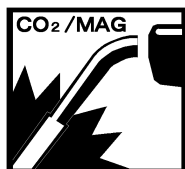




# OWNER'S MANUAL

FOR



## DIGITAL INVERTER CPVE-400/500

**MODEL: CPVE-400 P30161/C1017  
CPVE-500 P30162/C1018**

INVERTER CONTROLLED WELDING POWER SOURCE

**DO NOT DESTROY**

**IMPORTANT:** Read and understand the entire contents of this manual, with special emphasis on the safety material throughout the manual, before installing, operating, or maintaining this equipment. This equipment and this manual are for use only by persons trained and experienced in the safety operation of welding equipment. Do not allow untrained persons to install, operate or maintain this equipment. Contact your distributor if you do not fully understand this manual.

**DAIHEN Corporation** WELDING PRODUCTS DIVISION

**Upon contact, advise MODEL and MANUAL NO.**

Notice : Machine export to Europe

This product does not meet the requirements specified in the EC Directives which are the EU safety ordinance that was enforced starting on January 1, 1995. Please make sure that this product is not allowed to bring into the EU after January 1, 1995 as it is. The same restriction is also applied to any country which has signed the EEA accord.





Please ask us before attempting to relocate or resell this product to or in any EU member country or any other country which

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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.


 <b>WARNING</b>	<b>WARNING</b> gives information regarding possible personal injury or loss of life.
 <b>CAUTION</b>	<b>CAUTION</b> refers to minor personal injury or possible equipment damage.
 <b>MANDATORY</b>	Indicates " <b>MANDATORY</b> " matters.
 <b>PROHIBITED</b>	Indicates " <b>PROHIBITED</b> " matters.

## 2. ARC WELDING SAFETY PRECAUTIONS


 <b>WARNING</b>
<b>ARC WELDING can be hazardous.</b>
<p><b>1. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH.</b>  <b>Be sure to:</b></p> <ul style="list-style-type: none"> <li>• <b>Keep children away.</b></li> <li>• <b>Keep pacemaker wearers away until consulting a doctor.</b></li> </ul> <p><b>2. Read and understand the summarized safety information given below and the original principal information that will be found in the PRINCIPAL SAFETY STANDARDS.</b></p> <p><b>3. Have only trained and experienced persons perform installation, operation, and maintenance of this equipment.</b></p> <p><b>4. Use only well-maintained equipment. Repair or replace damaged parts at once.</b></p>
<b>ARC WELDING is safe when precautions are taken.</b>


## 2. ARC WELDING SAFETY PRECAUTIONS (continued)

	<b>ELECTRIC SHOCK can kill.</b>
<p>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.</p> <p>Leaving piled-up dust in the welding machine may cause insulation deterioration and result in electrical shock and fire.</p> <ol style="list-style-type: none"><li>1. Do not touch live electrical parts.</li><li>2. Wear dry insulating gloves and other body protection that are free of holes.</li><li>3. Insulate yourself from work and ground using dry insulating mats or covers.</li><li>4. Be sure to disconnect the line disconnect switch before installing, changing torch parts or maintaining this equipment.</li><li>5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.</li><li>6. Keep all panels and covers of this equipment securely in place.</li><li>7. Do not use worn, damaged, undersized, or poorly spliced cables.</li><li>8. Do not touch electrodes or any metal objects if POWER switch is ON.</li><li>9. Do not wrap cables around your body.</li><li>10. Turn off POWER switch when not in use.</li><li>11. Remove dust by blowing moisture-free compressed air on each part periodically.</li></ol>	


	<b>ARC RAYS can burn eyes and skin: FLYING SPARKS AND HOT METAL can cause injury. NOISE can damage hearing.</b>
<p>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.</p> <ol style="list-style-type: none"><li>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.</li><li>2. Wear approved face shields or safety goggles. Side shields recommended.</li><li>3. Use protective screens or barriers to protect others from flash and glare: warn others not to look at the arc.</li><li>4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.</li><li>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.</li><li>6. Wear proper body protection to protect skin.</li></ol>	



## 2. ARC WELDING SAFETY PRECAUTIONS (continued)


	<b>WELDING can cause fire and explosion.</b>
<p>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.</p> <p>Leaving piled-up dust in the welding machine may cause insulation deterioration and result in electrical shock and fire.</p> <ol style="list-style-type: none"><li>1. Protect yourself and others from flying sparks and hot metals.</li><li>2. Do not weld where flying sparks can strike flammable material.</li><li>3. Remove all flammables within 10m (33ft) of the welding arc. If this is not possible, tightly, cover them with approved covers.</li><li>4. Be alert that welding sparks and hot metals from welding can easily pass through cracks and openings into adjacent areas.</li><li>5. Watch for fire, and keep a fire extinguisher nearby.</li><li>6. Be aware that welding on a ceiling, floor, bulkhead, or partition can ignite a hidden fire.</li><li>7. Do not weld on closed containers such as tanks or drums.</li><li>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.</li><li>9. Remove stick electrodes from holder or cut off welding wire at contact tip when not in use.</li><li>10. Do not use the welding power source for anything other than arc welding.</li><li>11. Wear oil-free protective garments such as leather gloves, a heavy shirt, cuffless trousers, boots, and a cap.</li><li>12. A loose cable connection can cause sparks and excessive heating.</li><li>13. Tighten all cable connections.</li><li>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.</li><li>15. Remove dust by blowing moisture-free compressed air on each part periodically.</li></ol>	

	<b>FUMES AND GASES can be hazardous to your health.</b>
<p>Arc welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.</p> <ol style="list-style-type: none"><li>1. Keep your head out of the fumes. Do not breathe the fumes.</li><li>2. Ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.</li><li>3. If ventilation is poor, use an approved air-supplied respirator.</li><li>4. Read the Material Safety Data Sheets (MSDS) and the manufacturer's instructions on metals, consumables, coatings, and cleaners.</li><li>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.</li><li>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.</li></ol>	

## 2. ARC WELDING SAFETY PRECAUTIONS (continued)

	<p><b>CYLINDER</b> can explode if damaged.</p>
<p>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.</p> <ol style="list-style-type: none"> <li>1. Use only correct shielding gas cylinders, gas regulator, hoses, and fittings designed for the specific application; maintain them in good condition.</li> <li>2. Protect compressed gas cylinders from excessive heat, mechanical shock, and arcs.</li> <li>3. Keep the cylinder upright and securely chained to a stationary support or a rack to prevent falling or tipping.</li> <li>4. Keep cylinders away from any welding or other electrical circuit.</li> <li>5. Never touch cylinder with welding electrode.</li> <li>6. Read and follow instructions on compressed gas cylinders, associated equipment, and the CGA publication P-1 listed in <b>PRINCIPAL SAFETY STANDARDS</b>.</li> <li>7. Turn face away from the valve outlet when opening cylinder valve.</li> <li>8. Keep protective caps in place over valve except when a gas cylinder is in use or connected for use.</li> <li>9. Do not disassemble or repair the gas regulator except if you are authorized by the manufacturer.</li> </ol>	

		<p>Rotating parts may cause injuries. Be sure to observe the following.</p>
<p>If hands, fingers, hair or clothes are put near the fan's rotating parts or wire feeder's feed roll, injuries may occur.</p> <ol style="list-style-type: none"> <li>1. Do not use this equipment if the case and the cover are removed.</li> <li>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.</li> <li>3. Do not put hands, fingers, hair or clothes near the rotating fans or wire feed roll.</li> </ol>		

	<p><b>ARC WELDING</b> work areas are potentially hazardous.</p>
<p><b>FALLING</b> or <b>MOVING</b> machines can cause serious injury.</p> <ol style="list-style-type: none"> <li>1. When hanging the welding power source by a crane, do not use the carrying handle.</li> <li>2. Put the welding power source and wire feeder solidly on a flat surface.</li> <li>3. Do not pull the welding power source across a floor laid with cables and hoses.</li> <li>4. Do not put wire feeders on the welding power source.</li> <li>5. Do not put the welding power source or wire feeder where they will pit or fall.</li> </ol> <p><b>WELDING WIRE</b> can cause puncture wounds.</p> <ol style="list-style-type: none"> <li>1. Do not press the gun trigger until instructed to do so.</li> <li>2. Do not point the gun toward any part of the body, other people, or any metal when threading welding wire.</li> </ol>	

## 2. ARC WELDING SAFETY PRECAUTIONS (continued)

 <b>WARNING</b>
--

- Do not alter or remodel our products.
- You may get injured or have your equipment damaged because of fire, failure or malfunction caused by altering or remodeling the products.
- The warranty does not cover any altered or remodeled products

### PRINCIPAL SAFETY STANDARDS

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

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

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

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

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

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

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

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

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

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

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

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

M100415



### 3. GENERAL NOTICE OF OPERATION

#### 3.1 Rated Duty Cycle

⚠ CAUTION
<ul style="list-style-type: none"> <li>● Use this welding power source at or under the rated duty cycle. Exceeding the rated duty cycle limitation may result in damage to the welding machine.</li> <li>● 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, and then remove dust by blowing moisture-free compressed air on each part.</li> </ul>

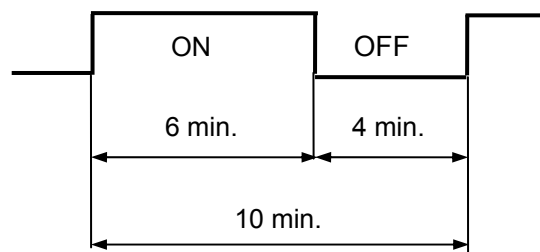
The rated duty cycle of the welding power source is the following:

CPVE-400: 60% at 400A.

CPVE-500: 100% at 500A

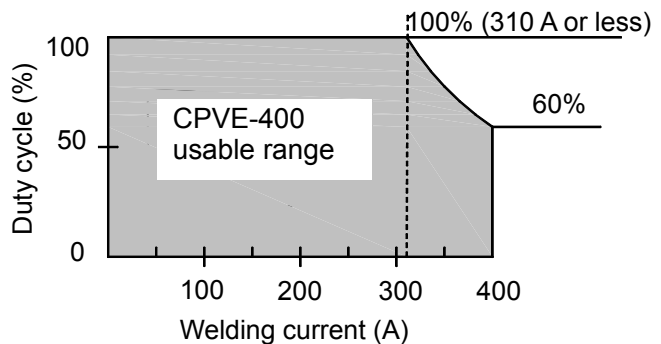
- The duty cycle of 60% means the machine must be rested for 4 minutes after 6 minutes of continuous welding at the rated current.

Cycle of operations with 60% duty cycle

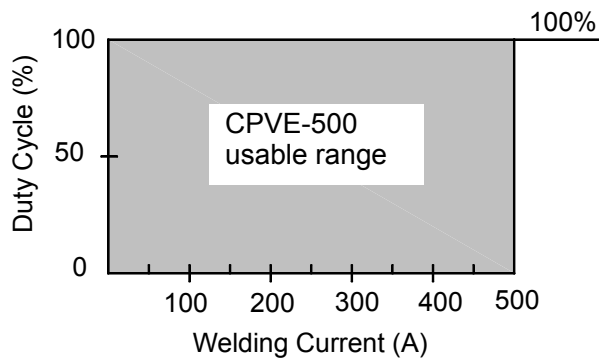


- Failure to observe duty cycle limitations may cause the temperature inside the welding machine to exceed tolerance levels. This may contribute to premature welding machine failure or product damage.

- The relationship between welding current and duty cycle is shown in the figure right. Use the welding machine within its usable range, based on appropriate the duty cycle for the welding current.



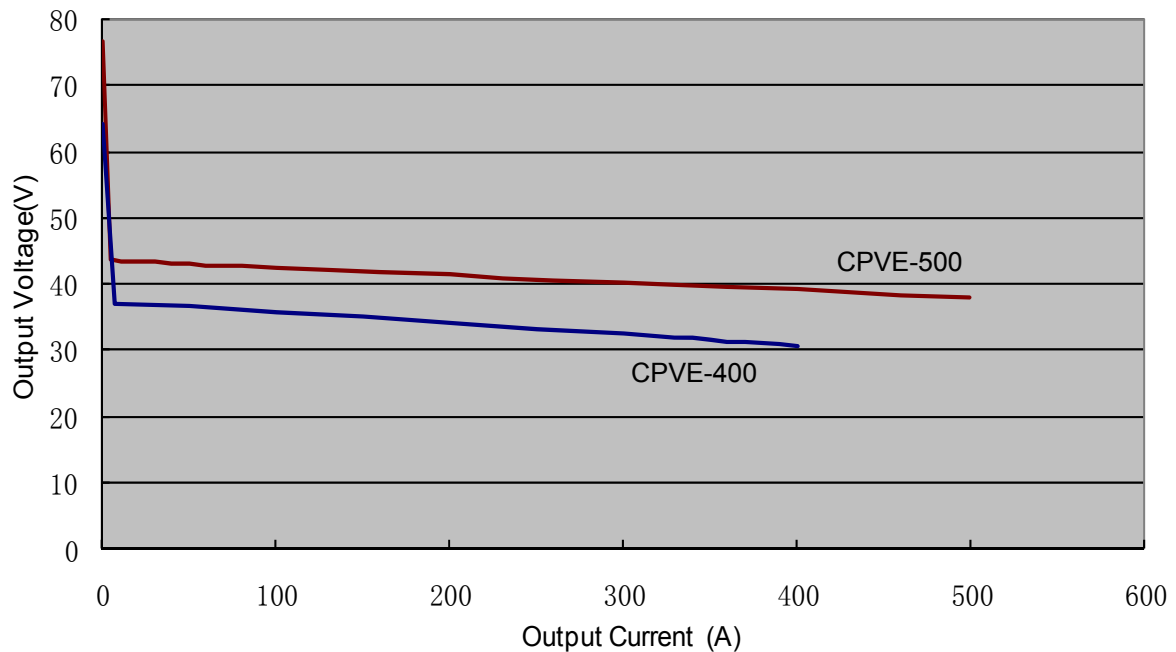
- The duty cycle of the welding power source is also limited by the duty cycles of combined accessories such as welding torches. Use the welding machine within the lowest rated duty cycle of the accessories.



### 3. GENERAL NOTICE OF OPERATION (Continued)

#### 3.2 Static External Characteristics

This welding power source is constant-voltage source, the static external characteristics as shown in the figure below.



#### 3.3 Wire feeder combination

This power source can be connected with several wire feeders while the default one is CM-8201 when leaving the factory. Different wire feeders will require relevant reset to internal function F14. Details of setting please see 「10.2.1 setting of internal function—(14)Switch of Wire feeding machine selection」.

#### 3.4 Gas mixture ratio and wire extension

Gas mixture ratio has affections to welding, may causing the difference between output and set value.

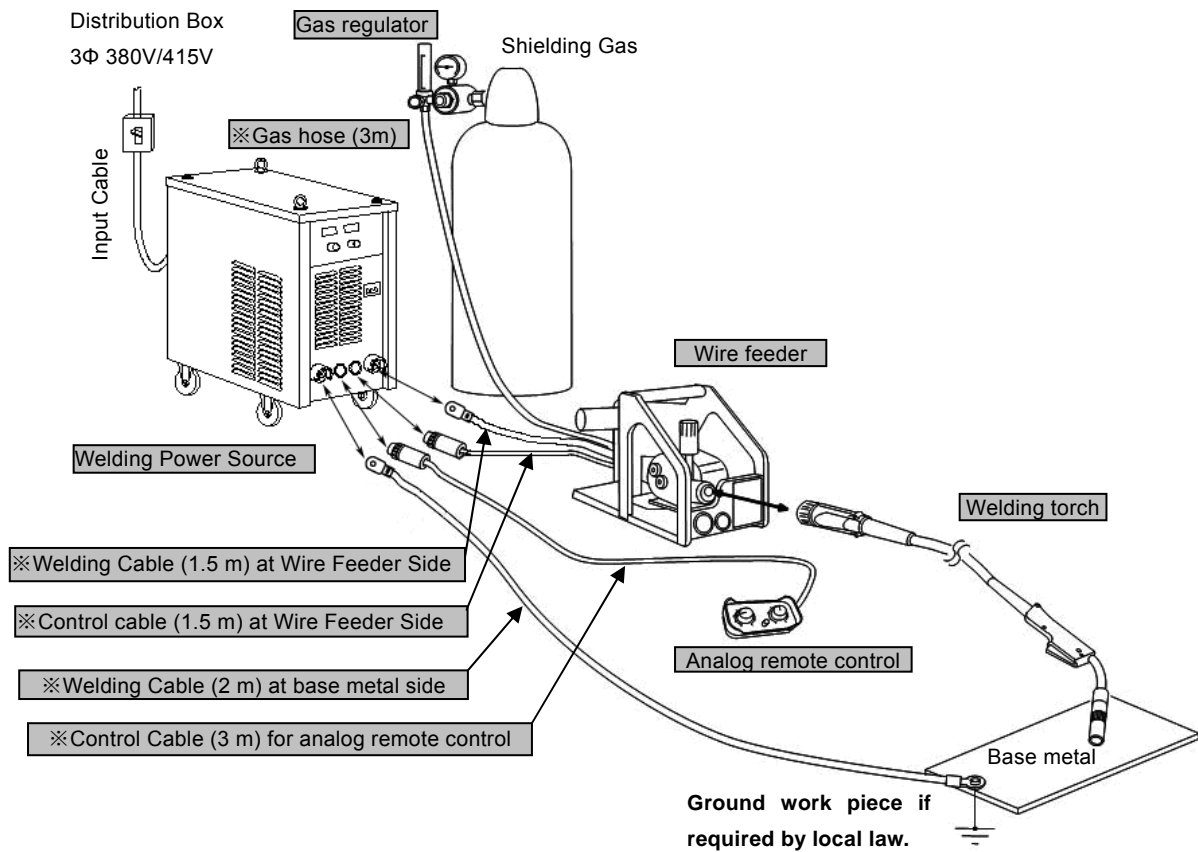
The change of wire extension will affect actual welding current and bring inconformity with set current.

## 4. STANDARD CONFIGURATION AND ACCESSORIES

### 4.1 Standard Configuration

- The devices shown in the boxes  are standard composition. Other parts must be prepared by the customers.
- As for those parts marked by ※, the user may select and purchase other extension cables or extended gas tubes with different specifications (5m, 10m, 15m, 20m) as necessary. Refer to Section 11.4.1 "Extension Cables and Extended Gas Tubes" .

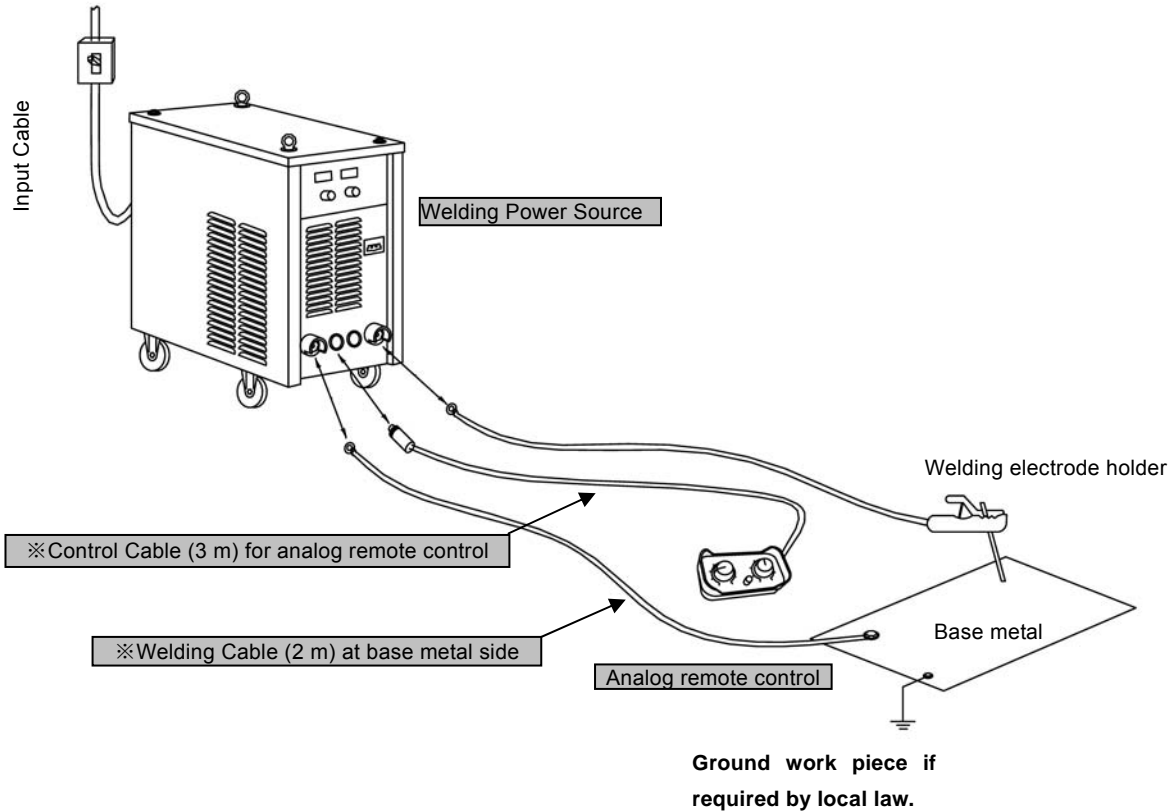
For MAG/MIG welding use



## 4. STANDARD CONFIGURATION AND ACCESSORIES (Continued)

For DC STICK welding use

Distribution Box  
3Φ 380V/415V



### 4.2 Standard accessories

Please confirm the following amount for the accessories when opening the package.

Name	Specification	Amount	Remarks
Analog remote control	P30092Z00	1	
Hex wrench	M8	1	For output terminal screw
Heat-shrink tube	40mm	2	For terminals of output cables
Glass fuse	10 A, 250 V	1	For circuit board P30110Q
Glass fuse	2 A, 250 V	1	For circuit board P30110Q
Ceramic fuse	4 A, 500 V	1	For circuit board P30161X

## 4. STANDARD CONFIGURATION AND ACCESSORIES (Continued)

### 4.3 Items to be Prepared by User

#### (1) Shielding Gas

Prepare carbon dioxide or mixed gases (in accordance with the welding method).

- Carbon Dioxide (CO<sub>2</sub> gas) :

The CO<sub>2</sub> gas used for welding shall be a conforming product with a purity above 99.5% and a moisture content below 0.05%.

Use CO<sub>2</sub> gas with a higher purity for higher welding quality as required.

- MAG Gas

Argon (Ar) 80%, carbon dioxide (CO<sub>2</sub>) 20%.

- MIG Gas

Argon (Ar)98%, Oxygen (O<sub>2</sub>) 2%

#### (2) Welding Wire

Use a suitable wire for welding method.

#### (3) Input Cable and Grounding Cable

Prepare input cables and grounding cable according to the model of the welding power source.

- Input cables and grounding cable with a cross-sectional area above 6 mm<sup>2</sup> must be used for CPVE-400.
- Input cables grounding cable with a cross-sectional area above 10 mm<sup>2</sup> must be used for CPVE-500.

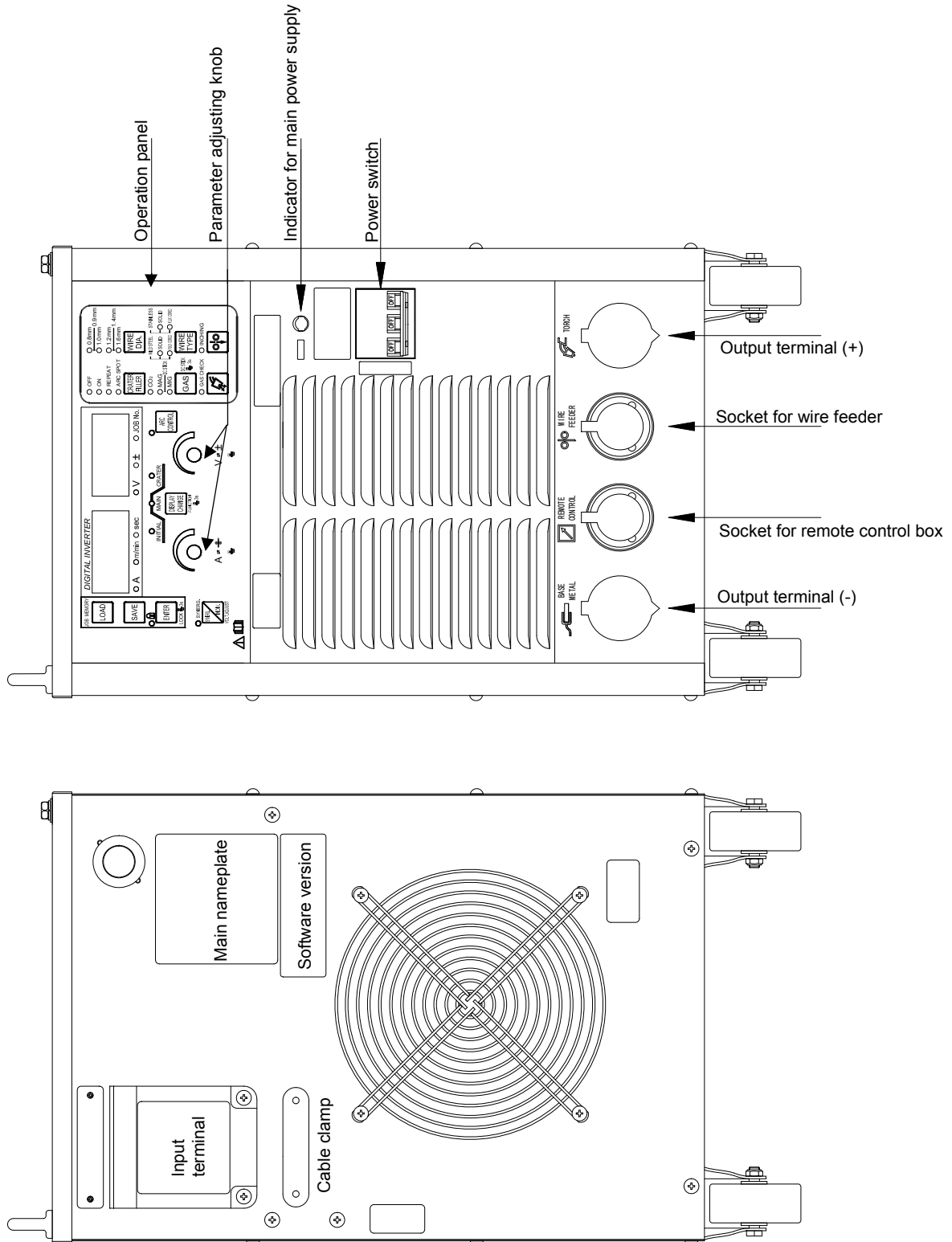
#### (4) Welding electrode holder (for DC STICK)

Prepare welding electrode holder according to the DC STICK mode of the welding power source.

## 5. NAME OF EACH PART

### 5.1 Welding power source

- Name of Each Part of CPVE-400/500



## 6. NECESSARY POWER SOURCE EQUIPMENT

### 6.1 Welding Power Source Equipment (commercial power supply)

#### WARNING

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

#### CAUTION

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

- Capacity of Necessary Power Source Utility

Specification	CPVE-400	CPVE-500
Supply voltage	Three-phase 380 V / 415 V	Three-phase 380 V / 415 V
Tolerance range of fluctuation of supply voltage	380 V / 415 V $\pm 10\%$	380 V / 415 V $\pm 10\%$
Installed capacity	23 kVA or more	30 kVA or more
Capacity of switch, electric leakage breaker	40 A	50 A

### 6.2 Precautions for Use of the Engine Generator or the auxiliary power of an engine welder

#### CAUTION

- Use the auxiliary power of an engine welder with an improved voltage waveform when it is used as power source for welding machine. Some engine welders have poor electricity, which may cause product damage. Contact an engine welder manufacture for improvement of voltage waveform.


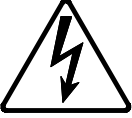
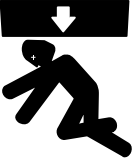
#### CAUTION

To prevent the engine generator or auxiliary power from being damaged, follow the instructions below.

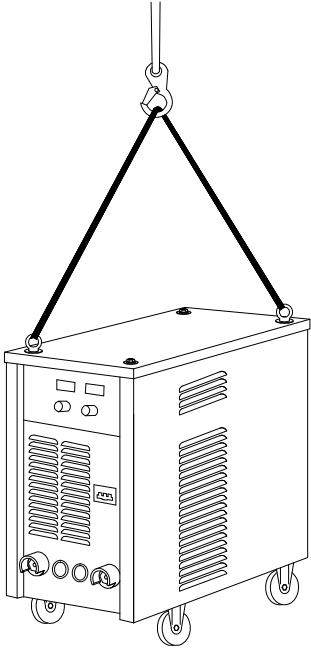
- Set the output voltage of the engine generator to voltage range between 415 and 456V at no-load welding operation. Setting to an extremely high output voltage may result in product damage.
- Use the engine generator with a damper winding that has a capacity of more than twice that of the rated input of the welding machine. Generally, the recovery time of the engine generator's voltage for load change is slower than that of the commercial input power source, and if the engine generator does not have sufficient capacity, sudden current change such as arc start will occur. This may result in an abnormal decrease in output current or arc loss. Ask an engine generator manufacturer for a damper winding.
- Do not combine more than two welding machines with a single engine generator. The effect of each welding machine may cause easy loss of arc.

## 7. TRANSPORT AND INSTALLATION

### 7.1 Transport

 <b>WARNING</b>	
<b>Follow the instructions below to avoid accident and product damage when carrying the welding power source.</b>	
	<ul style="list-style-type: none"><li>● Do not touch the live electrical parts inside or outside the welding power source.</li><li>● Be sure to disconnect the line disconnect switch before carrying the welding power source.</li></ul>
	<ul style="list-style-type: none"><li>● Use eye bolts when hanging the welding power source by a crane.</li></ul>




### Sketch of hoisting


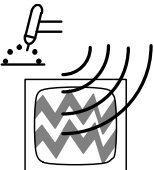
	<ul style="list-style-type: none"><li>● During hoisting of the welding power source, hoisting rings at two points must be applied. Single point hoisting is prohibited.</li></ul>
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## 7. TRANSPORT AND INSTALLATION (continued)

### 7.2 Installation

 <b>WARNING</b>	
<p>When installing the welding machine, follow the instructions below to avoid a fire caused by welding or physical injury from gas fumes.</p>	
	<ul style="list-style-type: none"> <li>● Do not place the welding machine near combustibles or flammable gases.</li> <li>● Remove combustible materials to prevent dross coming into contact with combustible objects. If that is not possible, cover them with noncombustible covers.</li> </ul>
	<ul style="list-style-type: none"> <li>● To avoid gas poisoning and risk of suffocation, wear a gas mask or adequately ventilate when the welding machine is used in a place regulated by a local law.</li> <li>● To prevent injury or poisoning caused by fume, wear a gas mask or weld at a partial exhaust facility approved by local regulations.</li> <li>● Adequately ventilate or wear a gas mask when using the welding machine in a tank, boiler, or the hold of a ship. Heavier gases such as carbon dioxide or argon gases tend to collect there.</li> <li>● When using the welding machine at a narrow space, comply with a trained supervisor's directions. And be sure to wear a gas mask.</li> </ul>

 <b>CAUTION</b>	
<p>To prevent electromagnetic troubles, read the following. Also, if electromagnetic troubles occur, check the following again.</p>	
	<ul style="list-style-type: none"> <li>● Change the placement of the welding power source.</li> <li>● Put the input cable in a grounded metal conduit.</li> <li>● Shield the whole welding places from electromagnetic trouble. If electromagnetic troubles are still not solved after following the above instructions, consult your dealer.</li> </ul>


## 7. TRANSPORT AND INSTALLATION (Continued)

### CAUTION

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

- Do not install the welding power source in a place subject to direct sunlight and rain.
- Place the welding machine on a strong and stable surface.
- Do not block the ventilating hole on the welding machine.
- Install the welding machine in a place where the ambient temperature is between  $-10^{\circ}\text{C}$  and  $40^{\circ}\text{C}$ .
- Do not install the welding machine in a place where metal material such as spatter enters the welding power source.
- Keep an installation distance of 30cm between the welding power source and the wall or other welding power.
- Install a wind shield to protect arc from wind.
- Fix the gas cylinder to a stand specifically made for gas cylinder.
- Do not put heavy things on the welding power source.
- Install the welding machine, wire feeder, torch, and control cables(including extension cables) in a place that water may not be splashed.
- Place it in a location with an altitude not more than 1,000 meters.
- Fix the gas cylinder in place to prevent it from toppling.
- Fix the wheels in place to prevent the welding power source from sliding.

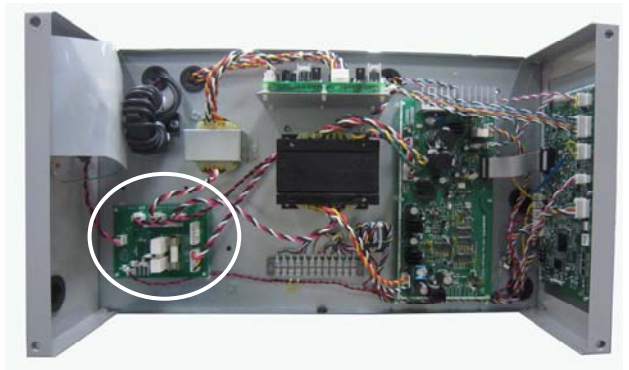
## 8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE

<b>⚠ WARNING</b>	
	<b>Follow the instructions below to avoid electric shock.</b>
<p><b>Do not touch the live electrified parts, as this will result in a fatal shock and sever burn.</b></p> <ul style="list-style-type: none"> <li>● <b>Do not touch the live electrical parts of the welding machine.</b></li> <li>● <b>Have a qualified electrical engineer ground the case of the welding power source and the base metal or jig electrically connected, following a local law.</b></li> <li>● <b>Disconnect the welding power source from input power supply by turning off the line disconnect switch in the power box before grounding the welding power source or base metal and connecting the cables or hoses.</b></li> <li>● <b>Do not use a cable with lack of capacity or a seriously damaged cable.</b></li> <li>● <b>Tighten and insulate the connections of cables.</b></li> <li>● <b>Securely attach the cover of the welding machine after connection of the cables.</b></li> <li>● <b>Do not expose the conductor parts of the wiring terminals for welding cables. Use the auxiliary heat shrinkable tubes (or high temperature insulating tapes) for good insulation.</b></li> </ul>	

### 8.1 Input voltage selection

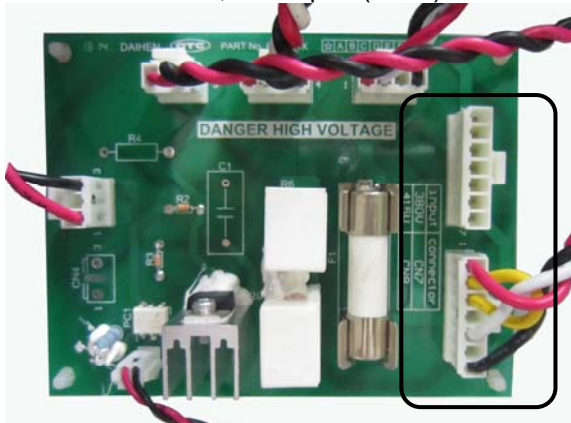
The input voltage of this welding power source can be switched between 415V and 380V. It is set as 415V upon ex-factory. If the voltage of your local utility power is 380V, follow the instructions below to switch the input voltage from 415V to 380V.

- (1) Turn off the NF switch of the welding power source and all of the line-disconnect switches.
- (2) Remove the top cover of the welding power source and find printed circuit board P30161X.
- (3) Confirm that connector CN8 is connected to wires, and connector CN7 is open circuited on P30161X. This is the connection for 415V input voltage.
- (4) Exchange the connectors of CN7 and CN8 to open circuit CN7 and link to CN8. This connection is for 380V input voltage.



Input voltage	CN8	CN7
380V	Open connector	Wired connector
415V	Wired connector	Open connector

CN8 wired, CN7 open (415V)



CN8 open, CN7 wired (380V)



## 8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (Continued)



- (5) Make sure CN7 and CN8 are plugged firmly, and then reinstall the top cover.
- (6) The input voltage is indicated by a plate with two labels on both sides. The plate is fixed on the rear panel of the welding power source. Take down the plate and fix it again with the label of INPUT 380V outward.


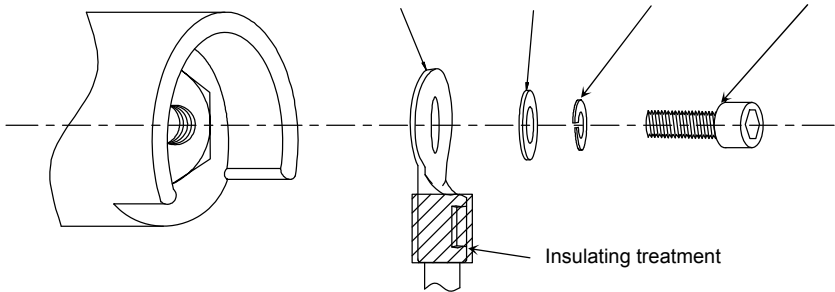
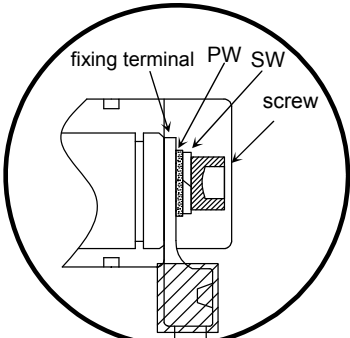
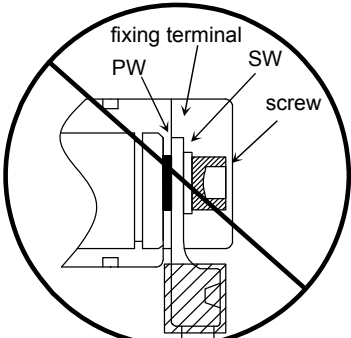


- (7) In case of switching back the input voltage from 380V to 415V, exchange the CN7 and CN8 again, and then fix the plate with the label of INPUT 415V outward.

## 8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (Continued)

### 8.2 Connection at the Output Side of the Welding Power Source

 <b>CAUTION</b>	
	In order to prevent occurrence of electromagnetic harm, refer to the following items when connecting the welding cables. In case of electromagnetic harm, refer to the following items again.
<ul style="list-style-type: none"> <li>● Reduce the length of the welding cables as much as possible.</li> <li>● Keep the welding cables close to the ground as much as possible.</li> <li>● Make the cable at the workpiece side parallel to the cable at the wire feeder side.</li> <li>● The grounding of the workpiece and welder shall not be shared by other.</li> </ul>	

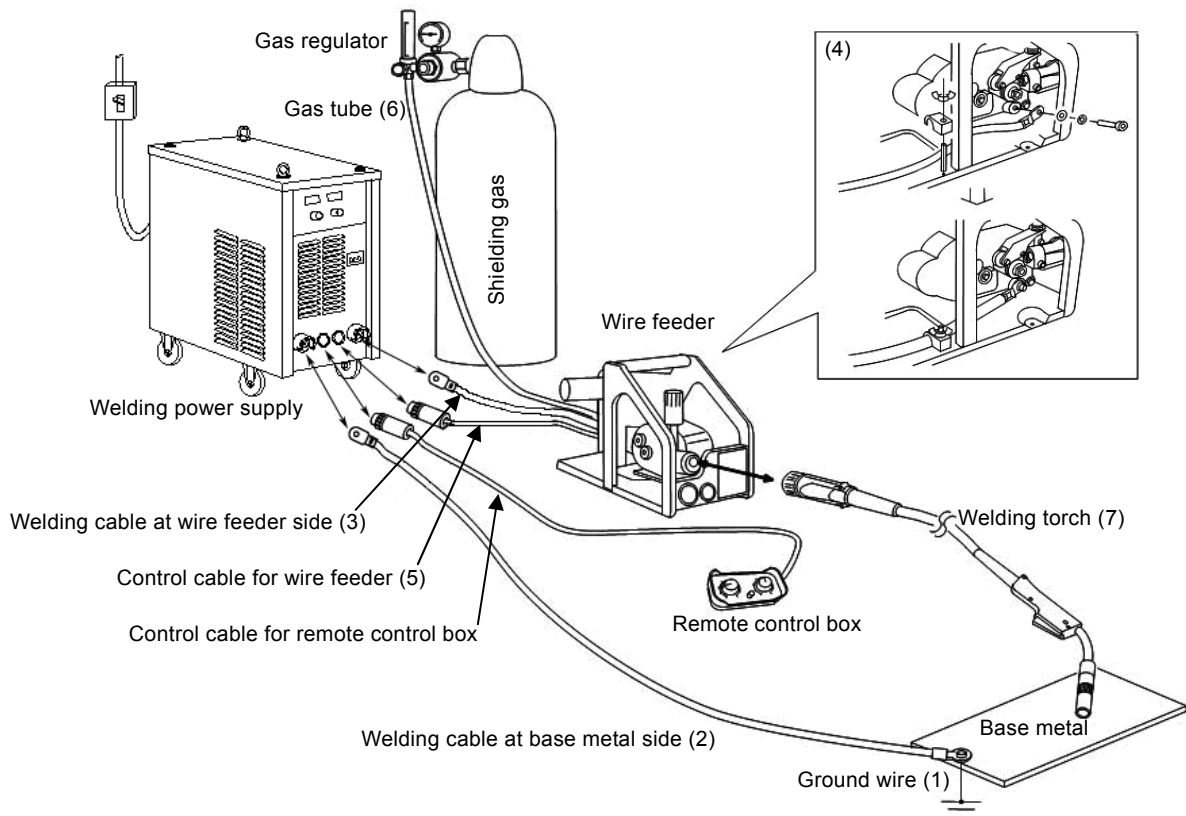
 <b>CAUTION</b>	<p>Connection fault may damage the output connection terminals of the power source, so please abide by the following points.</p> <ul style="list-style-type: none"> <li>● Please make insulating treatment to the part on the cable connection terminal that protrudes from output terminal</li> <li>● Please follow below orders to connect cable to the output terminal.</li> </ul>
	<p style="text-align: center;">output terminal      connection terminal      plain washer      spring washer      hexagon socket screw</p>  <p style="text-align: center;">Insulating treatment</p> <p>Plain washer and spring washer cannot be used between output terminal and cable pressing terminal</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>right</p>  </div> <div style="text-align: center;"> <p>wrong</p>  </div> </div>

## 8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (Continued)

### 8.2.1 For MAG/MIG welding use

Connect in the numerical order.

- (1) Ground the base metal. (If required by the local law or codes)
- (2) Connect the welding cable between the base metal and output terminal (base metal ⊖) of the power source.
- (3) Connect the welding cable at the wire feeder side to the output terminal (welding torch ⊕).
- (4) Connect the welding cable at the wire feeder side to the fixing terminal of the wire feeder. Tighten the nut to avoid contact of the welding cable with the bottom of the rack or the terminal block, and ensure sufficient insulation for the terminal area by means of insulating tapes.
- (5) Connect the control cable at the wire feeder side to the socket for wire feeder.
- (6) Connect the gas tube of the wire feeder to the gas outlet on the gas regulator.
- (7) Connect the welding torch to the wire feeder.

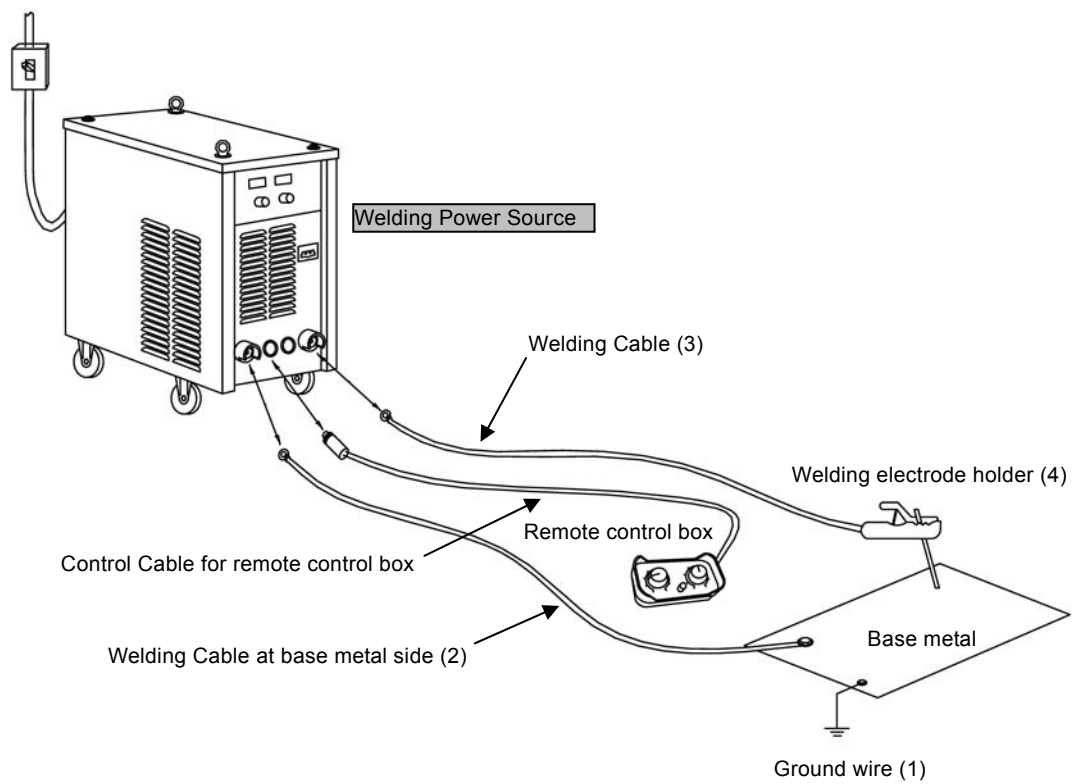


## 8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (Continued)

### 8.2.2 For DC STICK welding use



Connect in the numerical order.


- (1) Ground the base metal. (If required by the local law or codes)
- (2) Connect the welding cable between the base metal and output terminal (base metal $\ominus$ ) of the power source.
- (3) Connect the welding cable to the output terminal (welding torch  $\oplus$ ).
- (4) Connect the welding cable to the welding electrode holder.



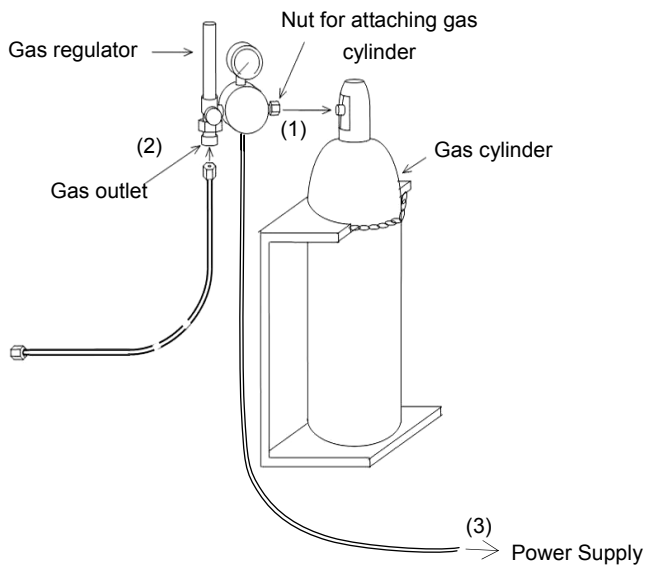
## 8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (Continued)

### 8.3 Connection of the Gas Hose

 <b>WARNING</b>	
	<b>You may suffer from danger of suffocation caused by lack of oxygen when shield gas keep drifting in a closed place. Be sure to turn off the shield gas at the main when the welding power source is not in use.</b>

 <b>WARNING</b>	
<ul style="list-style-type: none"><li>● <b>Be sure to connect the gas hose after fixing to the stand, as physical injuries may result from the gas cylinder toppling over.</b></li><li>● <b>Attach a proper gas regulator to a gas cylinder. Failure to do so may result in physical injuries. The gas regulator for high pressure gas must be used.</b></li></ul>	

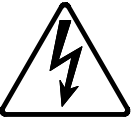
- (1) Connect the connecting nut on the gas regulator to the gas cylinder, and tighten it with a wrench or other tool.
- (2) Connect the gas tube to the gas outlet and tighten it with a wrench or other tool.
- (3) Connect the cable for the heater of the gas regulator to an appropriate power supply for heating the gas regulator.





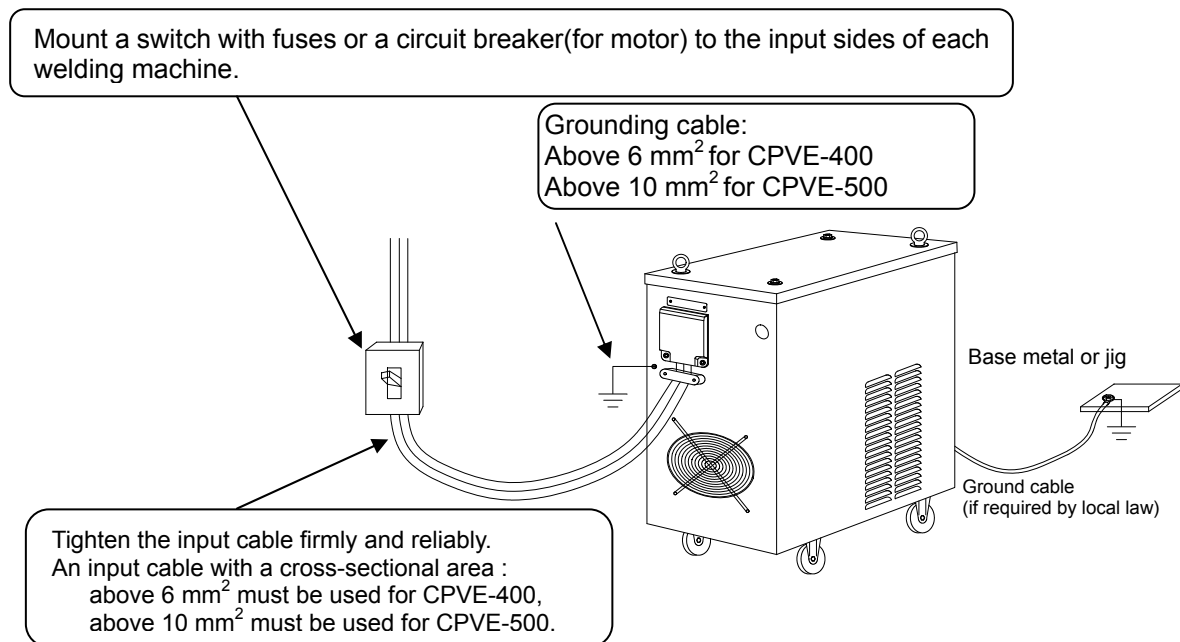
## 8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (Continued)

### 8.4 Grounding and Connecting of Input Power Source


<b>⚠ WARNING</b>	
	<p>Follow the instructions below to avoid electric shock. Touching the live electrical parts may result in a fatal electric shock and severe burn.</p>
<ul style="list-style-type: none"> <li>● Do not touch the live electrical parts of the welding machine.</li> <li>● Have qualified electrical engineer ground the welding power source and the base metal or jig electrically connected in accordance with a local law.</li> <li>● Disconnect the welding power source from input power supply by turning off the line disconnect switch in the power box before grounding the welding power source or base metal and connecting the cables or hoses.</li> <li>● After connecting the cables, cover the power source with the cover or the case.</li> <li>● Use a leakage protector when operating the welding power source in construction sites or other damp locations or on iron plates, steel structures, etc.</li> </ul>	

<b>⚠ CAUTION</b>
<p>Be sure to install a switch with fuse or a circuit breaker (for motor) on the input sides of each welding machine.</p>

<b>⚠ CAUTION</b>
<p>Be sure to ground the case of the welding power source.</p>
<p>If the welding power source operates without grounding, 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 or the base metal, you may receive an electric shock.</p>





## 8. CONNECTION PROCEDURE AND GROUND FOR SAFETY USE (Continued)



 MANDATORY	<p>Shell must be grounded. Section area: must exceed 6mm<sup>2</sup>.</p>
	<ul style="list-style-type: none"><li>● If ungrounded, the inner circuit of the power source can form voltage with capacitance between the shell or with stray capacitance(input side conductor and shell metal may form intermetallic). So, there is risk of electric shock.</li><li>● Please well finish the grounding work of the power source.</li></ul>

## 9. WELDING PREPARATION

### 9.1 Preparing the Projective Equipment

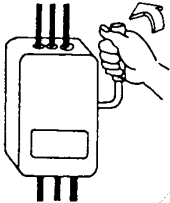

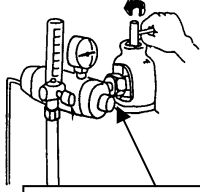
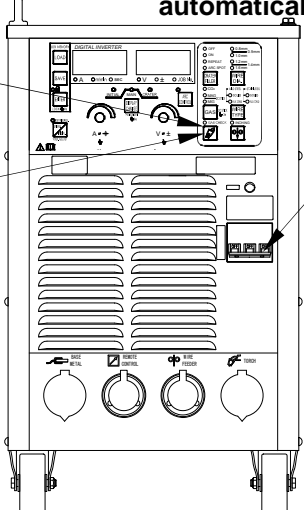
 <b>WARNING</b>	
	<p>To protect you and others from gas generated from welding, fumes, and lack of oxygen, wear protective equipment.</p>
<ul style="list-style-type: none"><li>● To avoid gas poisoning and danger of suffocation, wear a gas mask or adequately ventilate when the welding machine is used in the place regulated by local law.</li><li>● To prevent disorder or poisoning caused by fume, wear a gas mask or weld at a partial exhaust facility approved by the local regulation.</li><li>● Adequately ventilate or wear a gas mask when using the welding machine in a tank, a boiler, a hold of a ship, because heavier gas such as carbon dioxide or argon gases are drifting</li><li>● When using the welding machine at a narrow space, comply with a trained supervisor's directions. And be sure to wear a gas mask.</li><li>● Do not operate the welding machine near the places where degreasing, cleansing, and spraying are performed. Otherwise, poisonous gas may be generated.</li><li>● Be sure to wear a gas mask or adequately ventilate when welding a coating steel plate. (Poisonous gas and fume may be generated.)</li></ul>	

- Install a windshield to protect arc from wind when using an electric fan for ventilation or when welding outdoors. Failure to do so may result in poor welding.



 <b>CAUTION</b>	
	<p>Use the protective equipment to protect you and other workers from arc rays, spattering dross, and noise from welding operation.</p>
<ul style="list-style-type: none"><li>● When performing or monitoring welding operation, wear an eye protector with a good light blocking effect or face shield.</li><li>● Wear protective glasses to protect your eyes from the spattering dross.</li><li>● Wear protective equipment such as protective gloves, long-sleeve clothes, leg covers, and leather apron.</li><li>● Install protective screens or barriers to protect the eyes of others in the work area from arc ray.</li><li>● Wear an ear protector when noise level is high.</li></ul>	

## 9. WELDING PREPARATION (Continued)

### 9.2 Operation of Switches and Controlling the Gas Regulator

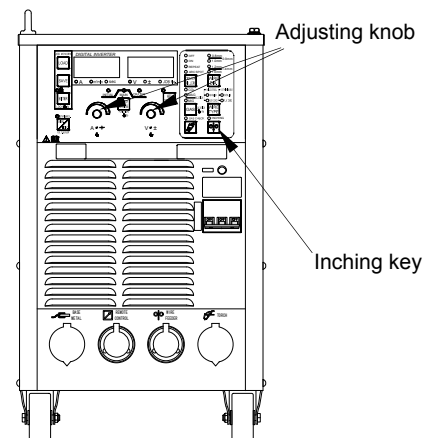
<b>CAUTION</b>	
<ul style="list-style-type: none"> <li>● <b>Keep your face away from the outlet when turning on gas at the main of the gas cylinder, as a burst of high-pressure gas may result in physical injuries.</b></li> </ul>	
<p>(1) Switch on the three-phase source 380V/415 V.</p> 	<p style="text-align: right;"><b>※ The gas check will stop automatically in 2 minutes.</b></p> <p>(3) Press GAS CHECK key (LED lights up)</p> 
<p>(2) Place the power switch in the "I" (ON) position.</p>	<p>(6) Press the GAS CHECK key again. (LED darkening)</p>
<p>(4) Set the gas regulator to "SHUT", and then open the valve on the gas</p>	 <p style="text-align: center;">Flow adjusting knob</p>
<p>(5) Turn the flow adjusting knob to "OPEN" direction to adjust flow.</p>	

### 9.3 Inching Operation

<b>CAUTION</b>	
<p><b>Refer to the manual of the wire feeder for detailed usage method and precautions for the wire feeder.</b></p>	
	<ul style="list-style-type: none"> <li>● <b>Do not watch whether the wire is feeding while inching. A welding wire suddenly sticking out may cause injury to your face or eyes.</b></li> <li>● <b>Keep your face, eyes and body away from the welding torch, which otherwise may cause injuries.</b></li> </ul>
	<ul style="list-style-type: none"> <li>● <b>Keep your hands, fingers, hair, clothes, etc. away from the rotating parts when inching, because they otherwise may be caught into the rotating parts and therefore cause danger.</b></li> </ul>

- 1) After straightening the welding torch cable, feed the wire by keeping pressing the INCHING key (the LED lights up).
- 2) When the wire from the contact tip sticks out (about 10 mm), stop feeding by releasing the INCHING key (the LED goes off).
- 3) Wire feeding speed can be adjusted by the CURRENT adjusting knob while the INCHING key is pressed down.

In addition, when the analog remote control is connected, inching operation can be also performed by the INCHING switch on the analog remote control. Then wire feed rate can be adjusted by the CURRENT adjusting knob on the analog remote control. However, the adjusting knobs on the control panel will become invalid after a remote control box is connected.



## 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.	<ul style="list-style-type: none"> <li>· Long Arc length</li> <li>· Wide bead width</li> <li>· Poor shield</li> <li>· current increase</li> </ul> <div style="text-align: right;">Note 1</div>
Wire extension is too short.	<ul style="list-style-type: none"> <li>· Short arc length</li> <li>· Easy generation of spatter</li> <li>· current decrease</li> </ul> <div style="text-align: right;">Note 1</div>
Welding voltage is too high.	<ul style="list-style-type: none"> <li>· Long arc length</li> <li>· Wide bead width</li> <li>· Shallow penetration and flat bead</li> </ul>
Welding voltage is too low.	<ul style="list-style-type: none"> <li>· Stick to base metal and easy generation of spatter</li> <li>· Narrow bead width</li> <li>· Deep penetration and high excess metal</li> </ul>
Welding current is too high.	<ul style="list-style-type: none"> <li>· Wide bead width</li> <li>· Deep penetration and high excess metal</li> </ul>
Welding speed is too fast.	<ul style="list-style-type: none"> <li>· Narrow bead width</li> <li>· Shallow penetration and low excess metal</li> </ul>

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

Note 1: the function of depth of fusion F13 can improve the difference between set current and actual current.

## 9. WELDING PREPARATION (Continued)

### 9.4.1 CO<sub>2</sub> Welding conditions for CO<sub>2</sub> (for reference only)

#### (1) Example Welding Conditions of Horizontal Fillet

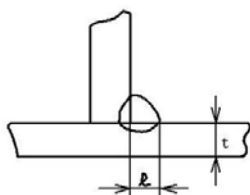


Plate thickness t (mm)	Leg length ℓ (mm)	Wire diameter Ø (mm)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)	CO <sub>2</sub> gas flow rate (L/min)
1.2	2.5~3.0	0.9, 1.0	70~100	18~19	50~60	10~15
1.6	2.5~3.0	0.9~1.2	90~120	18~20	50~60	10~15
2.0	3.0~3.5	0.9~1.2	100~130	19~20	50~60	15~20
2.3	3.0~3.5	0.9~1.2	120~140	19~21	50~60	15~20
3.2	3.0~4.0	0.9~1.2	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

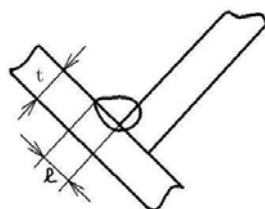


Plate thickness t (mm)	Leg length ℓ (mm)	Wire diameter Ø (mm)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)	CO <sub>2</sub> gas flow rate (L/min)
1.2	2.5~3.0	0.9, 1.0	70~100	18~19	50~60	10~15
1.6	2.5~3.0	0.9~1.2	90~120	18~20	50~60	10~15
2.0	3.0~3.5	0.9~1.2	100~130	19~20	50~60	15~20
2.3	3.0~3.5	0.9~1.2	120~140	19~21	50~60	15~20
3.2	3.0~4.0	0.9~1.2	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)

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

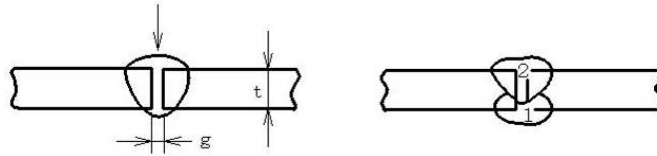


Plate thickness t (mm)	Root gap g (mm)	Wire diameter Ø(mm)	Number of layers	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)	CO <sub>2</sub> gas flow rate (L/min)
1.2	0	0.9, 1.0	1	70~80	17~18	45~55	10
1.6	0	0.9, 1.0	1	80~100	18~19	45~55	10~15
2.0	0~0.5	0.9, 1.0	1	100~110	19~20	50~55	10~15
2.3	0.5~1.0	0.9~1.2	1	110~130	19~20	50~55	10~15
3.2	1.0~1.2	0.9~1.2	1	130~150	19~21	40~50	10~15
4.5	1.2~1.5	1.2	1	150~170	21~23	40~50	10~15
6.0	1.2~1.5	1.2	2 Front 1 Back 1	220~260	24~26	40~50	15~20
9.0	1.2~1.5	1.2	2 Front 1 Back 1	320~340	32~34	45~55	15~20

### (4) Example Welding Conditions of Single and Double Grooves

Bevel shape	Plate thickness t(mm)	Root gap g (mm)	Root face h(mm)	Wire dia. Ø (mm)	Number of layers	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)	CO <sub>2</sub> gas flow rate (L/min)
	12	0~0.5	4~6	1.2	2 Front	300~350	32~35	30~40	20~25
					2 Back	300~350	32~35	45~50	20~25
				1.6	2 Front	380~420	32~35	35~50	20~25
					2 Back	380~420	32~35	45~50	20~25
	16	0~0.5	4~6	1.2	2 Front	300~350	32~35	30~40	20~25
					2 Back	300~350	32~35	45~50	20~25
1.6				2 Front	380~420	32~35	35~50	20~25	
				2 Back	380~420	32~35	45~50	20~25	
	16	0	4~6	1.2	2 Front	300~350	32~35	30~35	20~25
					2 Back	300~350	32~35	30~35	20~25
				1.6	2 Front	380~420	36~39	35~40	20~25
					2 Back	380~420	36~39	35~40	20~25
	19	0	5~7	1.6	2 Front 1	400~450	36~42	25~30	20~25
					2 Back 2	400~450	36~42	25~30	20~25
				1.6	4 Front 1	400~420	36~39	40~45	20~25
					4 Back 2	400~420	39~42	30~35	20~25
	25	0	5-7	1.6	4 Front 1	400~420	36~39	40~45	20~25
					4 Back 2	400~450	39~42	30~35	20~25

## 9. WELDING PREPARATION (Continued)

### (5) Example Welding Conditions of Lap Fillet

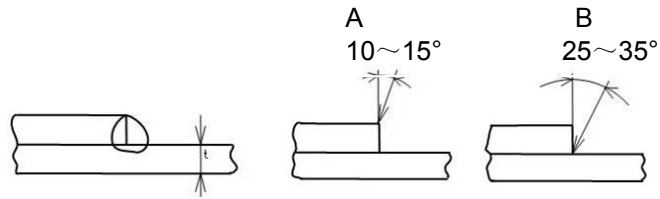


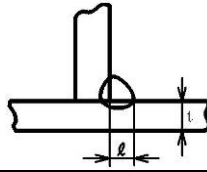
Plate thickness $t$ (mm)	Wire diameter $\varnothing$ (mm)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)	Mark position	CO <sub>2</sub> gas flow rate (L/min)
1.2	0.8~1.0	80~100	18~19	45~55	A	10~15
1.6	0.8~1.2	100~120	18~20	45~55	A	10~15
2.0	1.0~1.2	100~130	18~20	45~55	A or B	15~20
2.3	1.0~1.2	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)

### 9.4.2 Example Welding Conditions for CO<sub>2</sub> Welding with Flux-cored Wires

#### (1) Example Welding Conditions of Horizontal Fillet



Leg length $l$ (mm)	Wire diameter $\varnothing$ (mm)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)
4	1.2	250	27	50
	1.4	330	29	100
	1.6	350	31	105
5	1.2	270	29	50
	1.4	330	30	90
	1.6	370	33	90
6	1.2	270	29	45
	1.4	330	31	80
	1.6	380	34	80
7	1.2	280	30	40
	1.4	350	32	50
	1.6	380	34	65
8	1.2	300	31	30
	1.4	350	33	45
	1.6	380	34	52
9	1.2	320	32	30
	1.4	350	34	40
	1.6	380	34	40

#### 9.4.3 Example Welding Conditions of MAG Short Arc

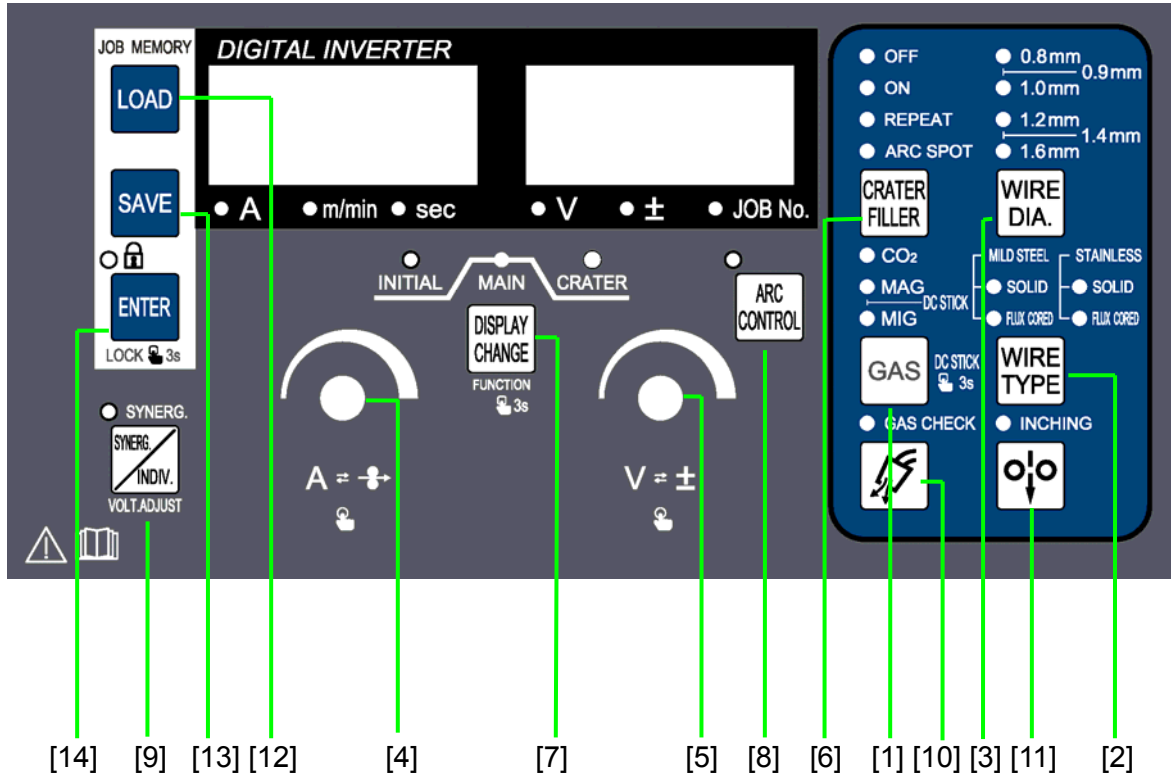
Material: Soft steel, Gas: Mixture gas 80% Ar+20% CO<sub>2</sub> (10~15 L/min)

Joint geometry	Plate thickness $t$ (mm)	Wire diameter $\varnothing$ (mm)	Gap (mm)	Welding current (A)	Welding voltage (V)	Travel speed (cm/min)
Butt Joint	1.0	0.8~1.0	0	50~55	13~15	40~55
	1.2	0.8~1.0	0	60~70	14~16	30~50
	1.6	0.8~1.0	0	100~110	16~17	40~60
	2.3	0.9~1.2	0~1.0	110~120	17~18	30~40
	3.2	0.9~1.2	1.0~1.5	120~140	17~19	25~30
	4.0	0.9~1.2	1.5~2.0	150~170	18~21	25~40

## 10. OPERATION

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

Operation Panel



[1] GAS select key	[8] ARC CONTROL key
[2] WIRE TYPE select key	[9] SYNERG/INDIV key
[3] WIRE DIAMETER select key	[10] GAS CHECK key
[4] WELDING CURRENT adjusting knob	[11] INCHING key
[5] WELDING VOLTAGE adjusting knob	[12] LOAD key
[6] CRATER FILLER key	[13] SAVE key
[7] DISPLAY CHANGE key	[14] ENTER key

## 10. OPERATION (Continued)

### CAUTION

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

When reading the operating instructions described below, unfold Section 14.3 "Initial value and Setting Range" so that you can read them confirming the location of the key on the digital panel.

### 10.1 Basic setting

#### 10.1.1 Setting of Welding Condition

Set a welding mode by using GAS select key[1], WIRE TYPE select key[2] and WIRE DIA. select key[3] in accord with customer needs. The optional modes are shown in the table below.

○: Supported      -: Not supported

Welding Method		Wire Diameter Ø (mm)	CPVE-400	CPVE-500
Type of Welding Wire	Gas			
STEEL SOLID	CO <sub>2</sub>	Ø 0.8	○	○
		Ø 0.9	○	○
		Ø 1.0	○	○
		Ø 1.2	○	○
		Ø 1.4	-	○
		Ø 1.6	-	○
STEEL SOLID	MAG	Ø 0.8	○	○
		Ø 0.9	○	○
		Ø 1.0	○	○
		Ø 1.2	○	○
		Ø 1.4	-	○
		Ø 1.6	-	○
STEEL FLUX-CORED	CO <sub>2</sub>	Ø 1.2	○	○
		Ø 1.4	-	○
		Ø 1.6	-	○
STAINLESS SOLID	MIG	Ø 0.8	○	-
		Ø 0.9	○	-
		Ø 1.0	○	-
		Ø 1.2	○	○
		Ø 1.6	-	○
STAINLESS FLUX-CORED	CO <sub>2</sub>	Ø 0.9	○	-
		Ø 1.2	○	○
		Ø 1.6	-	○
DC STICK	-	-	○	○

NOTE 1: MAG gas refers to a mixed gas of 80% argon(Ar) and 20% carbon dioxide(CO<sub>2</sub>)gas.

NOTE 2: MIG gas refers to a mixed gas of 98% argon(Ar) and 2% Oxygen(O<sub>2</sub>) gas.

NOTE 3:

1) Push and hold down GAS key[1] for a few seconds to switch to the DC STICK mode. Output current range is shown in below.

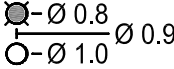
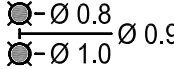
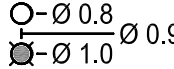
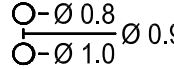
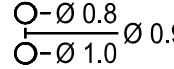
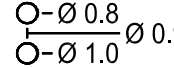
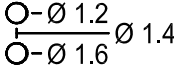
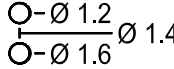
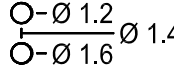
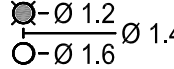
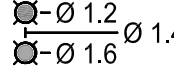
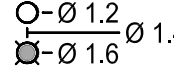
- CPVE-400: 30 to 300A.

- CPVE-500: 30 to 400A.

## 10. OPERATION (Continued)

- 2) When switched to DC STICK mode after 5 second, output voltage start automatically. So, please shut off the power of the distribution box and contact the output side before switching to DC STICK mode.
- 3) If wants to stop the DC output, push and hold down GAS key[1] for a few seconds to switch to the other modes.
- 4) When switched to DC STICK mode, only the Welding current knob of the analog remote control will work.
- 5) JOB MEMORY function and Power Saving function of fan are not useful in the mode of DC STICK.
- 6) In the mode of DC STICK, no-load voltage always exits. Please prevent to get an electric shock.

The representation for wire diameters of CPVE-500 are shown in below. The wire diameters of  $\varnothing 0.9$  and  $\varnothing 1.4$  are indicated by means of lighting two LED lamps.

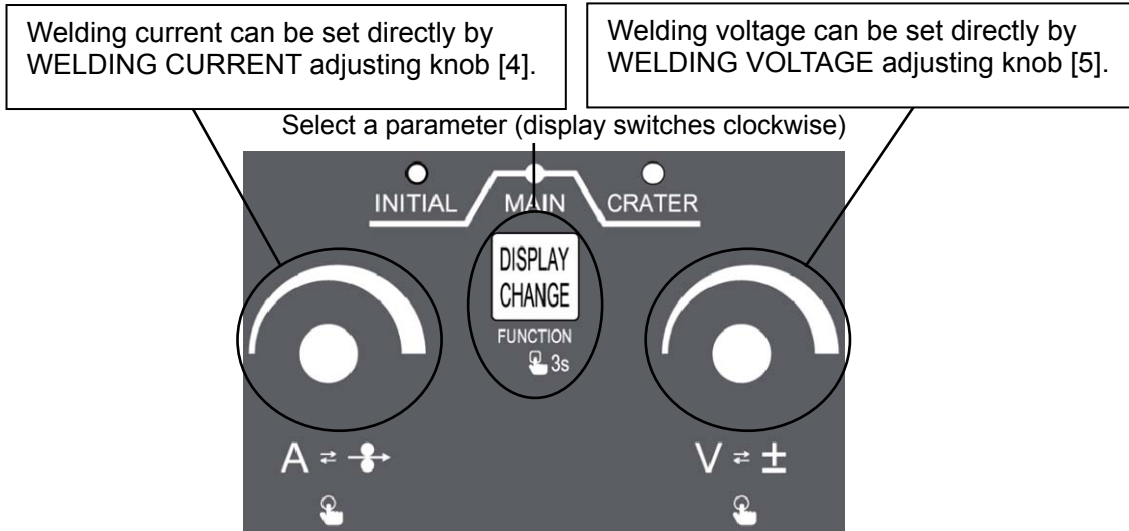
					
$\varnothing 0.8$ $\varnothing 1.0$ $\varnothing 0.9$	$\varnothing 0.8$ $\varnothing 1.0$ $\varnothing 0.9$	$\varnothing 0.8$ $\varnothing 1.0$ $\varnothing 0.9$	$\varnothing 0.8$ $\varnothing 1.0$ $\varnothing 0.9$	$\varnothing 0.8$ $\varnothing 1.0$ $\varnothing 0.9$	$\varnothing 0.8$ $\varnothing 1.0$ $\varnothing 0.9$
					
$\varnothing 1.2$ $\varnothing 1.6$ $\varnothing 1.4$	$\varnothing 1.2$ $\varnothing 1.6$ $\varnothing 1.4$	$\varnothing 1.2$ $\varnothing 1.6$ $\varnothing 1.4$	$\varnothing 1.2$ $\varnothing 1.6$ $\varnothing 1.4$	$\varnothing 1.2$ $\varnothing 1.6$ $\varnothing 1.4$	$\varnothing 1.2$ $\varnothing 1.6$ $\varnothing 1.4$
$\varnothing 0.8$ mode	$\varnothing 0.9$ mode	$\varnothing 1.0$ mode	$\varnothing 1.2$ mode	$\varnothing 1.4$ mode	$\varnothing 1.6$ mode
(0.8 and 1.0 lamps lighting)			(1.2 and 1.6 lamps lighting)		

When setting a combination is not existing in the table, abnormality of setting welding method will occur, the digital meter “-----” blinks, and the welding power source will stop operation automatically. In addition, the LED corresponding to the wrong wire diameter or shielding gas will also blink.

For example, the current welding mode is “SOLID”, “MAG”, “ $\varnothing 1.4$ ”, when the WIRE TYPE is changed form “SOLID wire” to “FLUX-CORED wire”, the LED for the mode of MAG shielding gas blinks, which indicates this setting in the combination is incorrect. The abnormality will disappear and welding operation can be carried out after properly setting, i.e., reselect a wire type by WIRE TYPE select key or reset a shielding gas by GAS select key.

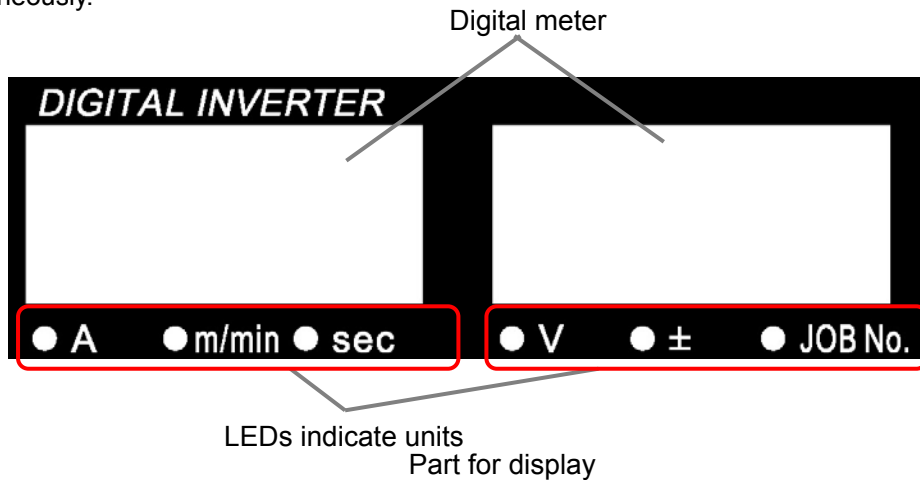
## 10. OPERATION (Continued)

### 10.1.2 Setting of Parameter



Part for welding parameter setting

Select a welding condition by DISPLAY CHANGE key[7], then the digital meter will display the corresponding condition value selected, and the LED corresponding to the condition will light up simultaneously.



#### (1) Setting of INITIAL condition

INITIAL condition can be selected only when internal function "F15" is "ON" and "CRATER FILLER" is set to "ON" or "REPEAT". When INITIAL condition is selected, the digital meter will display the setting value of INITIAL condition.

#### (2) Setting of MAIN condition

If MAIN condition is selected, the digital meter will display the setting value of MAIN condition.

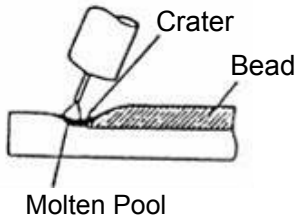
#### (3) Setting of CRATER condition

CRATER condition can be selected only when "CRATER FILLER" is set to "ON" or "REPEAT". If CRATER condition is selected, the digital meter will display the setting value of CRATER condition.

**NOTE:** The setting values for voltage, current and wire feed rate displayed are not the actually measured output values. Use the values in the displays as approximations.

## 10. OPERATION (Continued)

### 10.1.3 Setting of Crater Fill Functions

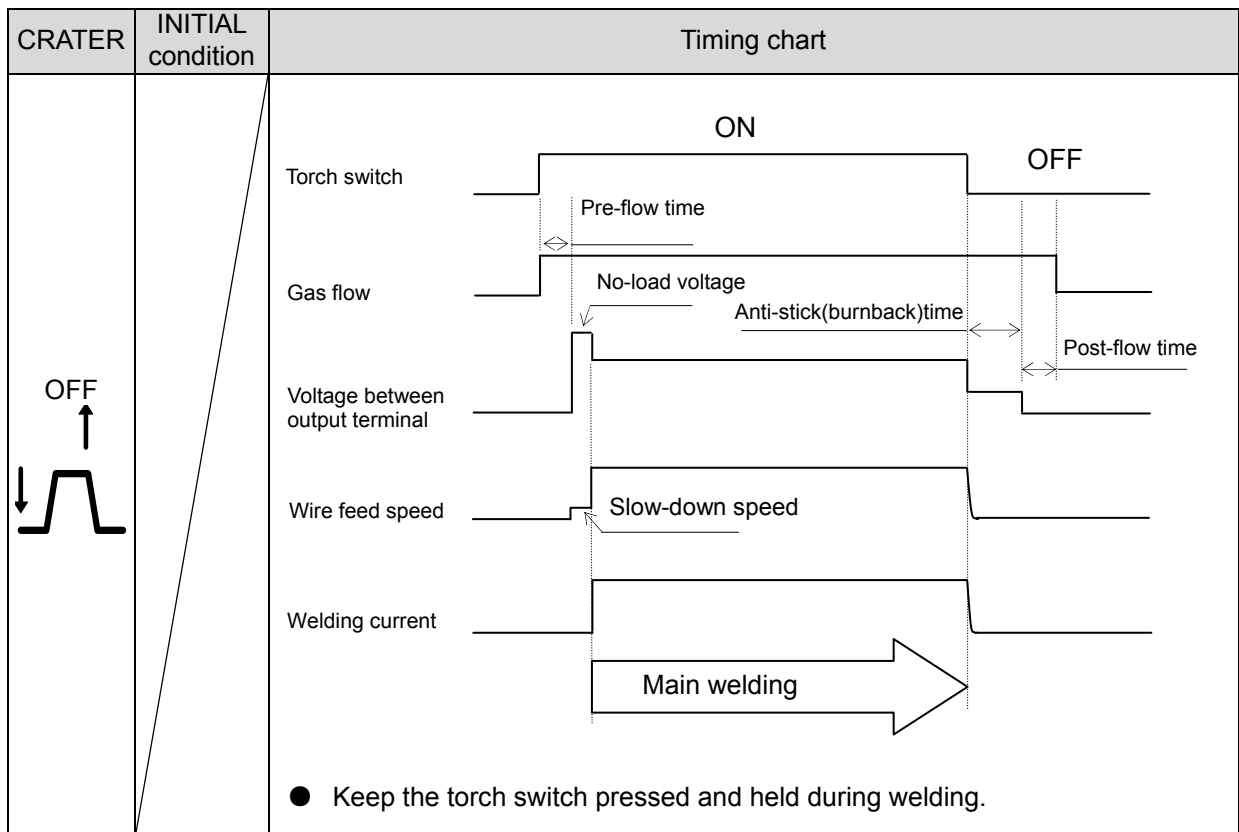


A crater is a depression left at the termination point of the weld. As it may cause cracks and welding defects, a crater treatment called crater-filler is used to fill in the depression.

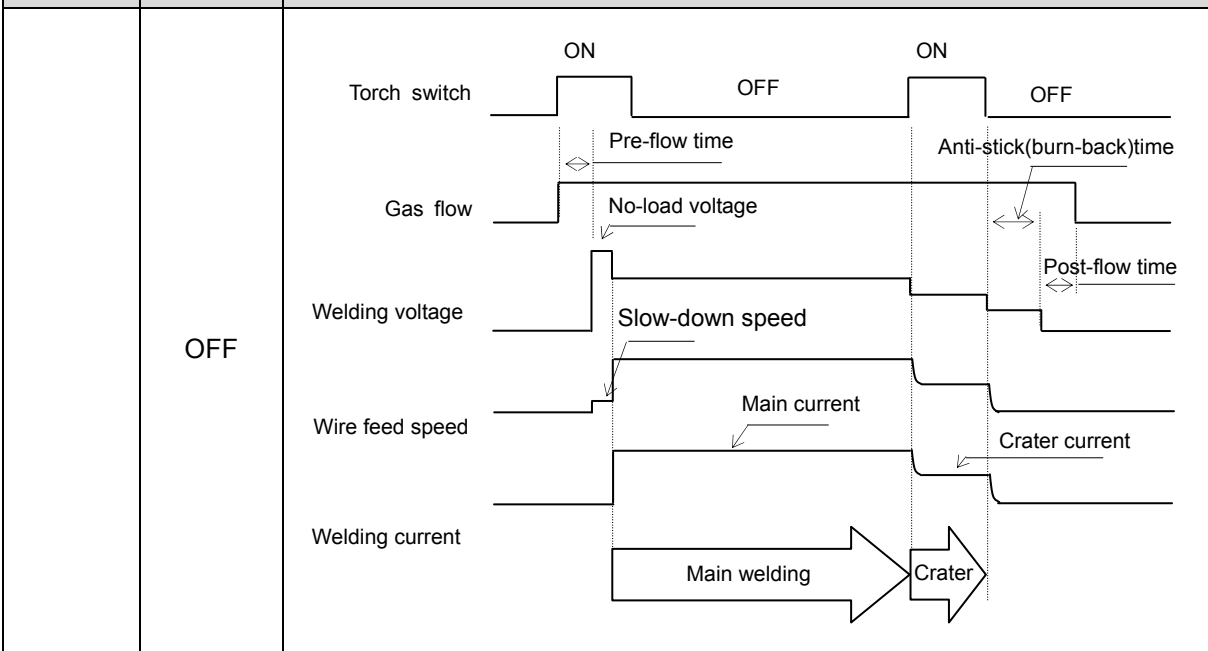
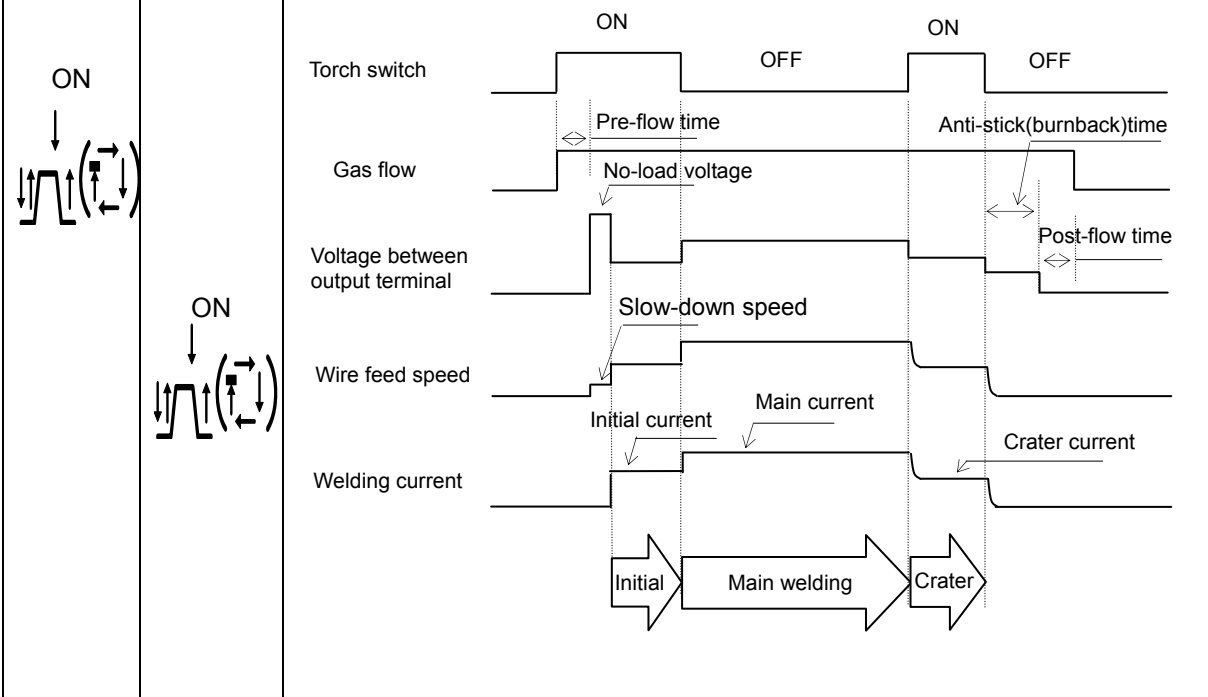
When giving a crater treatment, set the CRATER FILLER[6] key to "ON" or "REPEAT". The crater-fill mode is switched in the following order each time the key is pressed.



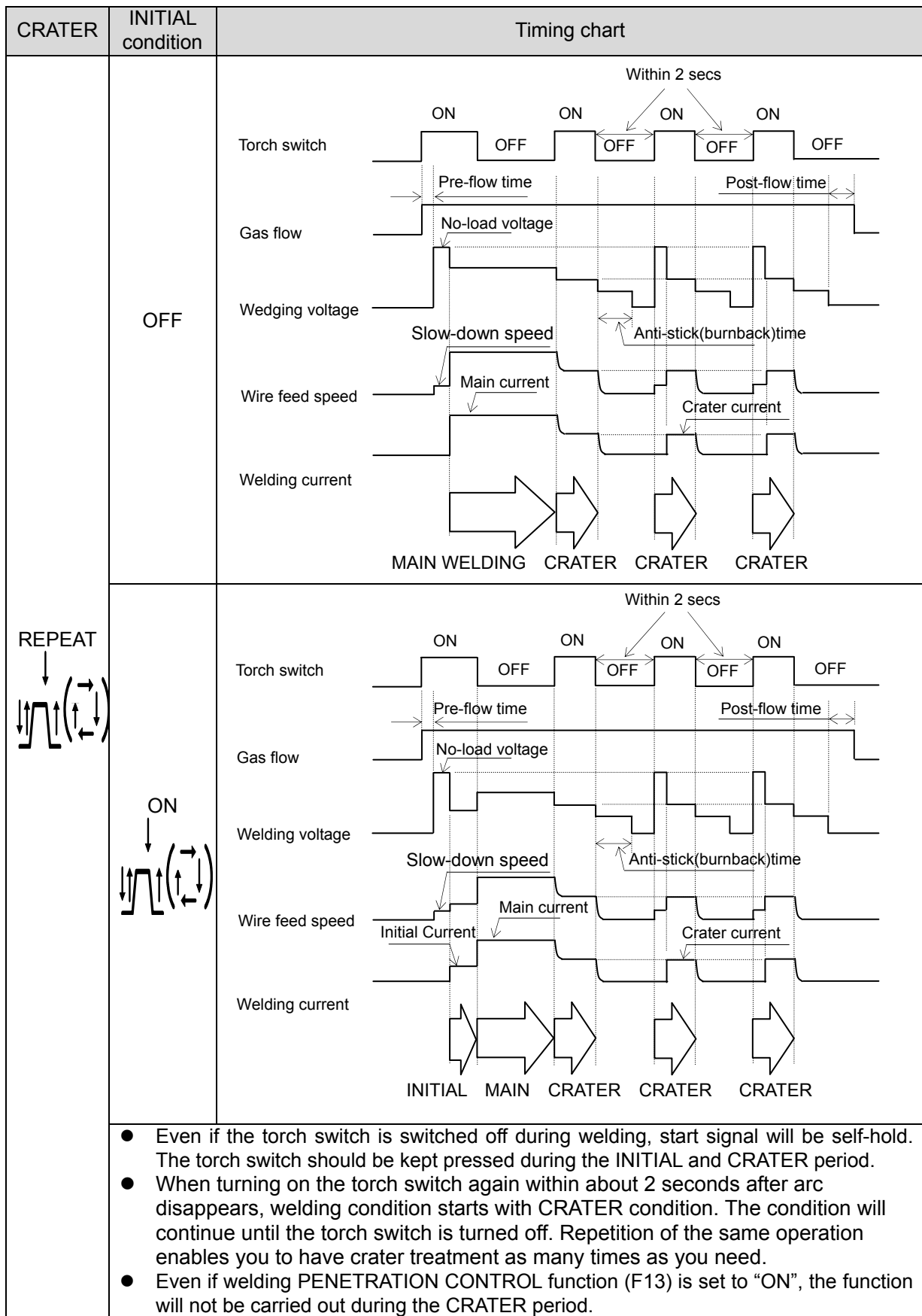
The schematic diagrams for different CRATER FILLER settings are as follows:



## 10. OPERATION (Continued)

CRATER	INITIAL condition	Timing chart
	OFF	
		
		<ul style="list-style-type: none"> <li>● Even if the torch switch is switched off during welding, the start signal will be self-hold. The torch switch should be kept pressed and held during the INITIAL and CRATER period.</li> <li>● Even if welding PENETRATION CONTROL function(F13) is set to "ON", the function will not be carried out during the CRATER period.</li> </ul>

## 10. OPERATION (Continued)





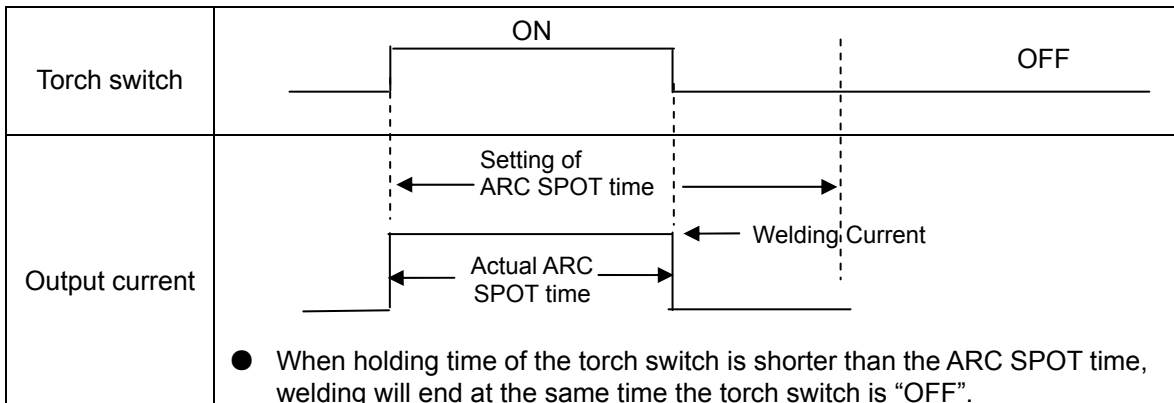
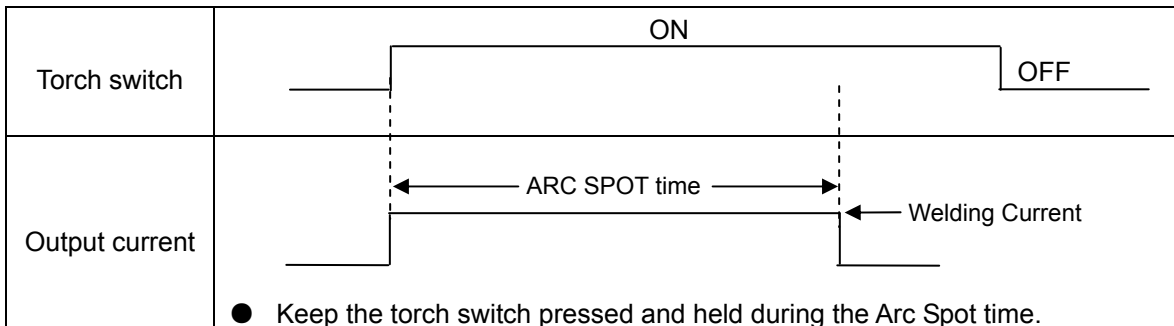
## 10. OPERATION (Continued)

### 10.1.4 Setting of Arc Spot Welding

To carry out arc spot welding, select the "ARC SPOT" mode by CRATER FILLER key[6], and set spot welding current by CURRENT adjusting knob[4] and spot welding voltage by VOLTAGE adjusting knob[5].

In ARC SPOT mode, press DISPLAY CHANGE key[7] to switch to spot welding time adjustment mode. The left digital meter will display setting value and the LED corresponding to "sec" will light up. In this status, an arc spot time between 0.1 seconds and 10 seconds can be set by parameter adjusting knobs ([4] or [5]).

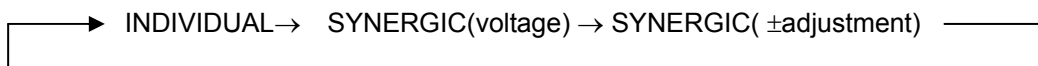
To return to the previous parameter item adjusted, just press CRATER FILLER key[6] or DISPLAY CHANGE key[7] again.



**Note: In the ARC SPOT mode, the penetration control function (F13) is unavailable. When setting spot welding with weld penetration control being "ON", this function will be automatically switched to "OFF".**

### 10.1.5 Adjustment of Welding Voltage

Using the VOLT. CONTROL key[9] allows you to select one of the following voltage adjustment methods. The state of VOLT. CONTROL is changed in the following order each time the key is pressed.



#### (1) INDIVIDUAL Adjustment

"INDIVIDUAL" adjustment can be performed when the LED to the upper left of the VOLT. CONTROL key goes out.

In the case of the INDIVIDUAL adjustment, welding current and welding voltage must be adjusted individually by parameter adjusting knobs([4] and [5]).

## 10. OPERATION (Continued)

### (2) SYNERGIC Adjustment

“SYNERGIC” adjustment can be performed when the LED to the upper left of the VOLT. CONTROL key lights.

In the SYNERGIC adjustment, the proper welding voltage for the current setting is automatically set. Fine adjustment of welding voltage can also be performed by VOLTAGE adjusting knob [5].

In addition, after pressing the VOLT. CONTROL key [4] again, the right digital meter will switch to a display mode of SYNERGIC adjustment ( $\pm$  adjustment). In this mode, the standard value is “0”, and you can increase or decrease the welding voltage in the range of -30 to 30 by rotating the VOLTAGE adjusting knob [5]. When the voltage adjustment method is changed from SYNERGIC to INDIVIDUAL, the right digital meter will display the voltage of the individual setting.

**NOTE: The welding voltage at SYNERGIC control, etc. may not be 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<sub>2</sub>)
- MIG gas : 98% Argon(Ar), 2% Oxygen (O<sub>2</sub>)

#### 10.1.6 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  $\pm$  lamp lights up. At that condition, it is possible to set arc characteristics by using the parameter adjusting knob [5]. The setting range is 0 to  $\pm 99$ . When pressing the ARC CONTROL key [8] or the DISPLAY CHANGE key [7] again, display returns to the previous parameter setting mode.

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 is set in the positive direction, arc condition becomes softer (up to 99). When use in the low current range, you set the setting value of the arc characteristic in the positive direction to obtain good welding results. When use in the high current range, you set the setting value of the arc characteristic in the positive direction to obtain good welding results. If you can not obtain optimum arc condition due to use of the extension cables, set the setting value of the arc characteristic in the negative direction.

#### 10.1.7 Gas Check ( ) Function

This function is used when opening the valve of the shielding gas and when adjusting the gas flow rate. When pressing the GAS CHECK key [10] once, the GAS CHECK lamp lights up and allows gas to flow. Pressing the GAS CHECK key [10] again turns off the GAS CHECK lamp and stops discharging gas. In more than two minutes after the GAS CHECK key [10] 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.

#### 10.1.8 Inching ( ) Function

When pressing the INCHING key [11], the INCHING lamp (located at the upper left of the INCHING key) will light up and begins feeding wire. Releasing the key stops the wire feed and the INCHING lamp goes out. The wire feed rate will change by turning the parameter adjusting knob [4] while pressing and holding down INCHING key. When connecting to the analog remote control, inching operation can be implemented using an inching switch on the remote control box. However, the INCHING key on the operation panel will therefore become unavailable.

## 10. OPERATION (Continued)

### 10.1.9 Using the Parameter Adjusting Knob

When using CURRENT and VOLTAGE adjusting knobs ([4] and [5]) to adjust parameters 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 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 arc characteristics.

### 10.1.10 Verifying the Parameters in the Display

The display on the front panel provides the following functions:

#### 1) Display of Parameter Setting Values

When setting to “parameter setting values display” mode during intermission period, or in the “setting value display” mode set during welding, parameters setting value can be displayed.

#### 2) Display of Output Current and Voltage 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 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. To adjust parameters during welding, press DISPLAY CHANGE key[7] to switch to the “setting value display” mode. If neither any operation is done nor DISPLAY CHANGE key[7] is pressed within 5 seconds, the digital meters will automatically return to the “average value display” mode. When pressing the welding torch switch, the LEDs in the part of welding parameter setting will light up according to welding operation and will switch in sequence. When switching to the “average value display” mode, the LED in the part of welding process parameter setting, which is having an output, will blink.

#### 3) Display of Welding Results After Completion of Welding

After completion of welding, the average output current and voltage of the last one second blink for about 20 seconds (however, the output condition of crater filler are ignored). The welding operator can verify the welding conditions according to such display after completion of welding, and such results can also be used as approximate values for condition adjustment. Such display can be canceled after completion of welding by starting another welding or by pressing any key on the control panel without the 20 seconds delay.

The result display time can be set by internal function “F8”, wherein the left digital meter displays setting value and the “sec” LED lights up. The setting range for the result display time is 0–60 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 an Abnormality When It Occurs

If an error is detected in the power source, an error number indicating error message blinks. See Section“12.4 How to Solve an Error ”for details.

**NOTE: The average output current and voltage displayed by the digital meters are for reference only, and it is not guaranteed that they can be used as metering management data.**

## 10. OPERATION (Continued)

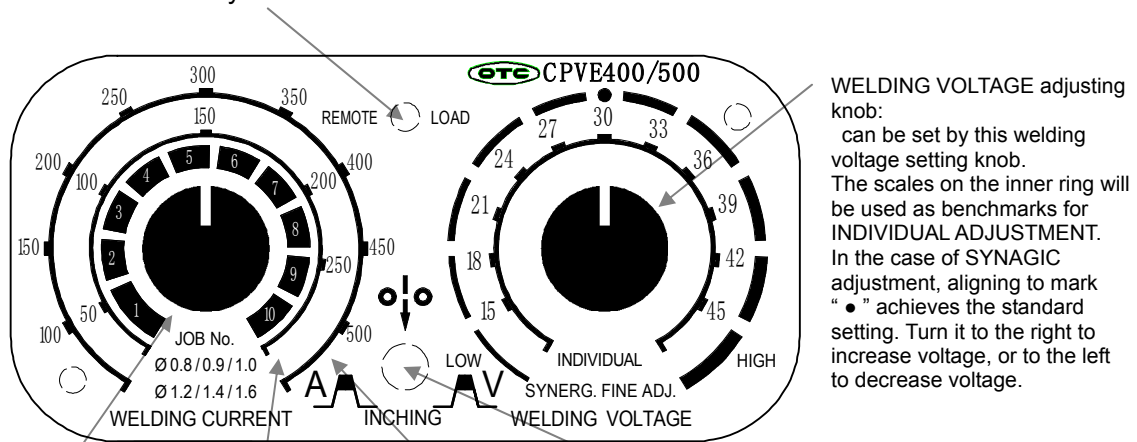
### 10.1.11 Using the Analog Remote Control

This welding power source can be operated without supplied analog remote control. When connecting the analog remote control to the power source, you can use it to adjust welding current and voltage, and read welding condition near the working area.

The analog remote control is automatically recognized when it connected. In this state it takes precedence, i.e., welding current and voltage can no longer be set from the operation panel side. While being connected to the analog remote control, the settings of remote control are displayed in the digital meters. The data set by the analog remote control will disappear immediately after it is disconnected.

Remote: Affects the settings through Remote Control Box knobs.

LOAD: The stored welding conditions from the first to the tenth one can be read by means of the knob on the left side.



Panel of Analog Remote Control for CPVE-400/500

**WELDING CURRENT** adjusting knob:  
Use this knob to set a welding current or select JOB MEMORY number.

Use the scales on the inner ring for setting current for wire diameter Ø0.8, Ø0.9, Ø1.0.

Use the scales on the outer ring for setting current for wire diameter Ø1.2, Ø1.4, Ø1.6.

**INCHING SWITCH:**  
press this switch to feed wire. Rotate the current setting knob to adjust wire feed speed.

**WELDING VOLTAGE** adjusting knob:  
can be set by this welding voltage setting knob. The scales on the inner ring will be used as benchmarks for INDIVIDUAL ADJUSTMENT. In the case of SYNERGIC adjustment, aligning to mark “•” achieves the standard setting. Turn it to the right to increase voltage, or to the left to decrease voltage.

- When making the INDIVIDUAL adjustment

When “INDIVIDUAL” is set (at the operation panel), welding current and voltage can be set individually.

- When making the SYNERGIC adjustment

When the “SYNERGIC” adjustment is set, welding voltage is automatically adjusted only by turning the WELDING CURRENT knob[4]. Use the WELDING VOLTAGE knob to finely adjust welding voltage.

The memorized welding conditions from the 11<sup>th</sup> to the 30<sup>th</sup> one can not be read out by using the reading function of the analog remote control.

## 10. OPERATION (Continued)

### 10.2 Applied setting

#### 10.2.1 Setting of Internal Function

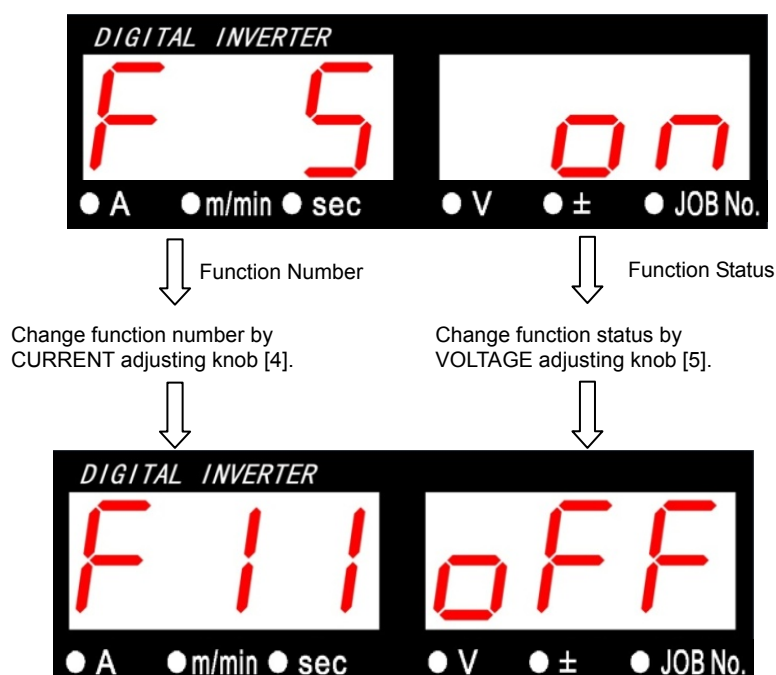
The welding power supply various built-in internal functions, as shown in the following table.

No.	Internal Function	No.	Internal Function
F1	Fine adjustment of anti-stick(burnback) time	F11	Fine adjustment of JOB MEMORY
F2	Fine adjustment of anti-stick(burnback) Voltage	F12	Setting of soft arc mode
F3	Fine Adjustment of Slow Down Speed	F13	Penetration Control function
F4	Switch of Auto/Semi-automatic Mode	F14	Switch of Wire feeding machine selection
F5	Switch of external setting voltage range	F15	Setting of INITIAL Condition
F6	Setting of up-slope time	F16	Gas Pre-flow time
F7	Setting of down-slope time	F17	Gas Post-flow time
F8	Setting of result display time	F18	-
F9	-	F19	-
F10	Disabling Power Saving Function	F20	-

This welding power source has all kinds of special internal functions which can be set through DISPLAY CHANGE key [7].

#### ● Usage of Internal Function

- (1) Push and hold down DISPLAY CHANGE key[7] for a few seconds to switch to the internal function mode. The left digital meter will display a function number, and the right digital meter will light up to display the function status corresponding to the function number.
- (2) Adjustment of function number and status.



This example shows function number "F5" with its "on" status.

This example shows function number "F11" with its "OFF" status.

## 10. OPERATION (Continued)

- (3) Long press DISPLAY CHANGE key [7] again to exit the internal function mode.

**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.**

### 10.2.1 Setting of Internal Function (continued)

The following functions can be set or adjusted.

- (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 after welding is completed. Anti-stick(burnback) time is set to the appropriate 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", and is adjusted in either the negative or positive direction. The fine adjustment range is 0 to  $\pm 50$  with a unit being 0.01 seconds.

Ex. 1) The setting value is 25: to increase the standard anti-stick(burnback) time by 0.25 sec.

Ex. 2) The setting value is -10: to decrease the standard anti-stick(burnback) time by 0.1 sec.

- (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 wire from sticking to the 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 setting F2. The standard anti-stick(burnback) voltage is preset to "0". When required set F2 in the negative direction to reduce anti-stick voltage, or set F2 in the positive direction to raise the voltage. The fine adjustment range is 0V to  $\pm 9.9V$ .

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

Slow-down speed means the speed to feed wire that is slower than the feed rate at normal welding during the period from triggered torch switch to arc start. The slow down speed is preset to proper conditions according to welding methods and 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 decrease. When set F3 in the positive direction, it increase. The fine adjustment range is 0 m/min –  $\pm 1.0$  m/min. When poor arc start occurred, lower the slow-down 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)

### 10.2.1 Setting of Internal Function (continued)

#### (4) Switch of Auto/Semi-automatic Mode: F4

Set F4 to “0” to switch to “semi-auto” mode.

In “semi-auto” mode, the “operation stop” status can be canceled only after turning on the power supply again.

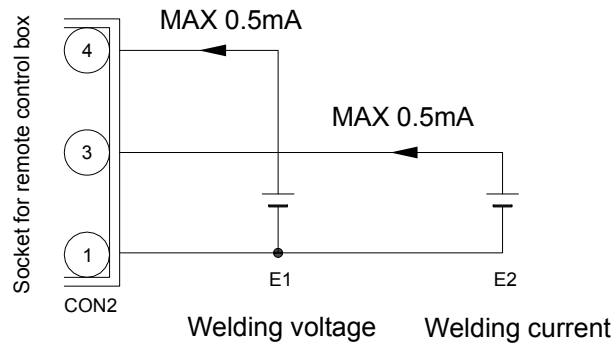
The default factory setting is “semi-auto” mode.

Set F4 to “1” or “2” to switch to “auto” mode. The “auto” mode has the following features:

- To release “operation stop” status just by re-short-circuiting the Operation Stop Terminals.
- After anti-stick (burnback) voltage time, the voltage is applied for approximately 0.2 second for prevent wire stick on base metal.

Set F4 to “1” when connected to automatic welding equipment to input welding current or voltage command by means of external voltage signal. When F4 is set to “2”, current or voltage adjustment can only be performed through a remote control box or the control panel, but not by means of external voltage signal. In “semi-auto” mode, the setting values by the control panel will be applicable, even if voltage signal is externally input to the socket for remote control box.

Perform connection according to the figure below for inputting current setting signal and voltage setting signal by means of external voltage. Use a power source with a capacity greater than 0.5mA for E1 and E2.



Applicable plug:

Specification	DPC25-6A
Part Number	4730-009



**PROHIBITED**

- The voltage supplied to E1 and E2 must be within 0–+15V. Exceeding +15 V will damage to the control circuit of the welding power source.



**CAUTION**

- E1 and E2 signals shall be inputted 100 ms before the input of starting signal, otherwise arc striking will be affected if E1 and E2 signals are inputted during or after the input of starting signal.

## 10. OPERATION (Continued)

### 10.2.1 Setting of Internal Function (continued)

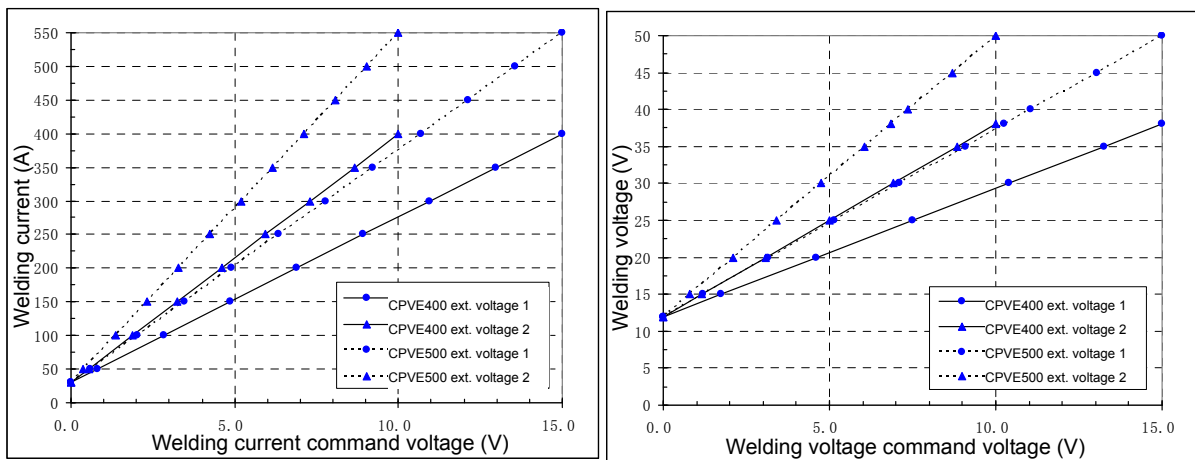
#### (5) Switch of external setting voltage range: F5

When using this function, the F4 must be set to "1" to switch to "auto" mode.

※ F5:OFF: default factory setting, the external supply voltage range of 0V to 15V.

※ F5:ON: function number "5" is set to "ON", the external supply voltage range of 0V to 10V.

- The relationship between external current/voltage command and output current/voltage is shown in the figures below. The welding current and welding voltage corresponding to welding conditions setting voltage may differ from the indications in the graphs due to wire stick-out length or dragging of output cable. These graphs are only for reference.



- Ext. voltage 1: externally supplied command voltage within 0–15 V. (at shipment setting)
- Ext. voltage 2: externally supplied command voltage within 0–10 V with F5 set to "ON".

#### (6) Setting of up-slope time: F6

Up-slope time is the time for increasing welding conditions stepwise when initial current is changed to main current. The factory setting for upslope time is 0 second, and it can be adjusted by F6 with a setting range 0–10 seconds.

This function is used when wire burns up while conditions are switched over due to the large difference between initial current and main welding current settings.

#### (7) Setting of down-slope time: F7

Down-slope time refers to the time period from main welding current (down) to crater current gradually. The factory setting for down-slope time is 0 second, and it can be adjusted by using F7 with a setting range 0–10 seconds.

For example, use this function when bundling wire or other phenomena occur during the transition due to the relatively large difference between the setting value for welding current and that for crater current.



## 10. OPERATION (Continued)

### (8) Setting of result display time: F8

After completion of welding, the average output current and voltage of the last 1 second will be displayed flickeringly for about 20 seconds. Result display time can be set by using “F8”, wherein the left digital meter displays setting value and the “sec” LED lights up. The setting range for the result display time is 0–60 seconds.

### (9) F9 is no function

### (10) Disabling Power Saving Function: F10

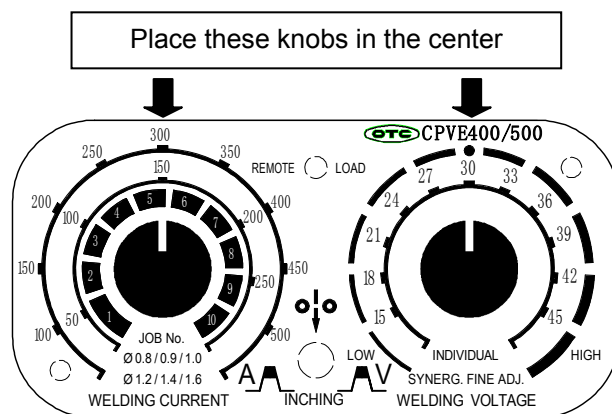
The default setting of F10 is “OFF”. In this state, the cooling fan of the welding power source will automatically stop running after about 10 minutes of intermission. When starting the next welding, the fan will automatically start up.

When this function is set to “ON”, the fan will be running constantly after turning on the main switch of the welding power source, and will not stop until turn off the main switch.

### (11) Fine adjustment of JOB MEMORY: F11

Under the welding conditions already stored in JOB MEMORY, the condition can be finely adjusted with the WELDING CURRENT knob and the WELDING VOLTAGE knob located on the analog remote control. The initial setting of F11 is “OFF”. When activating the function, set F11 to “on”. Setting both CURRENT and VOLTAGE knobs to the center of the scales allows the welding power source to work under the conditions already stored in the JOB MEMORY. To increase welding current slightly, turn the WELDING CURRENT knob clockwise. To decrease slightly, turn it counter-clockwise. Welding voltage can be adjusted in the same way. The fine adjustment range is  $\pm 20\%$ .

**NOTE: This function can't be switched on by setting it to “ON” when no JOB MEMORY is stored in the welding condition storage or a remote control box is not connected. When the stored condition is SYNERGIC, it will switch to INDIVIDUAL mode after turning on this function.**



### (12) Setting of soft arc mode: F12

If the welding method is CO<sub>2</sub> SOLID and wire diameter is 1.2/1.0/0.9, it is able to select the “soft arc” mode that is softer arc than the arc adjusted by the ARC CONTROL.

Set F12 to “ON” to switch to “Soft Arc Mode”, and the LED to the upper left of “ARC CONTROL key” will blink and indicates that the soft arc mode is activated. This setting can be stored in each JOB MEMORY number.

## 10. OPERATION (Continued)

### (13) Penetration Control function: F13

For conventional CO<sub>2</sub>/MAG welding, as the wire extension changes, welding current changes and base metal penetration depth and bead width change. By setting the PENETRATION CONTROL function to “ON”, wire feed rate is automatically adjusted so that constant current is always obtained even when wire stick-out 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 F13 to “ON”.

**NOTE: The PENETRATION CONTROL function does not function during the INITIAL and CRATER period. And the ARC SPOT mode is also unavailable this function.**

### (14) Switch of Wire feeding machine selection: F14

This welding power source can be used with many types of wire feeder. With different wire feeder, F14 should be set to the function number of the corresponding wire feeder. The corresponding relationship refers to the table below.

Wire feed model	F14 set value	MAX wire feeding speed
CM-8201	0	22m/min
CMXL-2301	1	18m/min
CM6201	2	22m/min

Power factory default settings for "0", the corresponding standard wire feeding machine: CM-8201.

### (15) Setting of INITIAL Condition: F15

The factory setting for this function is “OFF”, and when it is set to “ON”, it indicates that INITIAL Condition is existing. When INITIAL Condition is “ON”, initial current and voltage can be adjusted after switching to “INITIAL” status through DISPLAY CHANGE key[7].

**NOTE: Only when INITIAL Condition is set to “ON” and “CRATER FILLER” is set to “ON” or “REPEAT”, can you switch to “INITIAL” status to adjust initial parameters.**

### (16) Gas Pre-flow time: F16

When F16 is selected, the right digital meter will display setting value and the LED corresponding to “sec” will light up. In this status, gas pre-flow time can be set with a setting range from 0–10 seconds. The factory setting for this function is 0.1 seconds.

### (17) Gas Post-flow time: F17

When F17 is selected, the right digital meter will display setting value and the LED corresponding to “sec” will light up. In this status, gas post-flow time can be set with a setting range from 0–10 seconds. The factory setting for this function is 0.4 seconds.

(18) F18 is no function

(19) F19 is no function

(20) F20 is no function

## 10. OPERATION (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, you can still use DISPLAY CHANGE key[7], ARC CONTROL key[8] to confirm setting values when in a Key Lock state.



Holding down ENTER key[14] brings the key-lock condition. While keys are locked, the lock lamp (located at the upper of the Enter key) blinks. The key lock can be cancelled by holding down ENTER key [14] for a while again. The key lock is not cancelled by starting the machine up again.

This LED blinks when in a KEY LOCK state.

**NOTE: Even in a key lock state, GAS CHECK, INCHING, and JOB MEMORY function can be activated.**

### 10.2.3 Password Lock Function

The primary purpose of the 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 has been set, 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 Password Lock 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 change the password, you have to enter the current password first. Therefore, please manage the password well and never forget it.**

**In the password setting or entering mode, the welding power source will not be available for welding. (Power source disregards for the torch switch signal).**

#### [1] How to set password

- (1) Turn off the welding power source at once. After pressing the ENTER key [14] and turning on the power switch simultaneously, the digital meters on the front panel will display "PAS PAS" for 2 seconds before switching to the password setting mode.

If no password was set, the left digital meter will display "Loc" constantly (without blinking), and then you can go straight to step (2) to set a new password.

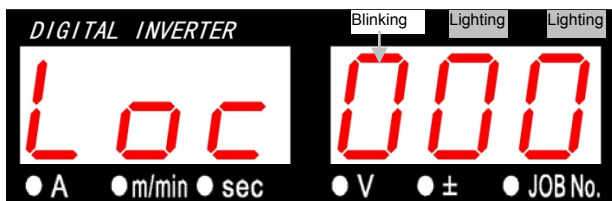
If a password was set, the left digital meter will blink "Loc", and then you can cancel the old password first according to the steps (2) and (3) in section [2] below before going to step (2) here to set a new password.



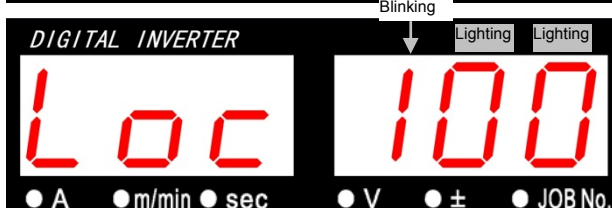
## 10. OPERATION (Continued)

- (2) After switching to the password setting mode, the left digital meter will display “Loc”, the right digital meter will display “000” with the hundreds digit blinking. In this status, the hundreds digit can be set through the parameter adjusting knobs ([4],[5]).

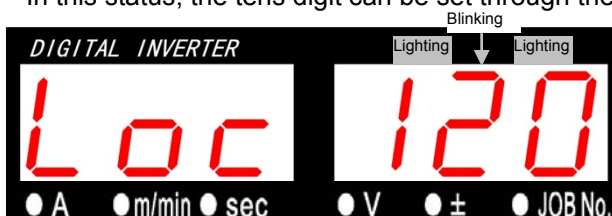
For example, the setting method for password “123” is as follows:



The blinking digit can be set through the parameter adjusting knobs [4],[5] with a setting range from 0~9.

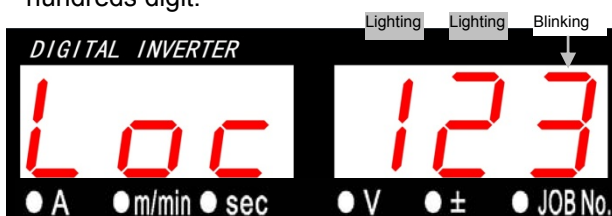


- (3) Press DISPLAY CHANGE key[7] to shift digit blinking from hundred's place to ten's place. In this status, the tens digit can be set through the parameter adjusting knobs([4],[5]).



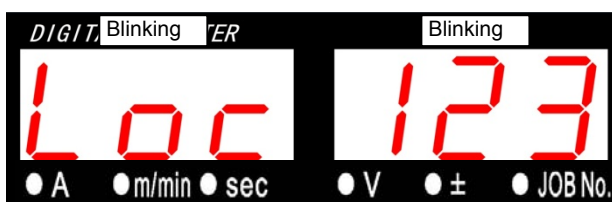
- (4) Press DISPLAY CHANGE key[7] again to shift digit blinking from ten's place to unit's place. In this status, the units digit can be set through the parameter adjusting knobs ([4],[5]).

In this status, if pressing the DISPLAY CHANGE key again, digit blinking will return to the hundreds digit.



- (5) After completion of all digits, press the ENTER key[14] for confirmation. The left display meter will display “Loc”, the right digital meter will display the newly set password “123”, and the both display meters will be blinking alternately.

If the password is wrong, press any key other than ENTER key[14] to return to the previous status, and then enter a correct password again.



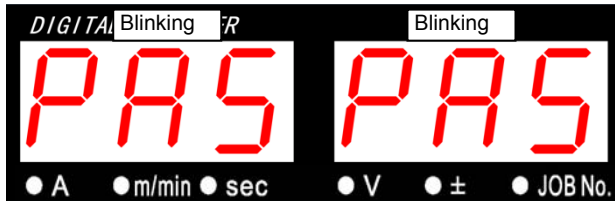
- (6) After confirmation of the correct password, press the ENTER key[14] again to complete the password setting mode. Now the password has been set successfully.

Note that now it is not in the password lock state. To switch to the password lock state, long press the ENTER key[14].

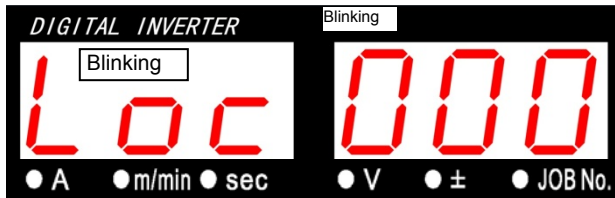
## 10. OPERATION (Continued)

### [2] Method for Releasing a Password Lock

- (1) When in the password lock state, after long pressing the ENTER key[14] to release the lock, the digital meters will display “PAS PAS” for 2 seconds before switching to the password input mode.



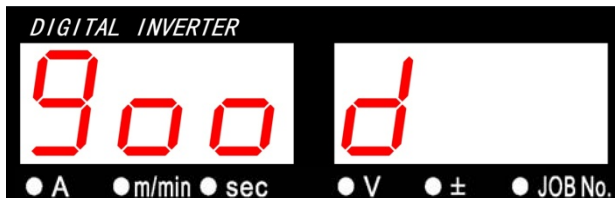
- (2) After switching to the password input mode, the left display meter will blink “Loc”, the right digital meter will display “000” with the hundreds digit blinking. Press DISPLAY CHANGE key[7] to switch to a blinking digit (hundred’s place, ten’s place, unit’s place), and then use the parameter adjusting knobs([4],[5]) to enter the password number corresponding to the blinking digit.



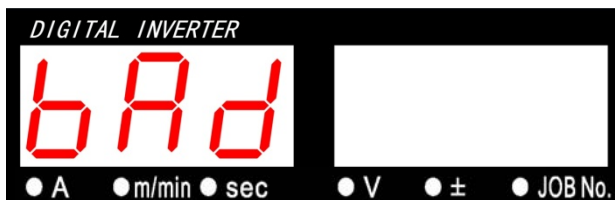
**Note: To change the password, you need to input the current password correctly before setting new password.**

- (3) After completion of password input, press ENTER key[14]. If the password input is correct, “good” will be displayed and the password lock state will be released.

In addition, when in a password setting mode, now you can go to the step (2) in section [1] above to set a new password.



If the password input is wrong, “bAd” will be displayed with the lock not released, and you need to input the correct password again or exit the password input mode.



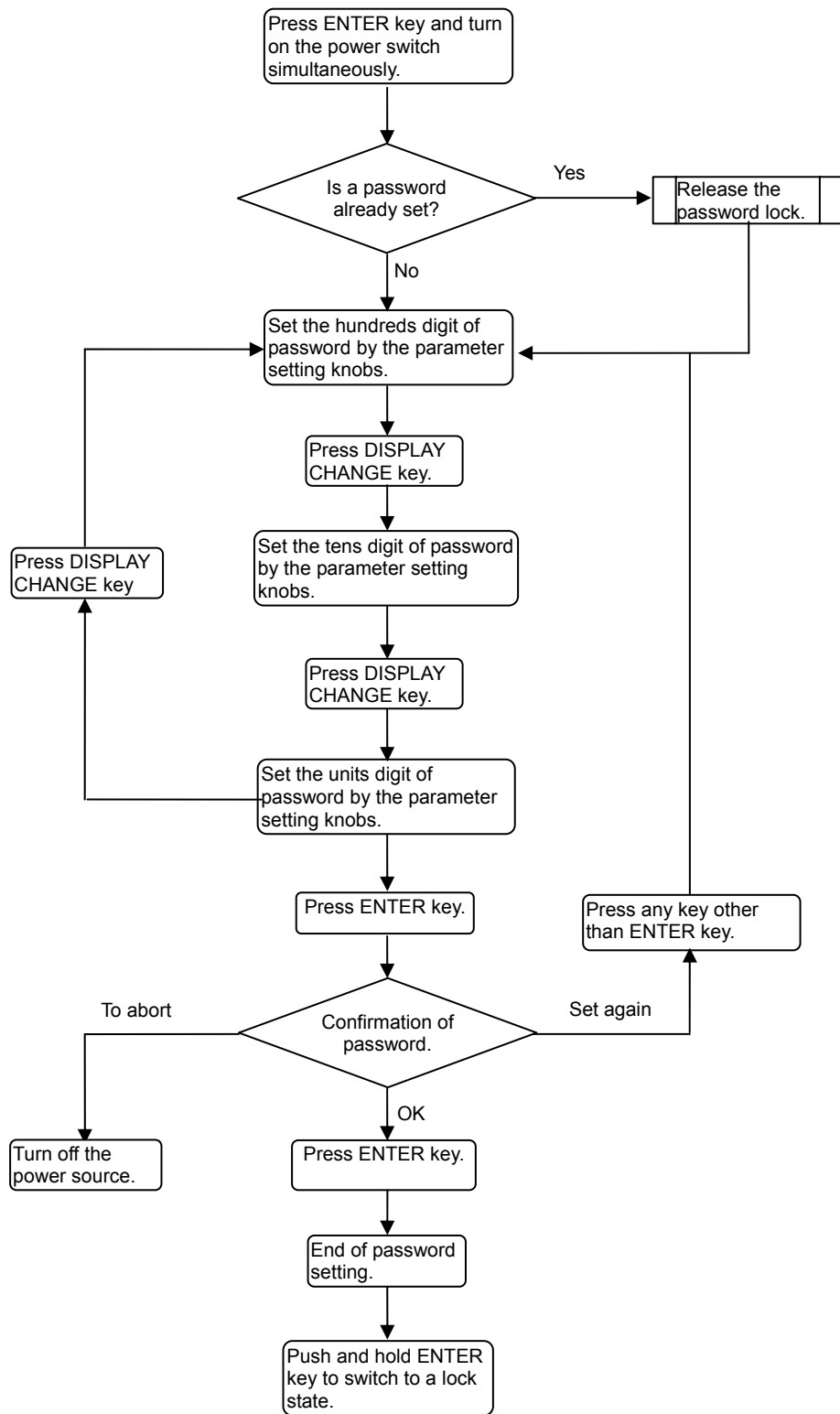
### [3] Method for Canceling Password Input

To cancel the password setting or input mode, turn off the power source. In such case, the password can not be set.

If the power source is in the input password mode to un-lock, press ARC CONTROL key[8] to cancel password input. In such case, the lock state can not be released.

## 10. OPERATION (Continued)

- Operation Procedure for Password Lock Function



## 10. OPERATION (Continued)

### 10.2.4 JOB MEMORY Function

The set welding conditions can be stored in the internal memory of the welding power source by using the memory function for welding condition, and the stored data can be read at any time to reproduce the welding conditions. Up to 30 welding conditions can be memorized.

**NOTE: The stored data by the JOB MEMORY function for welding condition will not include all of internal function parameters. These internal function parameters are not limited to a single welding condition, but are applicable to all welding conditions.**

#### 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.
- We shall not assume any responsibility for any change or loss of electronic information resulting from repair, which you should note in advance.

After switching to a memory mode or read mode, any key other than SAVE key, LOAD key and ENTER key will be unavailable. To back out of the memory mode or read mode, press LOAD key [12] or SAVE key [13] respectively.

To copy a welding condition, first read the welding condition, and then save it with a different condition number.

**Note: When an analog remote control is connected, the setting value of welding current or voltage by the analog remote control will take precedence even if a welding condition has been read.**

## 10. OPERATION (Continued)

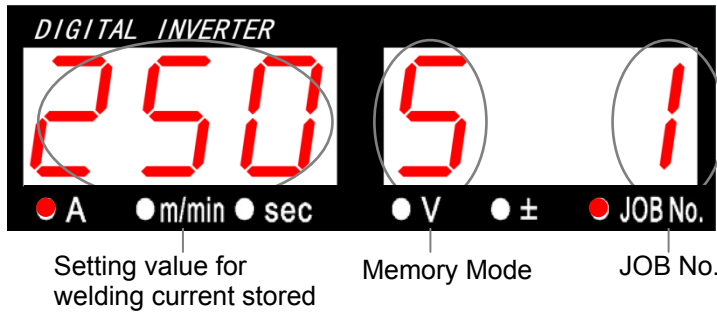
### [1] SAVE Function

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

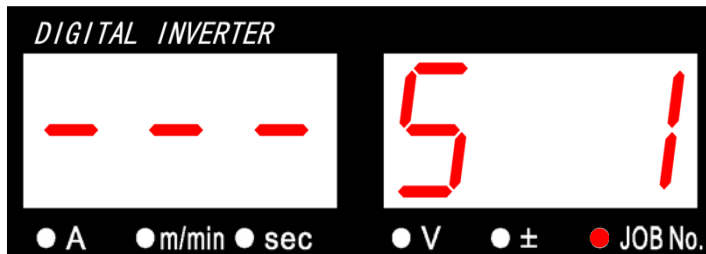
#### • Memory Method

(1) Press SAVE key [13] to switch to a memory mode.

If the specified condition number has memory data stored, the LEDs corresponding to Crater Filler, Welding Method, etc. will light up as shown in the figure below. For example, the right display meter will display a memory mode code and condition number “S 1” flickeringly, the “JOB No.” LED will light up, and the left display meter will display the setting value for welding current stored by JOB No.“1”. JOB number can be selected by VOLTAGE adjusting knob [5].



If the set condition number has no memory data, for example, the right display meter will display a memory mode code and condition number “S 1” flickeringly, and the left display meter will flickeringly display “— — —”, as shown in the figure below.



(2) Press ENTER key [14] to confirm memory data.

After pressing the ENTER key[14], if the specified condition number has memory data, the setting value for each parameter stored by the JOB number can be confirmed by pressing DISPLAY CHANGE key[7].

If the specified condition number has no memory data, the both display meters will flickeringly display “— — —”.

**NOTE: In this status, the condition number and JOB No. can not be changed. To change JOB No. again, press SAVE key[13] to return to the status shown in section (1) above. To cancel this status press LOAD key[12], then exit the memory mode.**

(3) Press ENTER key[14] again to store the welding condition to JOB MEMORY.

**NOTE: If the specified condition number has memory data stored before, the previous memory data will be overridden by the current data, so that old data should be backed up if needed.**



## 10. OPERATION (Continued)

### [2] LOAD Function

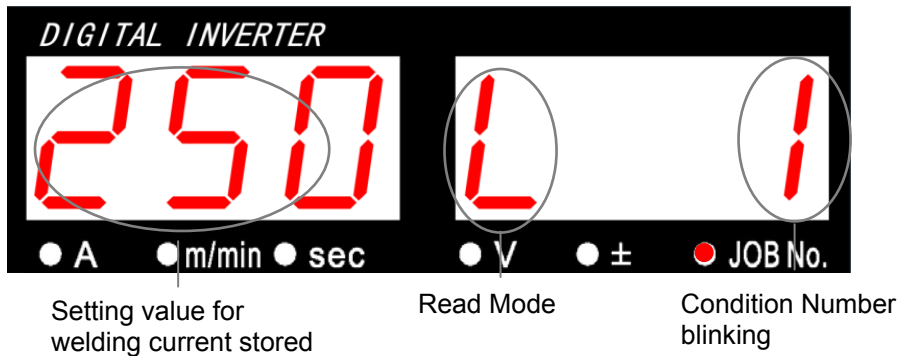
To read out the welding conditions stored in the JOB MEMORY of the welding power source.

**Note: The welding condition being used will be overwritten by the welding condition to be read. Store the current useful welding condition to be used in the future by a condition number before reading.**

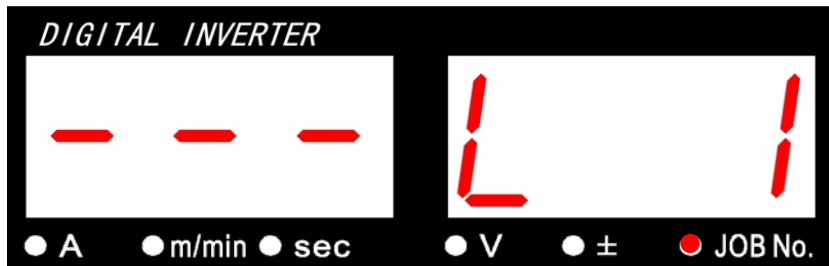
#### •Reading Method

(1) Press LOAD key[12] to switch to a read mode.

If the specified condition number has memory data stored, JOB No. and welding current of the JOB No. will light up as shown in the figure below. For example, the right digital meter will display a read mode code and condition number "L 1", the "Job No." LED will light up, and the left display meter will display the setting welding current of "250" stored by the condition number "1". In this status, you can change JOB number by VOLTAGE adjusting knob[5].



If the set condition number has no memory data, for example, the right display meter will blink display a read mode code and condition number "L 1", and the left display meter will display "— — —", as shown in the figure below. Select other JOB No.



(2) After select a JOB No., press ENTER key[14] to confirm data reading.

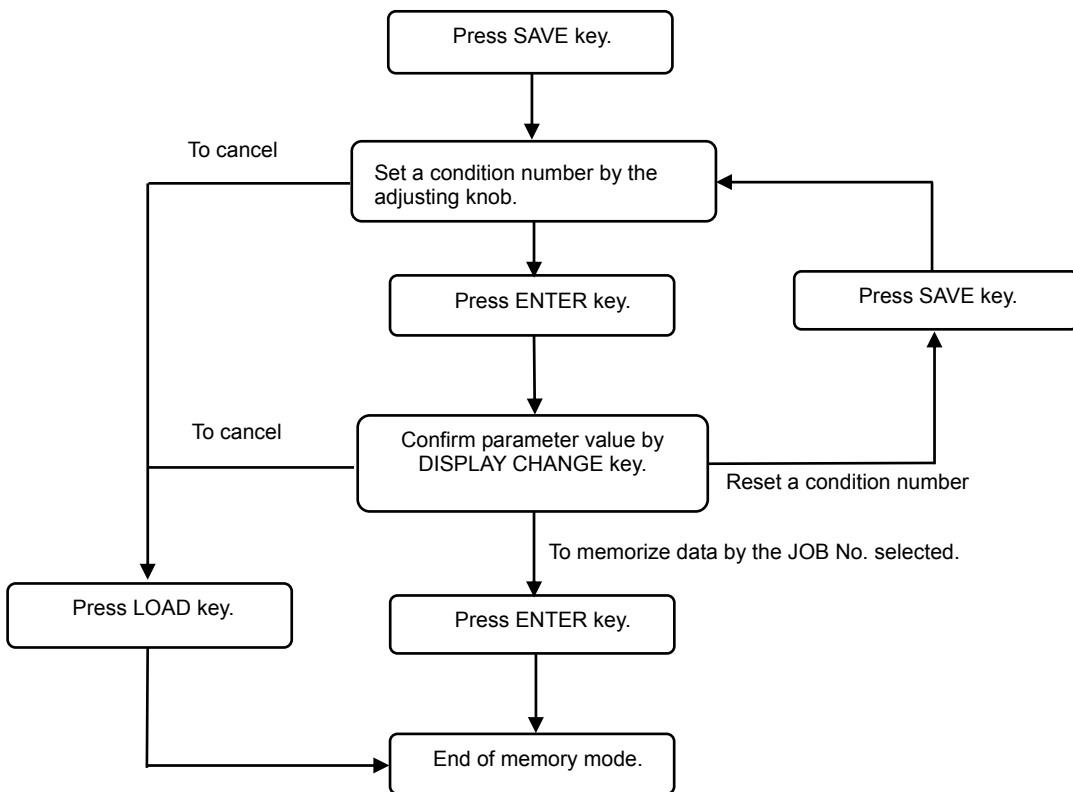
In this status, the setting value for each parameter of the welding condition to be read can be confirmed by using DISPLAY CHANGE key[7]. The setting value for the selected parameter will be displayed.

**NOTE: In this status, the condition number and mode can not be changed. To set a condition number again, press LOAD key[12] to return to the status shown in section (1) above. To cancel this status, press SAVE key [13]to exit the read mode.**

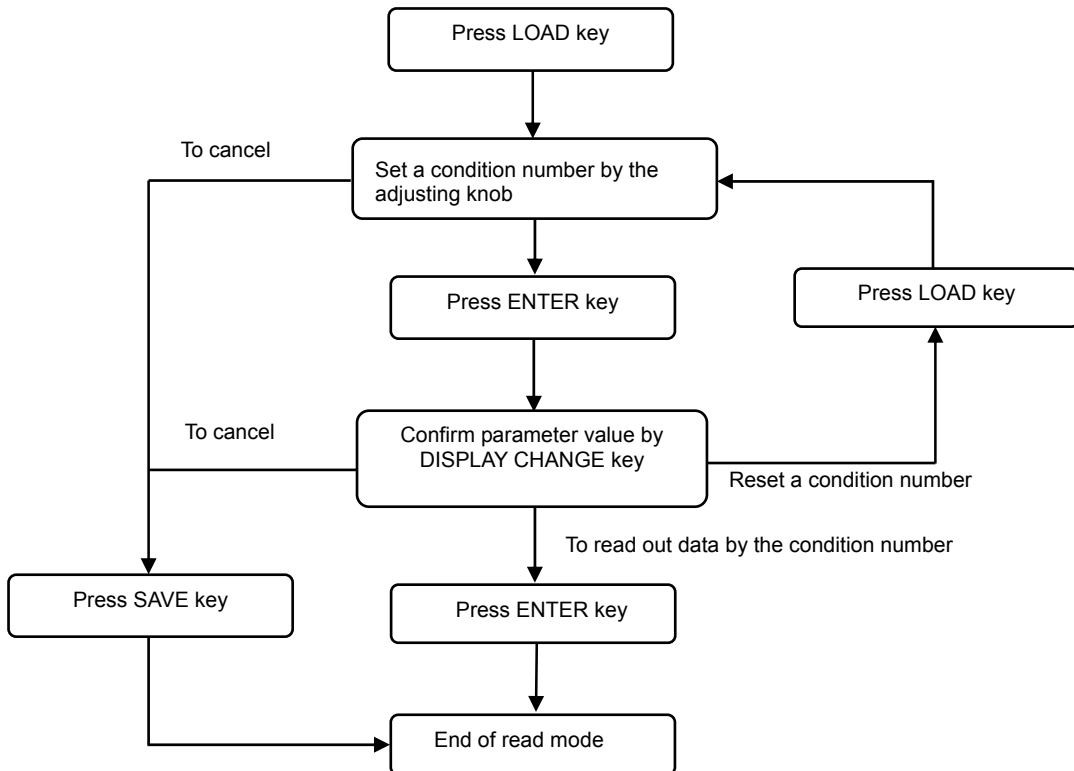
(3) Press ENTER key[14] again to read out the memory data and end the read mode.

## 10. OPERATION (Continued)

- Operation Procedure for Memory Mode



- Operation Procedure for Read Mode



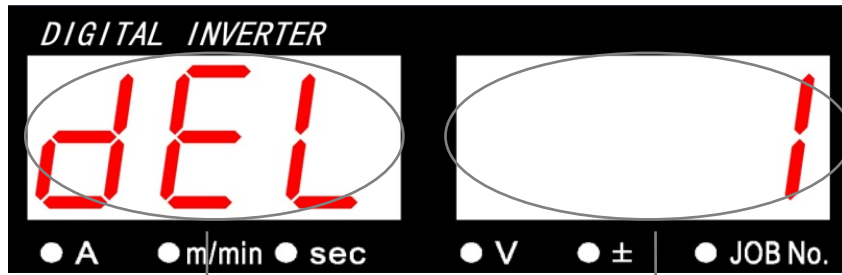
## 10. OPERATION (Continued)

### [3] Deletion of Memory

The welding conditions stored can be deleted. You can delete all stored welding conditions at one time or delete them one by one.

- Deletion Method

- (1) Turn off the power switch, and then turn on the power switch with LOAD key[12] and SAVE key[13] pressed down at the same time. After power-up, the left display meter will display “dEL” as shown in the figure below. If so, release all keys.

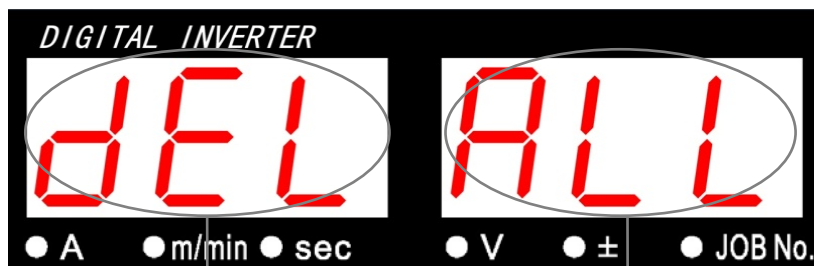


Deletion Model “dEL” lighting

Blinking Condition Number to be deleted

- (2) Set the condition number to be deleted by using VOLTAGE adjusting knob[5]. When rotating the knob counter-clockwise continuously, the right display meter will display “ALL” as shown in the figure below, and all memory data may be deleted thereafter.

The setting to delete all memory data.



“dEL” lighting

“ALL” blinking

**Note:** If using the “ALL” setting to delete all memory data, the welding condition being used will also be deleted. Therefore, all parameters will restore to their initial setting.

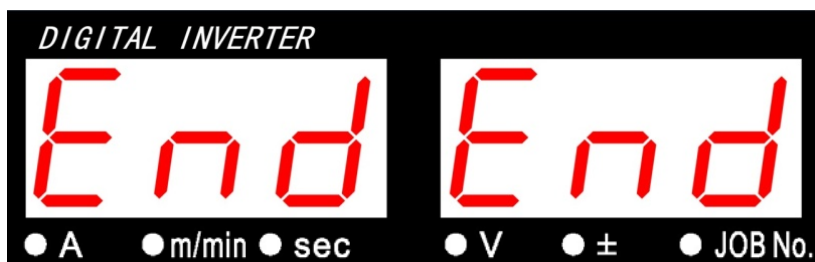
- (3) After pressing the ENTER key[14], “dEL” will be blinking. Confirm the correct number. If the number is wrong, press any key other than the ENTER key to return to step (2) above. To stop the deletion, shut off the power switch.
- (4) Press ENTER key[14] again to delete the memory data corresponding to the specified condition number. After data deletion, “End” will be displayed. Shut off the power switch and then switch on it again.

**Note:** In a deletion mode, the data to be deleted will be erased permanently after pressing the ENTER key twice. Confirm the condition number carefully to be deleted before effecting the deletion.

## 10. OPERATION (Continued)

### 10.2.5 Recovery method for Initial Values

The welding condition being used (including internal functions) can restore to their initial values completely without any effect to the stored welding conditions. To restore the initial values, first turn off the power switch, then press (keep pressing) DISPLAY CHANGE key [7] and GAS CHECK key[10] at the same time, and then turn on the power switch. After power-up and “End” being displayed as shown in the figure below, release the keys, turn off the power switch and then turn it on again.



The status after initialization

See section “14.3 initial value and setting range” about initial values for all parameters and functions.

### 10.2.6 Confirming Software Version

To confirm the software version installed in the power source, keep pressing DISPLAY CHANGE key [7] and turn on the power switch. After power-up, the digital meters will display the current software version number installed.

(example)

Left and right: “P30161” ←Display software number

↓ Press DISPLAY CHANGE key[7] again.

Left: “0 0 1” ←Display major version (Ver. 001)

Right: “0 0 0” ←Display minor version

↓ Press DISPLAY CHANGE key[7] again.


Left: “\_ \_ \_”

Right: “0 0 0” ←Display combination

↓ Press DISPLAY CHANGE key[7] again.

The power supply will start up normally and get ready to performing welding.

## 11. APPLIED FUNCTION

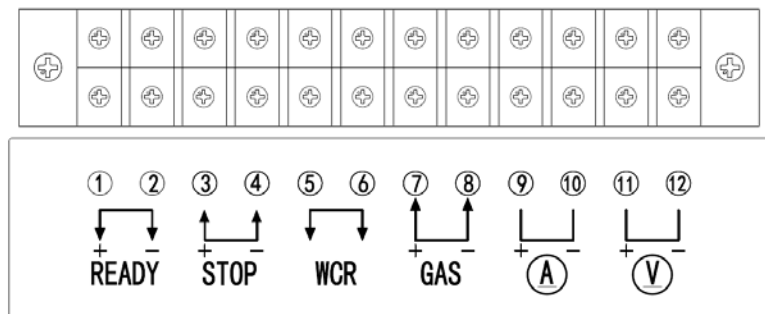
⚠ WARNING	
	Observe the following to prevent electrical shock.
<ul style="list-style-type: none"> <li>● Do not touch charging parts inside or outside the welding power source.</li> <li>● Grounding to the case of the welding power source should be performed by persons qualified electric work and according to the laws and regulations in your area.</li> <li>● 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.</li> </ul>	

⚠ CAUTION	
<ul style="list-style-type: none"> <li>● 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 may be caused by noise, etc., during welding operation.</li> <li>● Do not pull out the wiring on the printed circuit board to outside except the wiring to the external connection terminal block.</li> </ul>	

### 11.1 External Connection of Inside Terminal Block

- Shut off the line disconnect switch and wait for 3 minutes before removing the covering plate to perform operation as required.
- When performing external connection, puncture the back rubber plug before threading.

When taking off the upper cover of the welding power source, you will opening the covering plate of the welding power source, the 12P (TM5) terminal block on the inner partition board is visible as shown in the figure below.



## 11. APPLIED FUNCTION (Continued)

Signals Name and Functions about 10P Terminal Block

Pin No.	Signal Name	Function	
(1) <sup>+</sup> -(2) <sup>-</sup>	READY (output) Welding power source standby	Terminals for standby signal of welding power source. When there is no Open Phase, Operation Stop, Output Over Current or Abnormal Temperature and the power switch is ON, this signal is valid (internal TR breakover).	*1
(3) <sup>+</sup> -(4) <sup>-</sup>	STOP (input) Operation Stop	These terminals are used for Operation Stop. The machine will stop operation when these terminals are open. When Operation Stop (function) becomes effective, the welder will automatically stop operation. To restore normal operation, just shut off the welding torch switch and then close (short-circuit) the terminals. To prevent accidental restoration of "operation stop", use of a self-lock switch (press down to connect and lock, press down again to unlock and disconnect) is recommended.	*2
(5)-(6)	WCR (output) Current Detection	Contact of relay for detection of welding current. When welding current output is available, the contact will close.	*3
(7) <sup>+</sup> -(8) <sup>-</sup>	GAS (input) Open and closing of gas valve	To use this terminal when gas valve open or close through external signal. Open the gas valve when shortcircuit occurs between terminals.	*2
(9) <sup>+</sup> -(10) <sup>-</sup>	Ammeter	Terminals for connecting an ammeter Use the Ammeter (400A/60mV) for CPVE-400. Use the Ammeter (600A/60mV) for CPVE-500.	
(11) <sup>+</sup> -(12) <sup>-</sup>	Voltmeter	Terminals for connecting a voltmeter Use the voltmeter (full scale 100V, part number:4401-016)	*4

● 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 from the terminal blocks do not cross other signal wires from other welding power source.

\*1: The equivalent circuit is as the figure shown below. The 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: The equivalent circuit is shown in the right figure. Connect a contact with a capacity greater than 10mA to between the terminals. (Figure 2)

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

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

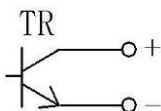


Figure 1

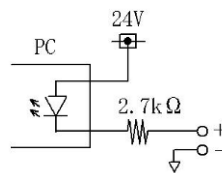


Figure 2

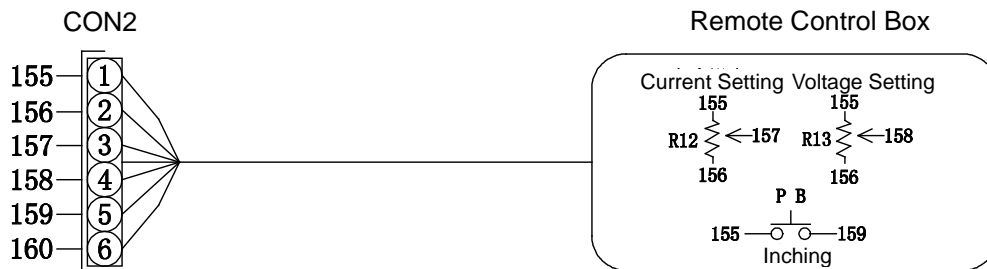
## 11. APPLIED FUNCTION (Continued)

### 11.2 Combining with an Automatic Machine

When combining with an automatic machine, connect the welding power source to an auto-welding machine through external connection using the internal 12P terminal block (TM5), the socket for remote control box and the socket for wire feeder. Refer to section "11.1 External Connection inside Terminal Block" about the 12P terminal block.

#### (1) Setting of current, voltage and inching signals

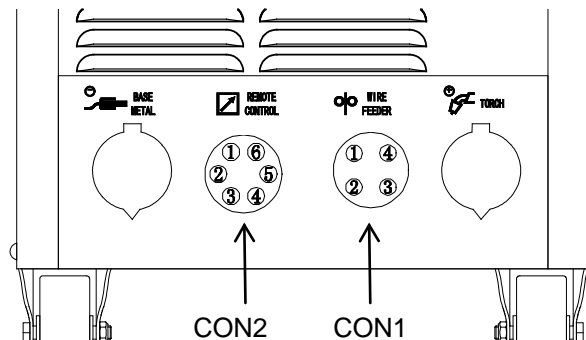
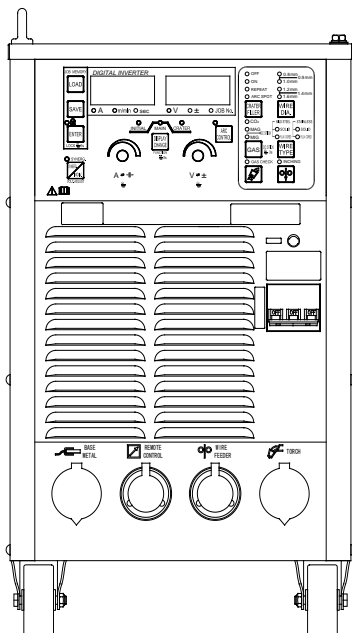
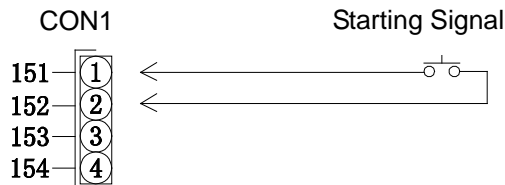
When connecting a self-made remote-control box, use a potentiometer R12 made for setting current, a potentiometer R13 made for setting voltage and the wire feeding switch PB that are specified in "13.1 PARTS LIST". Refer to the figure below for wiring.



In addition, internal function F4 must be set to "1" to switch to "Auto" mode for setting current and voltage by external voltage signal. Refer to "10.2.1 (4) Switch of Auto/Semi-auto Mode" for more details.

#### (2) Starting Signal

Welding is carried out by the start signal when terminals 1 and 2 of CON2 are short-circuited. Welding stops when the terminals are open.



## 11. APPLIED FUNCTION (Continued)

### 11.3 Auto-stop function of blower

Cooling blower can automatically stop 10 minutes after the finishing of welding work and automatically start at next welding work. In addition, when blower is switched on it will begin rotating, but power-saving function will automatically start after 10 minutes of non-operation. And thus, the blower will be stopped.

If you want to cancel this function, please see 「10.2.1(10) F10:Disabling Power Saving Function」

### 11.4 Optional Accessories

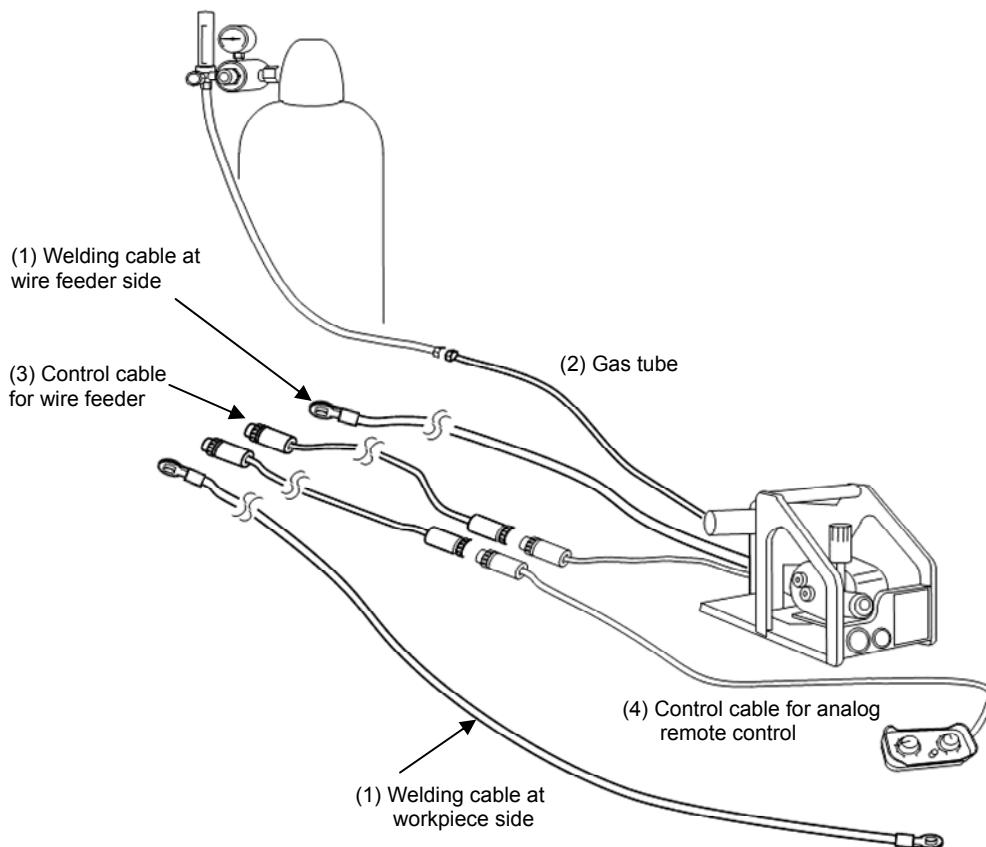
#### 11.4.1 Extension Cables and Extended Gas Tubes

#### ⚠ 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.

- Please select an extension cable at the wire feeder side (optional component) according to the radius of operation.

Our company supplies all kinds of extension cables and gas tubes with different lengths (optional components) for a larger radius of operation. Select them according to the actual radius of operation.





## 11. APPLIED FUNCTION (Continued)

### 1) Welding Cable (common numbers for cable at the wire feeder side or workpiece side)

	Applicable Machine Model	7m	12m	17m	22m	Remarks
Model	CPVE-400	BKPT-5007	BKPT-5012	BKPT-5017	BKPT-5022	Cross sectional area 50mm <sup>2</sup>
	CPVE-500	BKPT-7007	BKPT-7012	BKPT-7017	BKPT-7022	Cross sectional area 70mm <sup>2</sup>

### 2) Gas Tube (for CO<sub>2</sub>/MAG)

	5m	10m	15m	20m	Remarks
Model	BKGG-0605	BKGG-0610	BKGG-0615	BKGG-0620	CM-8201/CMXL-2301

	5m	10m	15m	20m	Remarks
Model	K-5857	K-5858	K-5859	K-5860	CM-6201

### 3) Control Cable for Wire Feeder (4-pin)


	5m	10m	15m	20m	Remarks
Model	BKCPJ-0405	BKCPJ-0410	BKCPJ-0415	BKCPJ-0420	CM-8201/CMXL-2301

	7m	12m	17m	22m	Remarks
Model	BKCPP-0407	BKCPP-0412	BKCPP-0417	BKCPP-0422	CM-6201

### 4) Control Cable for Analog Remote Control (6-pin)

	5m	10m	15m	20m
Model	BKCPJ-0605	BKCPJ-0610	BKCPJ-0615	BKCPJ-0620

#### 11.4.2 MAG Flow meter (for MAG welding)

 <b>WARNING</b>
<ul style="list-style-type: none"> <li>● Use a special MAG gas flow regulator when performing MAG (80% Ar, 20% CO<sub>2</sub>) welding.</li> <li>● Do not disassemble flow meter or touch pressure regulating assembly or pressure adjusting screw, which otherwise may result in serious injuries or accidents. Please refer to the attached service manual of the flow meter for more details.</li> </ul>

#### 11.4.3 Wire Feeder

- Setting internal function F14 to correspond to different wire feeders

Wire feeder model	Maximum wire feeding speed	F14 Number	Remark
CM-8201	22m/min	0	Two round, continuous integrated welder
CMXL-2301	18m/min	1	Two round, continuous integrated welder
CM-6201	22m/min	2	Two round, continuous integrated welder

## 11. APPLIED FUNCTION (Continued)

### 11.4.4 Wire feeding rolls



#### CAUTION

To ensure welding performance, please abide by the following

- Wire feeding roll must match the wire diameter
- If they do not match with each other, electric arc will be unstable

For the wire feeding rolls with the wire feeder, please see wire feeder instruction book.


### 11.4.5 Flow meter of argon gas (for MAG/MIG welding use)





#### WARNING

- Please use dedicated argon gas flow adjuster
- Flow meter of argon gas (Ar) is the professional flow adjuster. Please do not apply to other high pressure gas.
- Please do not disassemble flow meter and move pressure adjusting component and adjusting screw, otherwise serious human injury might be caused. Details please see the attached instruction book.

## 12. MAINTENANCE AND TROUBLESHOOTING

⚠ WARNING	
	To avoid electric shocks, follow the below instructions.
<ul style="list-style-type: none"> <li>● Do not touch the live electrical parts inside or outside the welding machine.</li> <li>● Turn off all of the line disconnect switches before touching the parts inside the welding machine.</li> <li>● Perform the maintenance checks periodically. If any damage parts are found, only use the welding machine after trouble shooting or repairing.</li> <li>● Only certified operators should maintain, inspect, or repair the welding machine.</li> <li>● When carrying out maintenance, wait more than three minutes after powering off all input power supply by turning off the line disconnect switch in the switch box. The capacitor may still have residual voltage even after powering off all input power supply. Make sure that capacitor has discharged completely before carrying out maintenance.</li> <li>● This welding power source adopts a high-frequency inverter system. Be careful of accidental connection of the line disconnect switch at input side.</li> <li>● Have qualified operators or the persons familiar with this welding power source test withstand voltage. And install a protective wall around the welding machine to keep away others from the welding machine.</li> </ul>	

⚠ CAUTION	
	Rotating parts may cause injuries. Be sure to observe the following.
<ul style="list-style-type: none"> <li>● Only certified operators should maintain, inspect, or repair the welding machine.</li> <li>● Install a fence around the welding machine to keep others away from it.</li> <li>● Do not put your hands, fingers, hair and clothes near the fans and wire feed roll rotating.</li> </ul>	

⚠ CAUTION	
	<ul style="list-style-type: none"> <li>● 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.</li> </ul>

⚠ CAUTION	
<ul style="list-style-type: none"> <li>● The welding conditions (electronic information) stored using the JOB MEMORY function are likely to be affected by occurrence of static electricity, and there is a possibility that the preset data contents may be changed or erased. We recommend taking notes of important data.</li> <li>● We shall not assume any responsibility for any change or erase of the electronic information resulting from repair.</li> </ul>	

## 12. MAINTENANCE AND TROUBLESHOOTING (Continued)

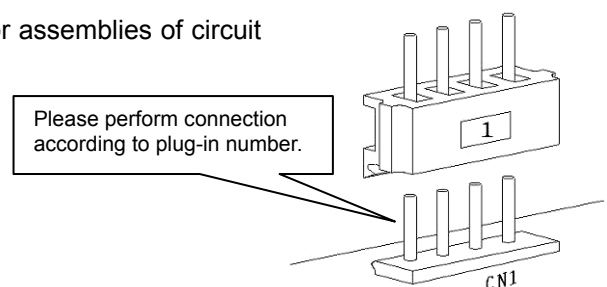
### 12.1 Carrying out Maintenance on the Welding Power Source

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 burning smell are generated from the welding power source.
  - No excessive heat is generated from the cable connections.
  - The cooling fan is running normally after turning on the power switch.
  - The switches properly function.
  - Connections and insulation of cables are surely made.
  - There is no break in cables.
  - Fluctuation of the power source voltage is not large.
  - The grounding cable is surely connected. (Disconnection of the grounding cable may result in failure or malfunction of the equipment.)
- Check the following each three to six months:
  - There is no damage inside the torch.  
Verify there are no aging or damaged parts inside the welding 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.


### 12.2 Precautions for Replacement of the Printed Circuit Board

- 1) To ensure safety, must shut off the power of the distribution box and wait for 3 minutes before any maintenance and overhaul inside the welding power source (the time for the capacity inside the power supply to discharge is about 3 minutes). In addition, this welding power source adopts a high-frequency inverter method and many parts are connected to the input side, so do not turn on the switch at the input side accidentally when performing overhaul.
- 2) Verify that the plug-in numbers printed on the circuit boards are in accordance with those on the bunched wires, and then plug them in place firmly after confirmation. Wrong insertion or connection may damage the circuit boards and even the entire machine.
- 3) Do not turn on the power switch when connector assemblies of circuit boards are pulled out.



## 12. MAINTENANCE AND TROUBLESHOOTING (Continued)

### 12.3 Insulation Resistance Test and Withstanding Voltage Test

<b>⚠ WARNING</b>	
	<b>To avoid electric shocks, observe the following precautions.</b>
<ul style="list-style-type: none"> <li>● <b>Insulation and withstanding voltage test shall be carried out by personnel who have knowledge and skills for the safety operation, and barriers, etc. shall be set up around the welding power source to forbid the access of unnecessary people. Confirm that the capacitance has discharged completely before the operation.</b></li> </ul>	

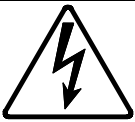
- Perform the insulation and withstanding voltage test as follows.

Refer to the Electric Connection Chart, Parts Configuration Chart and List of Parts for overhaul.

- 1) Remove all ground wires for the housing (wire number 80).
- 2) Pull out the plug-in CN4 on P30110R.
- 3) Short-circuit the AC side and rectifier side of DR1.
- 4) Short-circuit TR1 (3)-(1), (1)-(2), TR2 (3)-(1), (1)-(2)) one by one.
- 5) Short-circuit the positive and negative charges of diode DR2–DR4.
- 6) Short-circuit all input terminals and output terminals.
- 7) Close NF (ON).

Restore all wiring after completion of the test.

### 12.4 How to Solve an Error

<b>⚠ WARNING</b>	
	<b>Observe the following to prevent electrical shock.</b>
<p><b>When touching charging parts, critical electric shock and burn may occur.</b></p> <ul style="list-style-type: none"> <li>● <b>Do not touch live electrical parts inside or outside the welding machine.</b></li> <li>● <b>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.</b></li> <li>● <b>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.</b></li> </ul>	

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.

## 12. MAINTENANCE AND TROUBLESHOOTINGR (Continued)

### 12.4 How to Solve an Error (continued)

No.	Displays		Classification of errors
	Left	Right	
1	E-	000	Operation Stop
2	E-	010	Torch switch off state waiting
3	E-	100	Control power supply error
4	E-	150	Excessive primary input voltage
5	E-	160	Insufficient primary input voltage
6	E-	200	Primary or secondary current detection error
7	E-	210	Error in the output voltage detection
8	E-	220	Error in the inverter feedback
9	E-	300	Thermal overload
10	E-	700	Output over current (error)
11	E-	710	Input Open-phase

1) “E-000” blinking    -Operation Stop –

When the STOP terminals of the 12P terminal block (TM5) for external connection are open, “E-” and “000” in the displays blink and the welding power source stop. To release this error, shut off the power switch and then short-circuit the STOP terminals and then turn on the power switch again.

**Note: When in “auto” mode to release “Operation Stop”, it is only needed to short-circuit terminals to remove this abnormality without turning on the power switch again. Refer to Section “10.2.1 (4) Switch of Auto/Semi-auto Mode” for more details.**

2) “E-010” blinking    -Torch switch off state waiting-

Typically, after turning on the power switch, the machine will switch to an operating state 1 second after the digital meters display “000” and “000”. But if the welding torch switch remains on, the welding power source will hold a halt condition, then “E-” and “010” shown in the displays will blink. To release this error, turn off the welding torch switch, and then normal operation is available.

3) “E-100” blinking    -Control power supply error-

When the control power source has an abnormality, “E-100” in the display will blink, and the welding power source will automatically stop operation. Check the CN9 on the circuit board P30110P and the connecting wire of the auxiliary transformer, and then turn on the power supply again to remove this abnormality.

4) “E-150” blinking    -Excessive Primary Input Voltage –

When an Excessive Primary Input Voltage occurs, “E-150” will be displayed flickeringly, and the welding power source will automatically stop operation. Shut off the power switch, verify the circuit board P30161X is switched the right voltage and verify the three-phase input voltage of the power supply to check eliminate the breakdown, and then turn on the power supply again to remove this abnormality.

## 12. MAINTENANCE AND TROUBLE SHOOTING (Continued)

- 5) "E-160" blinking -Insufficient Primary Input Voltage –

When an Insufficient Primary Input Voltage occurs, "E-160" will be displayed flickeringly, and the welding power source will automatically stop operation. Shut off the power switch, verify the circuit board P30161X is switched the right voltage and verify the three-phase input voltage of the power supply to check eliminate the breakdown, and then turn on the power supply again to remove this abnormality.

- 6) "E-200" blinking - Primary / secondary current detection error –

When the current sensor has an abnormality, "E-200" will be displayed flickeringly, and the welding power source will automatically stop operation. Shut off the power switch, verify good connection of the connector assembly CN2 and CN4 of circuit board P30110P, and then turn on the power supply again to remove this abnormality.

- 7) "E-210" blinking - Voltage Detection error –

When the voltage detection line (+) has an abnormality, "E-210" will be displayed flickeringly, and the welding power source will automatically stop operation.

Shut off the power switch, verify that the signal feedback line connected to the output terminal (+) has no damages and the plug-in CN1 on the circuit board P30110P is tightened, and then turn on the power supply again to remove this abnormality.

- 8) "E-220" blinking - Error in the Inverter Feedback –

When primary current feedback CT1 has an abnormality, "E-220" will be displayed flickeringly, and the welding power source will automatically stop operation.

Shut off the power switch, verify the connector assembly CN3、CN5 of the circuit board P30110P,P30066S and then turn on the power supply again to remove this abnormality.

- 9) "E-300" blinking - Thermal overload –

When the temperature inside the welding power source increases, "E-300" will blink and the welding power source will automatically stop. The power switch shall keep ON at that moment. Wait for 10 minutes while the cooling fan is constantly rotating, and then decrease duty cycle and welding current, shut off the power supply and then start up again; the abnormality will be removed and the machine will switch to a welding state again. If power-on again immediately without cooling for 10 minutes, such repeated operation will cause the welding power source to malfunction, avoid this wrong operation. Refer to "3.1 Rated Duty Cycle" for duty cycle of the welding power source.

- 10) "E-700" blinking - Output Over Current error –

If over-current time exceeds sac or the secondary side has a continuous short-circuit during welding, "E-700" will be displayed flickeringly, and the welding power source will automatically stop operation. When this display appears, verify that welding current does not exceed the rated output current, the contact tip has no contact with the workpiece, and the cable, etc. at the output side has no short-circuit; after eliminating the faults, shut off the power switch and then start up again.

- 11) "E-710" blinking -Input Open-phase –

When primary input open-phase is detected, "E-710" will be displayed flickeringly, and the welding power source will automatically stop operation. When this display appears, verify each phase voltage of the primary input.

## 12. MAINTENANCE AND TROUBLESHOOTING (Continued)

### 12.5 Troubleshooting

When an error code is displayed, refer to Section 12.4 "How to solve an error".

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

No.	Trouble (Phenomenon)		Cause	Solution
1	The Power switch tripping.		<b>Never turn it on again. Contact your dealer.</b>	
2	Indicator for main power supply (PL1) does not light.	After turning on the power switch, the digital meter lights up.	Trouble with PL1.	Inspect PL1.
		When turning on the power switch, the digital meter has no display, and the fan does not rotate.	The line disconnect switch is not turned on.	Inspect the power box.
			The input cables are not surely connected.	Inspect the input cable.
3	When turning on the power switch, nothing appears in the display.	Indicator for main power supply (PL1) not lighting up.	Refer to No.2 in this list.	
		PL1 lights.	Trouble with the power circuit.	After inspecting PCB P30110Q, replace them if necessary.
4	When turning on the power switch, an error code appears in the display.		Refer to "12.4 How to Solve an Error".	
5	No gas flows out after pressing the torch switch.	Still no gas flows out when pressing GAS CHECK key.	The discharge valve on the gas cylinder is closed.	Open the valve.
			Insufficient gas pressure of the gas cylinder.	Check for proper gas pressure.
			Trouble with the gas solenoid valve SOL.	Inspect the gas solenoid valve SOL.
		Gas flows out after pressing GAS CHECK key.	Disconnection of the torch switch cable or incomplete insertion to receptacle.	Check wiring number 151,152.
6	Shielding gas supply does not stop.		The gas check lamp lights up.	Press GAS CHECK key to stop gas check.
			Trouble with the gas solenoid valve SOL.	Check for the operation of the gas solenoid valve (SOL) on the wire feeder.



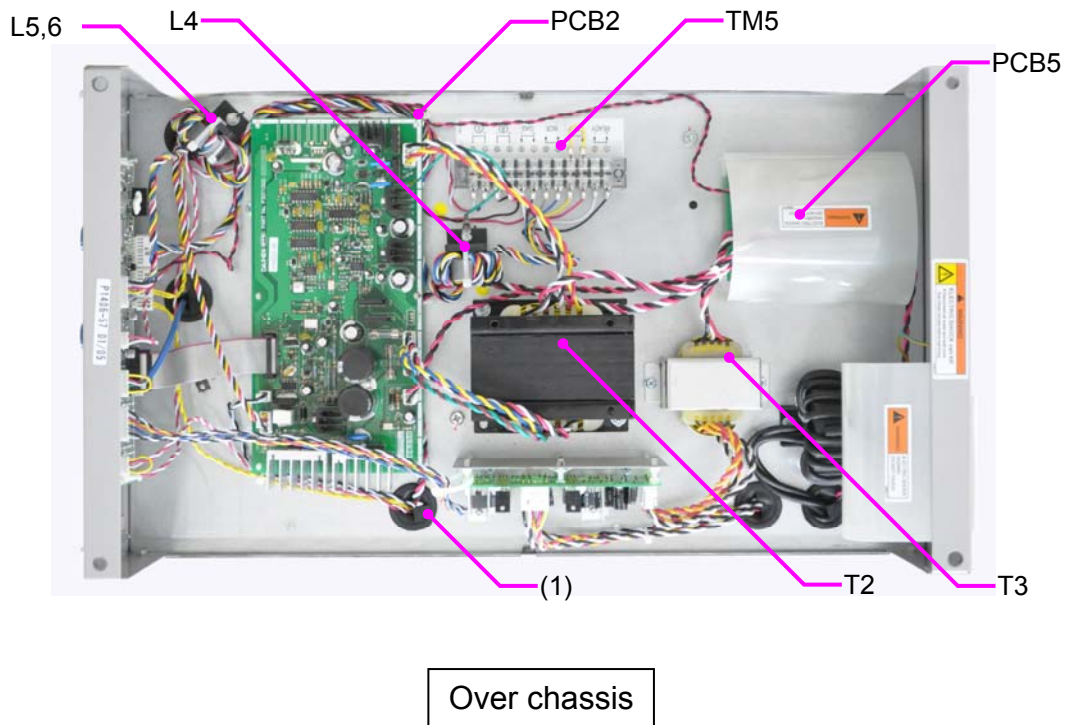
## 12. MAINTENANCE AND TROUBLESHOOTING (Continued)

No.	Trouble (Phenomenon)	Cause of Malfunction and Abnormality	Treatment
7	After pressing the welding torch switch, gas flows out without no-load voltage.	Trouble with the inverter main circuit.	Shut off the power supply and contact your dealer.
		Trouble with the control circuit.	After inspecting P30110P and P30066S, replace it if necessary.
8	Current and voltage can not be set.	Trouble with the control circuit.	After inspecting PCB P30110P, replace it if necessary.
		Trouble with the filter circuit.	After inspecting PCB P30110R, replace it if necessary.
		Trouble with the remote control.	After inspecting the cable and plug for remote control or the remote control, replace them if it necessary.
		Error in voltage detection.	Check the connection for CN5 on circuit board P30110P.
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 P30110Q , replace it if necessary.
		Trouble with the filter circuit.	After inspecting PCB P30110R, replace it if necessary.
10	WCR keeps working.	Trouble with the Hall current detector (CT2).	Inspect the hall current element CT2.
		Trouble with the WCR relay (RY).	After inspecting RY on PCB P30110P, replace it if necessary.
		Trouble with the WCR circuit.	After inspecting PCB P30110P, replace it if necessary.

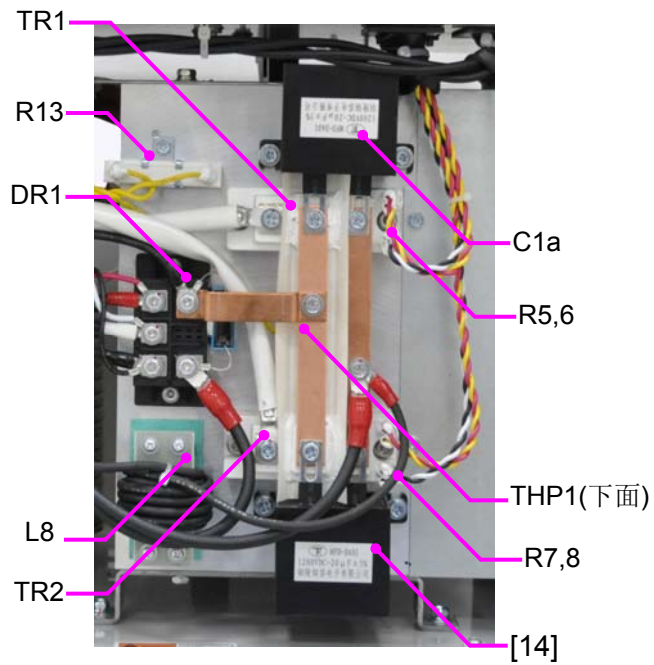
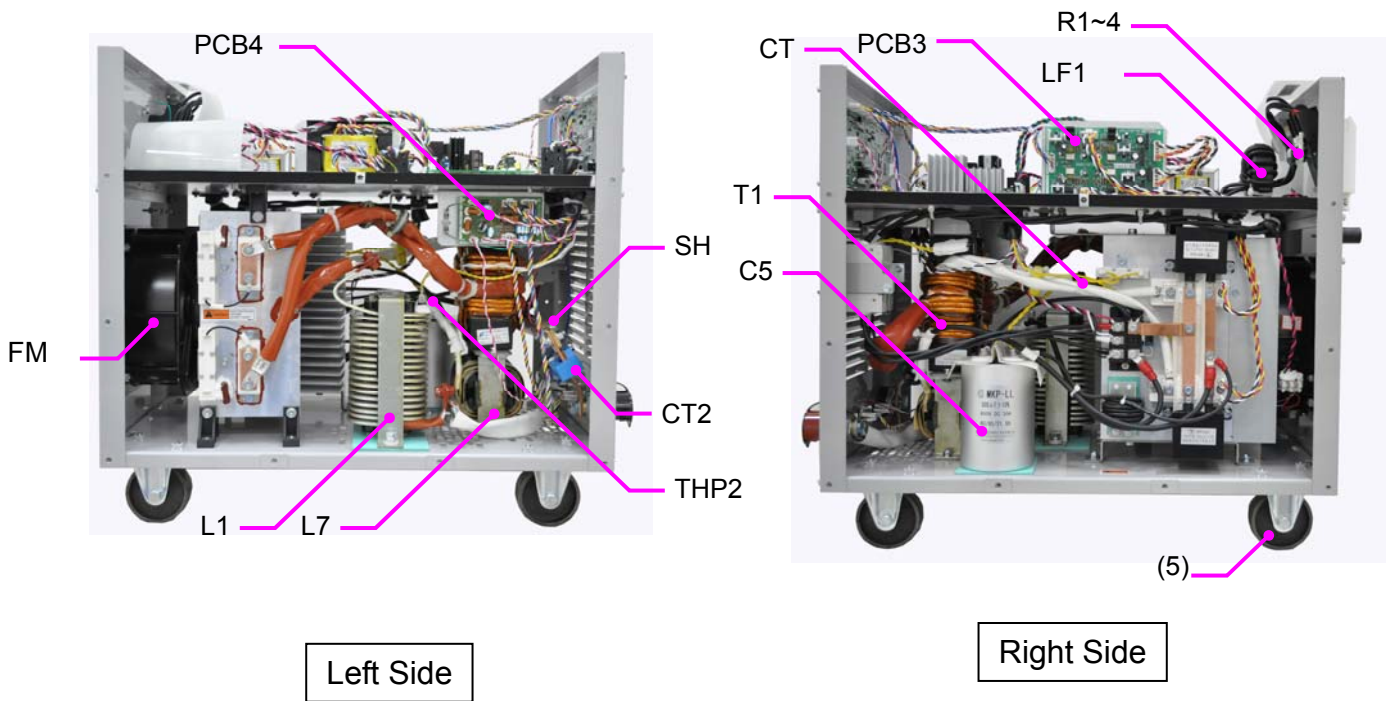


## 12. MAINTENANCE AND TROUBLE SHOOTING (Continued)

### 12.7 Parts Layout

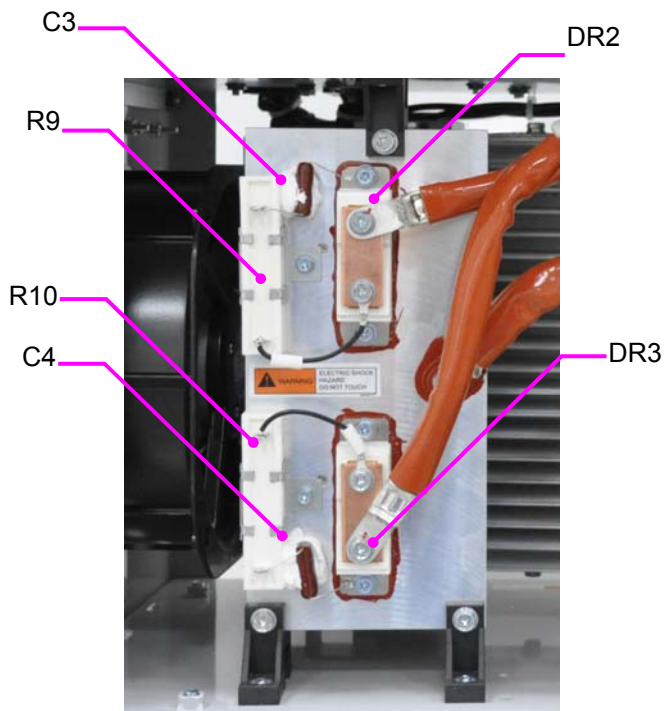


## 12. MAINTENANCE AND TROUBLE SHOOTING (Continued)

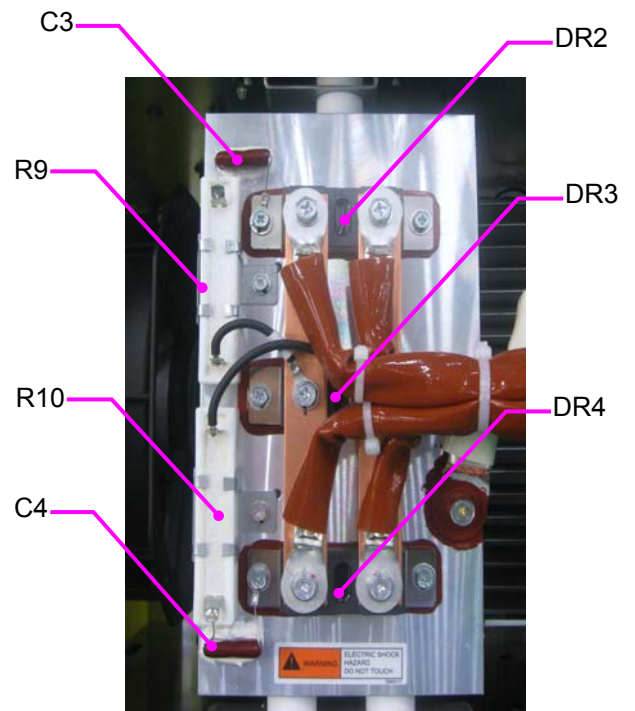


Around TR

## 12. MAINTENANCE AND TROUBLE SHOOTING (Continued)



Around DR(CPVE-400(S-2))



Around DR(CPVE-500(S-2))

## 13. PARTS LIST

### 13.1 Parts List

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

#### 1) Parts list for power source

Symbol	Part No.	Name	Specification	CPVE-400	CPVE-500
				Amount	Amount
NF	100-1286	CIRCUIT PROTECTOR	NDB2-63 D40/3(AC 415V)	1	-
	100-1408	CIRCUIT PROTECTOR	NDB2-63 D50/3(AC 415V)	-	1
LF	P30101H01	LINE FILTER	P30101H01	1	-
	P30102H01	LINE FILTER	P30102H01	-	1
PL1	4600-366	NEON LAMP	N46010A7KW-01	1	1
DR1	100-1393	DIODE MODULE	MDS75-16	1	-
	100-1409	DIODE MODULE	MDS100-16	-	1
DR2~3	100-0666	FRD MODULE	BD150N04FZ	2	-
DR2~4	100-2056	FRD MODULE	MMF300Y060DK1	-	3
TR1,2	100-0667	IGBT MODULE	MMG75SR120B	2	-
	100-2462	IGBT MODULE	BG150B12LY2-I	-	2
CT1	100-0851	CURRENT TRANSFORMER	QW-W00050	1	1
CT2	P30110L04	CURRENT DETECTOR	P30110L04	1	1
SH	100-0938	SHUNT	60mV 400A	1	-
	4403-128	SHUNT	60mV 600A	-	1
FM	100-0933	FAN	200FZY3-S	1	1
	100-0850	FINGER GUARD	QW-W00049B	1	1
C1a,b	100-1953	FILM CAPACITOR	MFD-DA01 DC1200V-20μF	2	2
C2	100-1290	CAPACITOR	CBB80-2000V-473J	1	1
C3,4	100-1396	CAPACITOR	CBB81-2000V-223J	2	2
C5	100-1397	CAPACITOR	MKP-LL 500μF 800V DC 50A	1	1
or C		CAPACITOR	MLC-LL 500μF 800V DC 50A	1	1
C6,7	4517-401	CAPACITOR	CS17-F2GA103MYGSA	2	2
CON1	4730-006	MACHINE SOCKET	DPC25-4BP	1	1
CON2	4730-010	MACHINE SOCKET	DPC25-6BP	1	1
L1	P30161C00	OUTPUT REACTOR	P30161C00	1	-
	P30102C00	OUTPUT REACTOR	P30102C00	-	1
L2	4739-543	FERRITE CORE	E04RA310190100	1	1
L4	4739-497	FERRITE CORE	E04RA400270150	1	1
L7	P30101U00	INPUT REACTOR	P30101U00	1	-
	P30102U00	INPUT REACTOR	P30102U00	-	1
L8	P30161H07	FERRITE CORE	P30161H07	1	-
	P30162H07	FERRITE CORE	P30162H07	-	1
L9	4739-497	FERRITE CORE	E04RA400270150	1	1
L10	4739-543	FERRITE CORE	E04RA310190100	1	-
L11	4739-543	FERRITE CORE	E04RA310190100	1	-
PCB1	P30110P00	PCB	P30110P00	1	1
RY601	4341-206	RELAY	G6A-274P DC24V	1	1
ECD501,502	100-2518	ENCODER	RE1201XE1-H01	2	2
PCB2	P30110Q00	PCB	P30110Q00	1	1
PCB3	P30066S00	PCB	P30066S00	1	1
PCB4	P30110R00	PCB	P30110R00	1	1

### 13. PARTS LIST (Continued)

Symbol	Part No.	Description	Specification	CPVE-400	CPVE-500
				Amount	Amount
PCB5	P30161X00	PCB	P30161X00	1	1
R1~4	100-175	VARISTOR	TND14V-911KB0LLAA0	4	4
R5~8	4508-015	CARBON FILM RESISTOR	CFS1/4CT52A102J	4	4
R9,10	100-0858	CEMENT RESISTOR	RX27N-4V-40W-5.1RJ	2	2
R11	100-0672	CEMENT RESISTOR	RX27-4V-40W-1R-J	1	1
R13	4509-905	RESISTOR	MHR20A513J1	1	1
T1	P30161B00	TRANSFORMER	P30161B00	1	-
	QW-W00152	TRANSFORMER	QW-W00152	-	1
T2	QW-W00149	TRANSFORMER	QW-W00149	1	1
T3	QW-W00095	TRANSFORMER	QW-W00095	1	1
THP1	100-0931	THERMOSTAT	KSD301-PM6-80/3-NC(250# CQC)	1	1
THP2	100-0932	THERMOSTAT	KSD301-PH-110/3-NC(250# CQC)	1	1
TM1	K3904B00	INPUT TERMINAL	K3904B00	1	1
	K3904C00	COVER	K3904C00	1	1
TM2	100-1292	OUTPUT TERMINAL	EDZ95b (R)	1	-
	100-1410		EDZ120b (R)	-	1
TM3	100-1291	OUTPUT TERMINAL	EDZ95b (B)	1	-
	100-1411		EDZ120b (B)	-	1
TM5	100-2057	TERMINAL BLOCK	TB-1512	1	1
(1)	4735-038	KNOB	K-100 22RSB RHOS	2	2
(2)	4735-039	CAP	K-100 22CSBL RHOS	2	2
(3)	W-W03637	GROMMET WITH FILM	W-W03637	5	5
(4)	100-0945	GROMMET WITH FILM	QW-W00016	1	1
(5)	P30161W02	OPERATION PANEL SHEET	P30161W02	1	-
	P30162W02		P30162W02	-	1
(6)	100-1401	WHEEL	151075	4	4
(7)	100-1404	HEX WRENCH	M8	1	1

※ To order printed circuit board P30110P00, provide the software version number printed on the label affixed to the back panel of the welding power source, for example “**P30161 Ver ###.###.000**” or “**P30162 Ver ###.###.000**”.

The relay “RY” for WCR signal is not included in the P30110P00. Take it off and mount on a new printed circuit board.

#### 2) Parts List for analog remote control

Symbol	Part No.	Description	Specification	Amount	Remark
R20,21	4501-039	Variable Resistor	RV24YN20SB 5 kΩ	2	
PB	4250-077	Push button witch	A2A-4R	1	
S1	100-1412	Toggle Switch	T8013-SLBQ-H+U	1	
	4735-013	Knob	K2195 (M)	2	
	4730-009	Socket	DPC25-6A	1	
	3361-665	Screw	N-3 M5 L=10(Black)	2	

## 14. SPECIFICATIONS

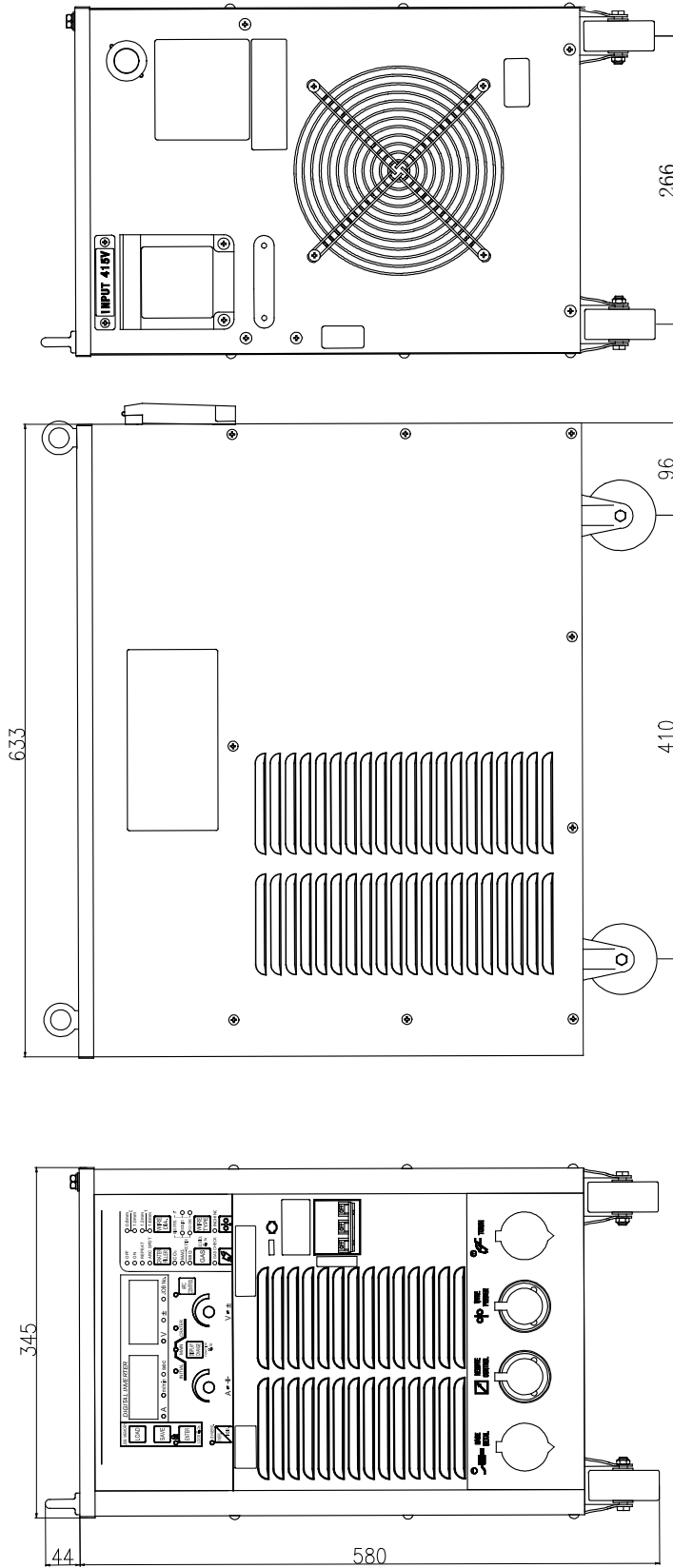
### 14.1 Specifications

Product Name	CPVE-400		CPVE-500	
Number of phases	3		3	
Rated frequency	50/60Hz		50/60Hz	
Rated input voltage	380V	415V	380V	415V
Input voltage range	380V / 415V±10%		380V / 415V±10%	
Rated input	16.8kVA 15.4kW	17.4kVA 15.6kW	23.9kVA 22.1kW	24.3kVA 22.4kW
Rated input current	25.5A	24.1A	36.2A	33.8A
Rated output current	400A		500A	
Rated load voltage	34V		39V	
Output current range	30–400A		30-500A	
Output voltage range	12–38V		12-45V	
Rated no-load voltage	72V	78V	70V	76V
Rated duty cycle	60%		100%	
Storage (memory) number for welding conditions	30		30	
Insulation level	Class H		Class H	
Operating temperature range	-10–40°C		-10–40°C	
Operating humidity range	20–80% (no condensation)		20–80% (no condensation)	
Storage Temperature range	-10–60°C		-10–60°C	
Storage humidity range	20–80% (no condensation)		20–80% (no condensation)	
External dimensions (WxDxH)	345 x 633 x 580 (mm)		345 x 633 x 580 (mm)	
Mass	54kg		60kg	
IP CODE	IP21S		IP21S	



## 14. SPECIFICATIONS (Continued)

### 14.2 External View



## 14. SPECIFICATIONS (Continued)

### 14.3 Initial Value and Setting Range

#### ● Initial Value and Setting Range of Parameters

		Initial value	Setting range	
			CPVE-400(S-2)	CPVE-500(S-2)
·Initial condition ·Main welding condition ·Crater-fill condition	Current	100 A	30–450A	30-550A
	Voltage	19 V	12–45V	12-50V
	Fine adjustment of voltage	0	-30–30	
ARC Spot Time		3 sec.	0.1–10 sec.	
ARC CHARACTERISTICS		0	-99–99	
Memory Number for Welding Condition		1	1–30	

#### ● Function

	Initial Value	Setting Item	
		CPVE-400(S-2)	CPVE-500(S-2)
Crater Filler	OFF	OFF / ON / REPEAT / ARC SPOT	
Shielding gas	CO <sub>2</sub>	CO <sub>2</sub> /MAG/MIG/DC STICK	
Wire Type	MILD STEEL SOLID	MILD STEEL SOLID / FLUX CORED STAINLESS SOLID / FLUX CORED	
Wire Diameter	1.2	0.8/0.9/1.0/1.2	0.8/0.9/1.0/1.2/1.4/1.6
Initial Current	OFF	ON / OFF	
Welding Voltage Adjustment	INDIVIDUAL	SYNERGIC / INDIVIDUAL	

#### ● Internal Function refer to section “10.2.1 Setting of Internal Function” for more details-

F	Function	Initial value	Setting range
F1	Fine adjustment of anti-stick(burnback) time	0	-50 (0.50 sec. decrement) –50 (0.50 sec. incremental)
F2	Fine adjustment of anti-stick(burnback) voltage	0.0	-9.9–9.9 V
F3	Fine adjustment of slow wire feed	0.0	-1.0–1.0 m/min.
F4	Switch of Auto/Semi-automatic mode	0	0 (semi-auto mode)/ 1(auto1)/ 2(auto2)
F5	External command 10 V MAX	OFF	ON(valid) / OFF(invalid)
F6	Setting of up-slope time	0.0	0–10.0 sec.
F7	Setting of down-slope time	0.0	0–10.0 sec.
F8	Setting of Result display holding time	20	0–60 sec.
F9	-	-	-
F10	Disabling Power saving function	OFF	ON (valid) / OFF (invalid)
F11	Setting of fine adjustment for welding condition memory	OFF	ON (valid) / OFF (invalid)
F12	Setting of soft arc mode	OFF	ON (valid) / OFF (invalid)
F13	Setting of CONSTANT PENETRATION	OFF	ON (valid) / OFF (invalid)
F14	Switch of Wire feeding machine selection	0	0: CM-8201(22m/min) 1: CMXL-2301(18m/min) 2: CM-6201(22m/min)
F15	INITIAL CONDITION setting	OFF	ON (valid) / OFF (invalid)
F16	Gas pre-flow time	0.1	0 – 10 sec
F17	Gas post-flow time	0.4	0 – 10 sec



## 14. SPECIFICATIONS (Continued)

### ● Quick manual

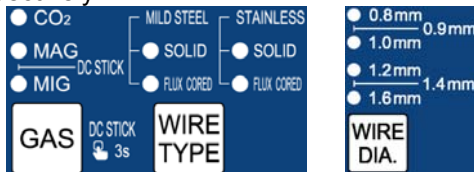
Refer to Section 10.1 “Basic Settings” and Section 10.2 “Applied setting” for detailed setting.

#### Before Using the Welding Power Source

##### 1. Settings of Welding Method

Select shielding gas by GAS select key, and push and hold down GAS select key for a few seconds to switch to the DC STICK mode.

Select wire type and wire diameter by WIRE TYPE select key and WIRE DIA. select key respectively.



##### 2. Setting of Crater Fill and ARC SPOT



Select “OFF”, “ON”, “REPEAT” or “ARC SPOT” mode by CRATER FILLER key.

##### 3. Setting of Welding Voltage



Set “INDIV.” by SYNERG key when carry out welding voltage adjustment with individual.

SYNERGIC: SYNERGIC lamp is on.  
INDIVIDUAL: SYNERGIC lamp is off

##### 4. Setting of Parameter

Select the parameter to be set by DISPLAY CHANGE key, and then set a parameter value by a parameter setting knob.



#### Note:

- Turn the knob to the right to increase value, or to the left to decrease value. In addition, faster rotational speed will make the increment or decrement (each span) larger.
- After setting “2” “3”, some functions may not be selected. Refer to Chapter “10. Operation” for more details.



To adjust the desired arc characteristic (HARD/SOFT), after pressing the ARC CONTROL key, and then set the level of the arc characteristic by turning the parameter adjusting knob.

##### 5. Gas Check



Open the gas valve on the gas cylinder, and then press the GAS CHECK key to confirm gas flow. After confirmation, press GAS CHECK key again to stop gas supply.

##### 6. Inching



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.

#### Key Lock and Unlock



● Lock  
Just long press ENTER key to switch to a lock state with the LED to the upper left of ENTER key blinking.

● Unlock  
Just long press ENTER key again to release the lock state with the LED extinguished.

## 14. SPECIFICATIONS (Continued)

### Storage of Welding Condition

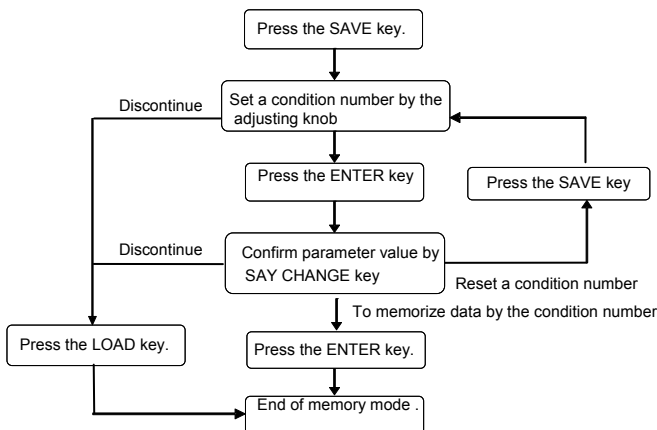


1) Press the SAVE key to switch to a memory mode. The right display meter will display a condition number and the left display meter will display the welding current stored by the condition number.

2) Use the condition adjusting knob to set a condition number. "--" displayed by the left display meter indicates the condition number is empty. If other identifier is displayed, it indicates that old data will be overwritten when new data is stored.

3) Press the ENTER key to confirm each parameter value stored by the condition number specified.

4) Press the ENTER key again to store the current welding condition to the specified condition number.



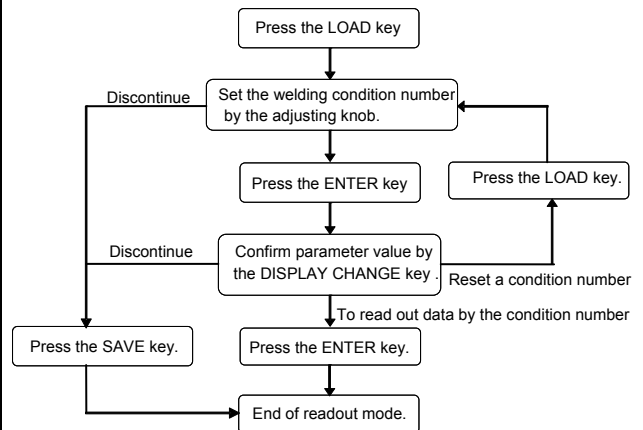
### Loading the Welding Condition

1) Press LOAD key to enter the load mode. The right display meter will display a condition number and the left display meter will display the welding current of the condition number.

2) Use the parameter adjusting knob to set a desired condition number. If the left display meter displays "--", it indicates the condition number is empty.

3) Press the ENTER key to confirm each parameter value of the welding condition.

4) Press the ENTER key again and the memory data will be read out.



### Setting of Function (internal function)

1) Hold down the DISPLAY CHANGE key for a few second to enter function mode. Then the left display meter will display a function number, and the right display meter will display the function status of the function number.

2) Select a function number by turning the CURRENT adjusting knob to set a function number.

3) Set a status of the function by turning the VOLTAGE adjusting knob.

4) Hold down the DISPLAY CHANGE key again to exit the "function mode".

### List of Abnormality Code

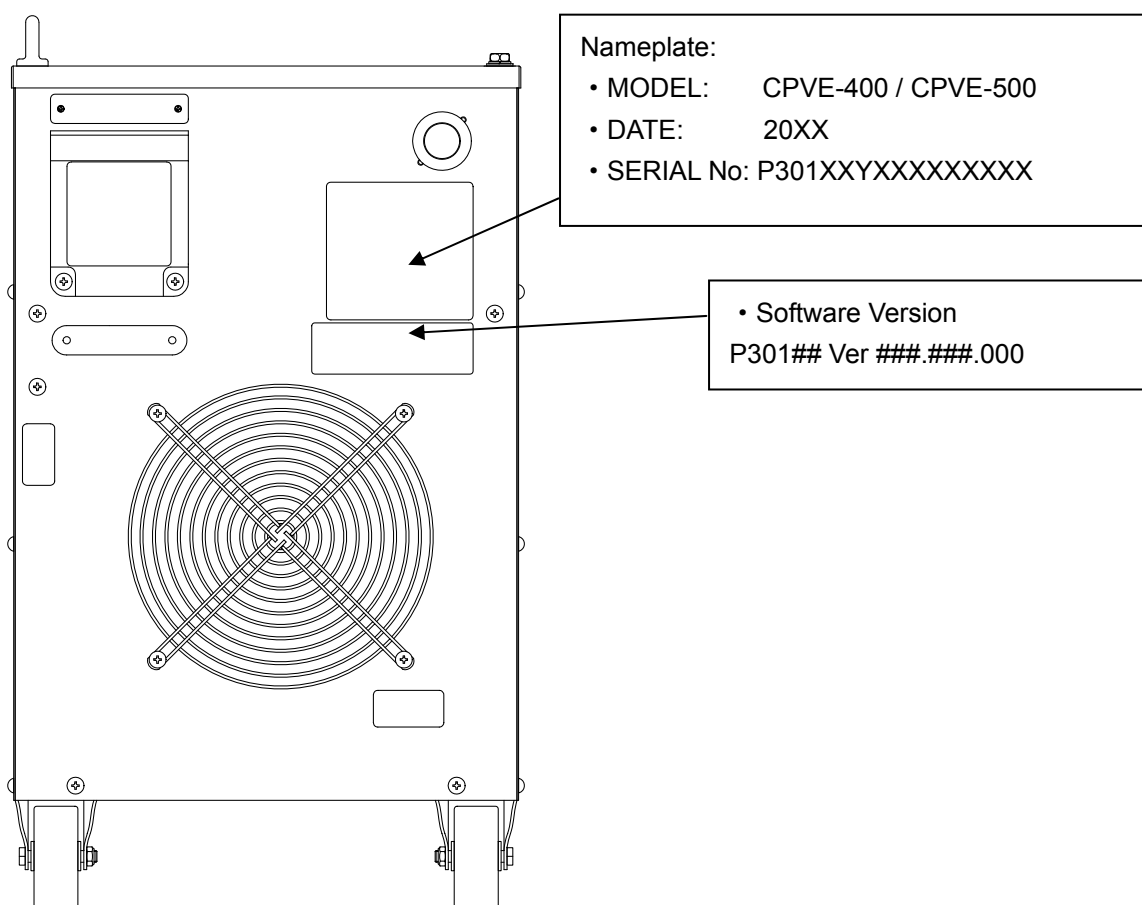
N o.	Digital Meter		Classification of Abnormality
	Left	Right	
1	E-	000	Operation Stop
2	E-	010	Torch switch off state waiting
3	E-	100	Control power supply error
4	E-	150	Excessive Primary Input Voltage
5	E-	160	Insufficient Primary Input Voltage
6	E-	200	Primary / secondary current detection error
7	E-	210	Voltage Detection error
8	E-	220	Inverter Feedback error
9	E-	300	Thermal overload
10	E-	700	Output Over Current error
11	E-	710	Input Open-phase

## 15. SERVICE AND SUPPORT

Please contact your dealer for service. (See the back cover for telephone number, fax number, and mailing address.)

### Note:

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





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