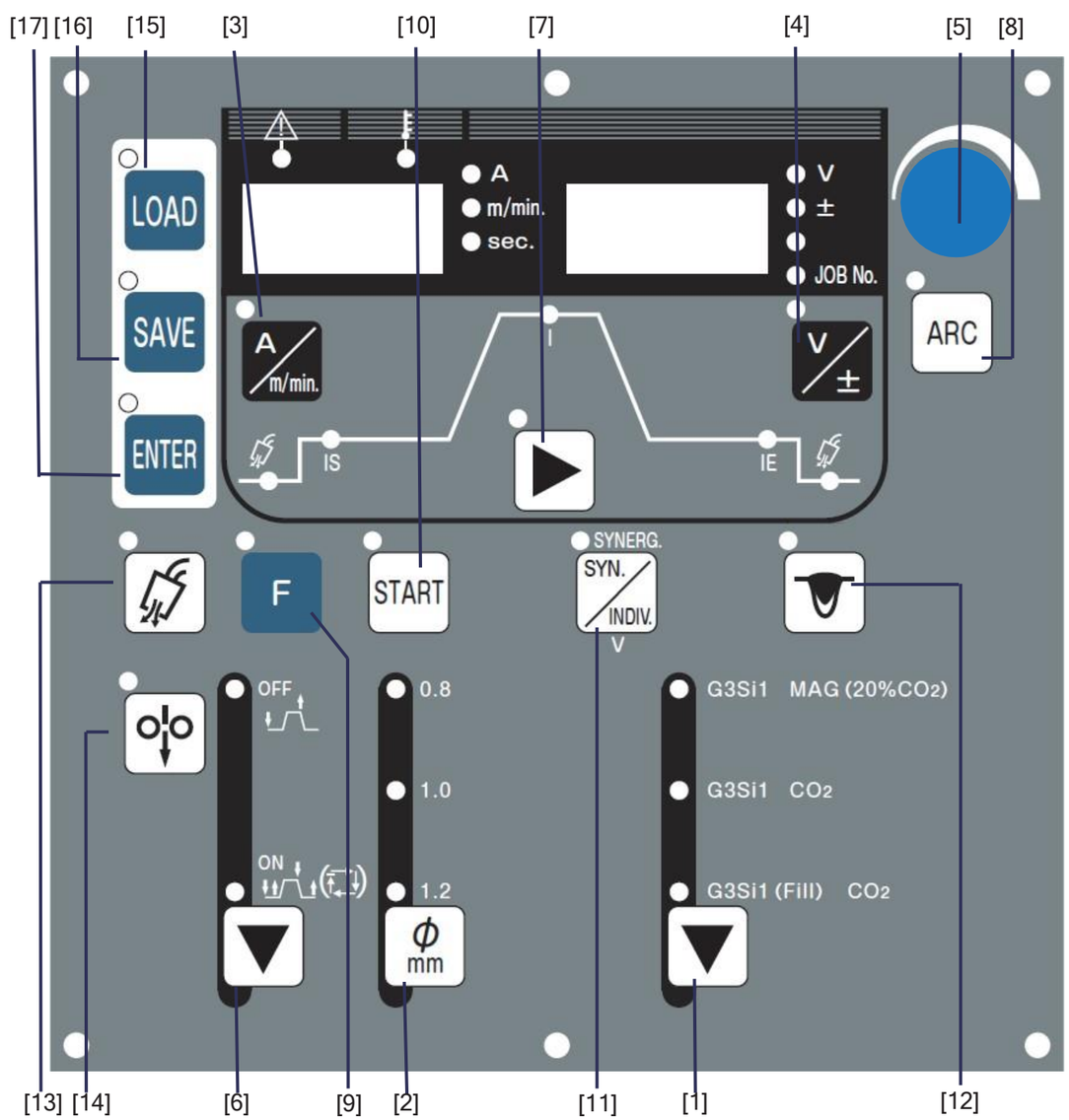
●Functions

	Initial value	Setting item
Crater	OFF	OFF/ON
Welding method	G3Si1 MAG (20%CO_2)	G3Si1 MAG(20%CO_2) / G3Si1 CO_2 / G3Si1(Fill) CO_2
Wire diameter	1.2	0.8/1.0/1.2
Initial current	OFF	ON/OFF
Adjustment of welding voltage	INDIVIDUAL	SYN./INDIV.
Penetration control	OFF	ON/OFF

●Internal Functions <Refer to Section 10.2.1, “Using of internal functions >

		Initial value	Setting range
F1	Fine adjustment of anti-stick (burnback) time	0	-50(0.50 seconds down) - 50(0.50 seconds up)
F2	Fine adjustment of anti-stick (burnback) voltage	0.0	-9.9 - +9.9 V
F3	Fine adjustment of slow-down speed	0.0	-1.0 - +1.0 m/min.
F4	Selection of automatic/semi-automatic	0	2(Automatic mode 2) / 1(Automatic mode 1) / 0(SEMI-AUTOMATIC)
F5	External Input Voltage	15.0	15.0V / 14.0V / 10.0V
F6	Setting of up-slope time	0.0	0 - 10.0 seconds
F7	Setting of down-slope time	0.0	0 - 10.0 seconds
F8	Result display holding time	20	0 - 60 seconds
F9	Selection of scale plate of analog remote control	350	200/350/500
F10	Setting of feed motor load current error detection level	70	20 - 150 %
F11	Fine adjustment of JOB MEMORY Fine Adjustment	OFF	OFF(INVALID) / 1 — 30 %(VALID)
F12	Setting of Soft Arc Mode	OFF	ON(SOFT) / OFF(STANDARD)
F15	Changeover to Wire feeding speed Setting	OFF	ON(Wire feeding) / OFF (Current)
F17	Change of a peculiarly crater-filler sequence	OFF	ON(VALID)/OFF(INVALID)
F18	Setting of Initial time	0	0 - 10.0s (Peculiarly Crater only)
F19	Setting of crater time	0	0 - 10.0s (Peculiarly Crater only)
F20	Current adjustment by torch switch	OFF	ON(VALID)/OFF(INVALID)
F21	Current change amount by single click	0	-50 – 50 A
F22	Current change amount by double click	0	-50 – 50 A
F23	Initial current and crater current setting in percentage (%)	OFF	ON(VALID)/OFF(INVALID)
F24	Setting of initial current in percentage	100	10 – 300%
F25	Setting of crater-filler current in percentage	100	10 – 300%

● Front Panel



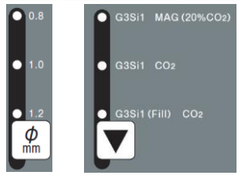
[1] ▼ (WELDING METHOD) key	[10] START (INITIAL CURR.) key
[2] φ mm key	[11] VOLT. CONTROL key
[3] A/m/min selector key	[12] CONSTANT PENETRATION key
[4] V/± selector key	[13] GAS CHECK key
[5] Parameter adjusting knob	[14] INCHING key
[6] ▼ (CRATER-FILL) key	[15] LOAD key
[7] ▶ (DISPLAY CHANGE) key	[16] SAVE key
[8] ARC (CONTROL) key	[17] ENTER key
[9] F (FUNCTION) key	

14. SPECIFICATIONS (continued)

QUICK MANUAL
Refer to Section 10.1, “Basic Settings”and Section 10.2, “Applied Settings”.

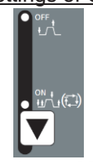
① Before Using the Welding Power Source

1. Settings of Welding Method



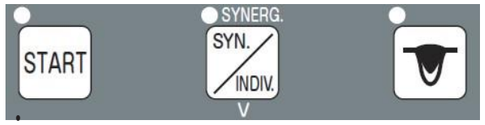
Set a welding method, then wire diameter by using the ▼ (WELDING METHOD) key, and the φ mm (WIRE DIA.) key respectively.

2. Settings of Crater/Arc Spot



Use the ▼ (CRATER-FILL)key to select OFF/ON.

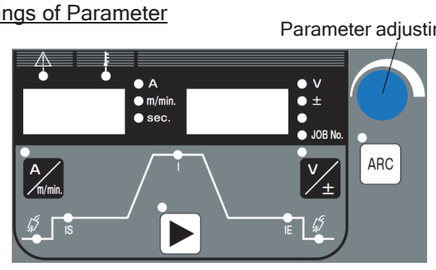
3. Settings of Functions



For using INITIAL CURRENT, press the START key to set the function to “ON”.
[ON]: START lamp lights.
[OFF]: START. lamp does not light.

- For controlling voltage in the SYNERG. way, select “SYNERG.” by pressing the SYN./INDIV. key.
  [SYNERGIC]: SYN./INDIV. lamp lights.
  [INDIVIDUAL]: SYN./INDIV. lamp does not light.
- For activating a CONSTANT PENETRATION function, set the function to “ON”.
  [ON]: CONTANT PENETRATION lamp lights.
  [OFF]: CONSTANT PENETRATION lamp does not light.

Settings of Parameter



Use the DISPLAY CHANGE key to select the parameter you want to set, then adjust it while turning the Parameter adjusting knob. When changing the parameter unit in the display, use the ele key.



To adjust the desired arc characteristic (HARD/SOFT), after turning on the ARC lamp by pressing the ARC key, set the level of the arc characteristic.
[ON]: ARC lamp lights.
[OFF]: ARC lamp does not light.

NOTE:

- Turning the Parameter adjusting knob clockwise increases the parameter. To decrease the parameter, turn the Parameter adjusting knob counter-clockwise.
- There may be unavailable parameters in some crater settings and function settings. Refer to Section 10, “OPERATION” for details.

4. 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.

5. Inching the Wire



After pressurizing the wire mounted on the wire feeder using the pressure roll, feed the wire up to the end of the torch while using the INCHING key. When pressing the INCHING key again, the wire feeding stops.

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

② 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 power source is in the key protection mode.

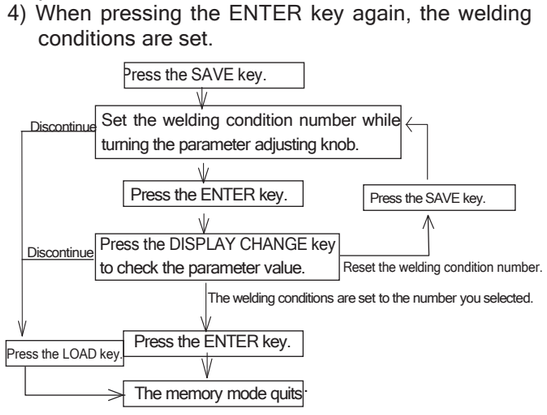


- Releasing the key protection
  Hold down the ENTER key + the F key at a time for a few seconds. When the F lamp turns off, the key protection function is released.

③ Presetting the Welding Conditions

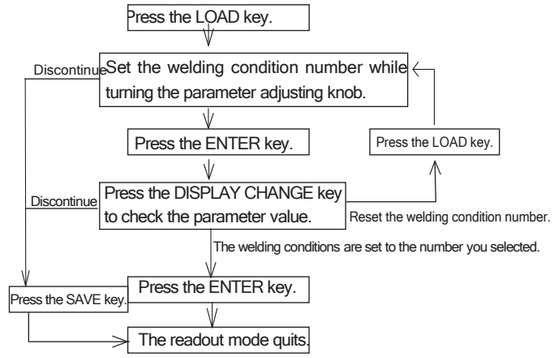


1) Pressing the SAVE key enters the save mode. The preset welding condition number is displayed in the right display and the welding current is displayed in the left display.
2) Preset the welding conditions to the desired numbers 0 - 30 while turning the Parameter adjusting knob. When “---“ is displayed 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 deleted and overwritten with the welding conditions you newly set.
3) Press the ENTER key to check the parameter 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 enter 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.

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 -	2 1 0	Error in the voltage detection
6	E -	3 0 0	Thermal overload
7	E -	5 1 0	Lack of water pressure
8	E -	6 0 0	Battery low (warning)
9	E -	7 0 0	Output overcurrent
10	E -	7 1 0	Lack of phase
11	E -	8 0 0	Encoder in the wire feeder error
12	E -	8 1 0	Thermal overload in the governor circuit
13	E -	8 2 0	Motor overcurrent (warning)
14	E -	8 3 0	Motor overcurrent (error)
15	E -	9 X X	Microcomputer error

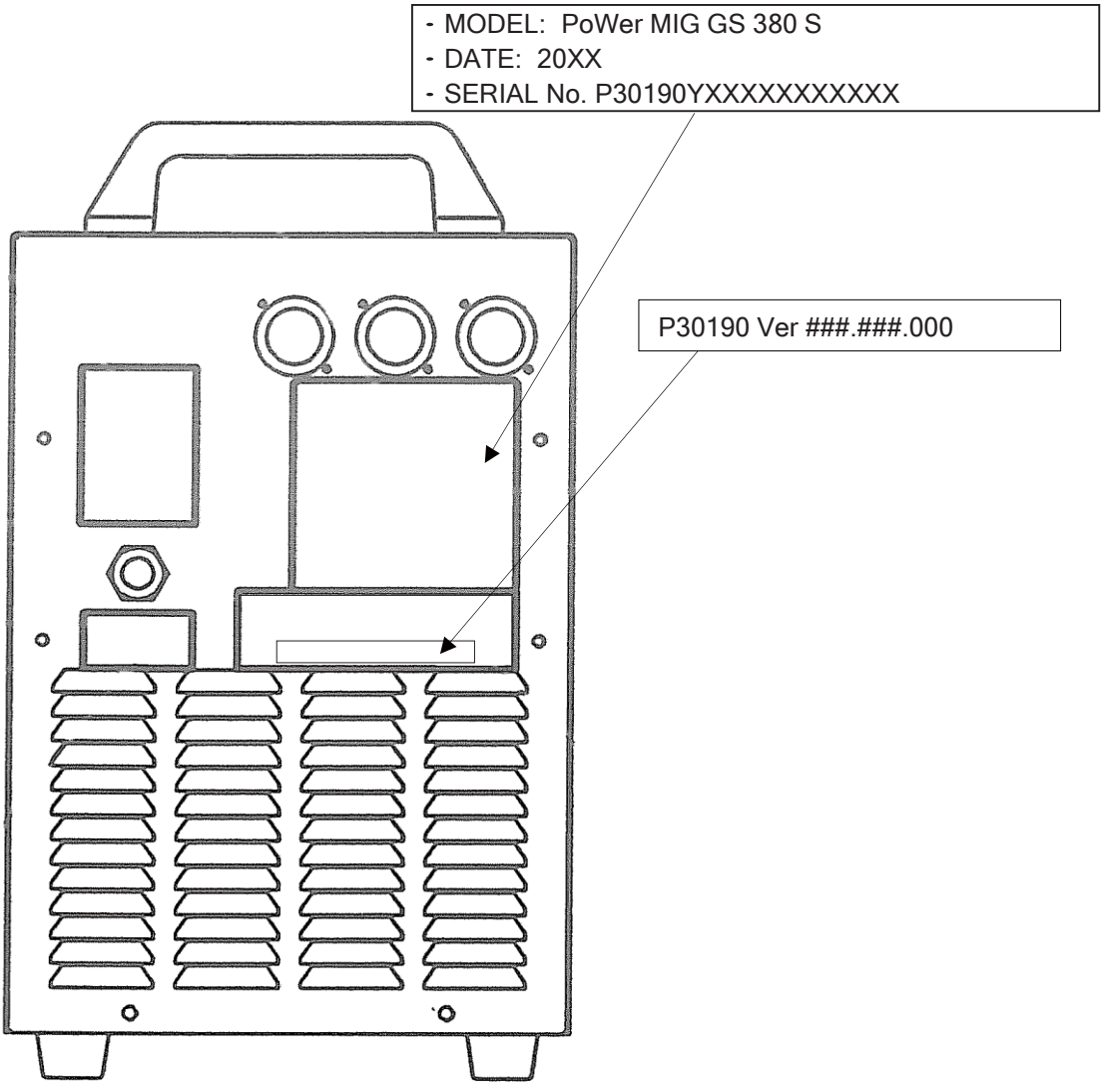
When using this product with a robot of our company, refer to “Application (arc welding)” in owner’s manual of the robot.

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 MIG Series

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