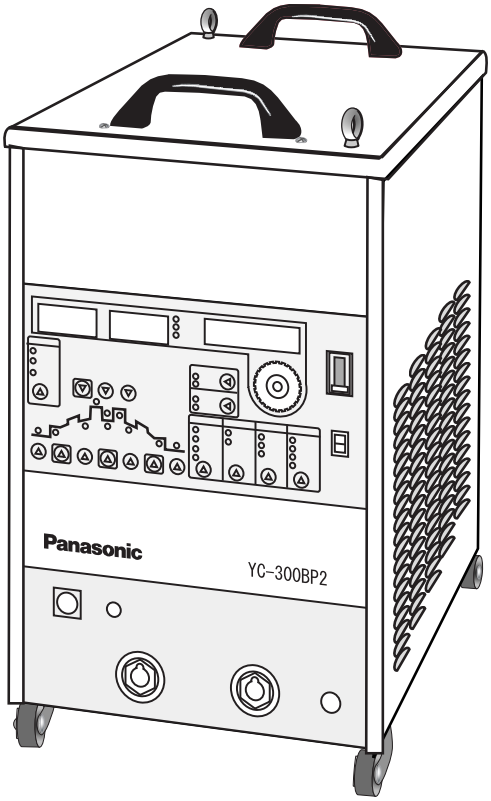
Panasonic®

Operating Instructions

Inverter TIG welding power source

Model No. **YC-300BP2YAF**



Fully digital controlled power source

Before operating this product, please read the instructions carefully and save this manual for future use.

- First of all, please read “Safety precautions” or “Safety manual.”

OMCTT5639E09

2011

♦Introduction

- This product is useful up to 400Hz in AC TIG frequency.
- It is easy to use even with multiple functions incorporated.
  (a) “Simple touch panel”
  (b) “Digital display”
  (c) “LCD display screen”
- As it is fully digitalized, it has the excellent reproducibility of welding conditions.
- It can store and reproduce up to 50 different welding conditions in total.
- Using an external connecting unit (option) enables it to call its stored conditions more easily.
- An IT system can also be introduced into your welding site by enhancing communication facilities.
  (a) It can be connected to the controller “G2” of our industrial robot “Panasonic robots VR2 series”.
  (b) It can also be connected to other various open networks*.
  *: Networks constructed by using standard protocols, such as TCP/IP, etc.
- Compact and lightweight / mass: 51kg (69% of our conventional machine)

♦Caution for your safety

Read and understand this manual before installing, operating or servicing this product.
This equipment and instructions 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.
The wiring and grounding should be done by educated and/or skilled person.

♦Signal Words and Safety Symbols

Signal Words		Safety Symbols (Examples)	
⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.		Indicates a prohibited action.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.		Indicates a mandatory action.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor injury or property damage.		Indicates a hazard alert.

♦Disclaimer

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- Any problem arising out of any Force Majeure, including but not limited to, act of God.
- Any malfunction or defect of this Product that is directly or indirectly the result of any malfunction or defect of one or more related parts or products that are not supplied by PSFS. Or any problem arising out of, or directly or indirectly attributable to, the combination of this Product with any other product, equipment, devices or software that is not supplied by PSFS.
- Any problem arising out of, or directly or indirectly attributable to, user’s failure to strictly carry out or follow all of the conditions and instructions contained in this instruction manual, or user’s misusage, mishandle, operational miss or abnormal operation.
- Any problem arising out of this Product or the use of it, the cause of which is other than the foregoing but is also not attributable to PSFS.
- Any claim of a third party that this Product infringes the intellectual property rights of such third party that are directly or indirectly caused by User’s use of this Product and relate to the method of production.

ANY LOST PROFITS OR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH OR ARISING FROM ANY MALFUNCTION, DEFECT OR OTHER PROBLEM OF THIS PRODUCT.

- This operating instructions manual is based on the information as of November, 2020.
- The information in this operating instructions manual is subject to change without notice.
- English version is the original instructions.

♦Cautions about electromagnetic disturbance

(1) Extra precaution may be required when welding power source is used in a domestic establishment.

(2) Before installing welding equipment, the user shall make an assessment of potential Electromagnetic problems in the surrounding area as below.
   (a) Other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;
   (b) Radio and television transmitters and receivers;
   (c) Computer and other control equipment;
   (d) Safety critical equipment, e.g. guarding of industrial equipment;
   (e) The health of the people around, e.g. the use of the pacemaker and hearing aids;
   (f) Equipment used for calibration or measurement;
   (g) The immunity of other equipment in the environment; the user shall ensure that other equipment being used in the environment is compatible; this may require additional protection measures;
   (h) The time of day that welding or other activities are to be carried out.

(3) The user shall be observe to reduce emission disturbance as below.
   (a) Welding equipment should be connected to mains supply according to the manufacture's recommendations.
   (b) Welding equipment should be routinely maintained according to the manufacture's recommendations.
   (c) The welding cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.
   (d) Confirm to connection of all metallic component in the welding installation and adjacent to it should be considered for safety.
   (e) The work-piece should be connected to earth for electric safety.
   (f) Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of entire welding installation may be considered for special applications.

(4) The user should take the responsibility with respect to interference from welding.

♦About “Turkish RoHS Regulation”

EEE Yönetmeliğine Uygundur.	EEE Complies with Directive of Turkey.

♦About “Ukrainian RoHS Regulation”

English	Declaration of Conformity with the requirements of Technical Regulation on the Restriction Of the use of certain Hazardous Substances in Electrical and Electronic Equipment (adopted by Order №1057 of Cabinet of Ministers of Ukraine) The Product is in conformity with the requirements of Technical Regulation on the Restriction Of the use of certain Hazardous Substances in electrical and electronic equipment (TR on RoHS). The content of hazardous substance with the exemption of the applications listed in the Annex №2 of TR on RoHS: 1. Lead (Pb) - not over 0,1wt % or 1000wt ppm; 2. Cadmium (Cd) - not over 0,01wt % or 100wt ppm; 3. Mercury (Hg) - not over 0,1wt % or 1000wt ppm; 4. Hexavalent chromium (Cr6+) - not over 0,1wt % or 1000wt ppm; 5. Polybrominated biphenyls (PBBs) - not over 0,1wt % or 1000wt ppm; 6. Polybrominated diphenyl ethers (PBDEs) - not over 0,1wt % or 1000wt ppm.
Ukrainian	Декларація про Відповідність Вимогам Технічного Регламенту Обмеження Використання деяких Небезпечних Речовин в електричному та електронному обладнанні (затвердженого Постановою №1057 Кабінету Міністрів України) Виріб відповідає вимогам Технічного Регламенту Обмеження Використання деяких Небезпечних Речовин в електричному та електронному обладнанні (ТР ОВНР). Вміст небезпечних речовин у випадках, не обумовлених в Додатку №2 ТР ОВНР, : 1. свинець(Pb) – не перевищує 0,1wt % ваги речовини або в концентрації до 1000 частин на мільйон; 2. кадмій (Cd)– не перевищує 0,01wt % ваги речовини або в концентрації до 100 частин на мільйон; 3. ртуть(Hg) – не перевищує 0,1wt % ваги речовини або в концентрації до 1000 частин на мільйон; 4. шестивалентний хром (Cr6+) – не перевищує 0,1wt % ваги речовини або в концентрації до 1000 частин на мільйон; 5. полібромбіфеноли (PBB) – не перевищує 0,1% ваги речовини або в концентрації до 1000 частин на мільйон; 6. полібромдефенілові ефіри (PBDE) – не перевищує 0,1wt % ваги речовини або в концентрації до 1000 частин на мільйон.
Russian	Декларация о Соответствии Требованиям Технического Регламента об Ограничении Использования некоторых Вредных Веществ в электрическом и электронном оборудовании (утверждённого Постановлением №1057 Кабинета Министров Украины) Изделие соответствует требованиям Технического Регламента об Ограничении Использования некоторых Вредных Веществ в электрическом и электронном оборудовании (ТР ОИВВ). Содержание вредных веществ в случаях, не предусмотренных Дополнением №2 ТР ОИВВ: 1. свинец (Pb) – не превышает 0,1wt % веса вещества или в концентрации до 1000 миллионных частей; 2. кадмий (Cd) – не превышает 0,01wt % веса вещества или в концентрации до 100 миллионных частей; 3. ртуть (Hg) – не превышает 0,1wt % веса вещества или в концентрации до 1000 миллионных частей; 4. шестивалентный хром (Cr6+)– не превышает 0,1wt % веса вещества или в концентрации до 1000 миллионных частей; 5. полибромбифенолы (PBB) – не превышает 0,1wt % веса вещества или в концентрации до 1000 миллионных частей; 6. полибромдифеноловые эфиры (PBDE) – не превышает 0,1wt % веса вещества или в концентрации до 1000 миллионных частей.

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1. About safety

♦Safety symbols

1.1 Safety precautions

⚠	WARNINGS

Welding power source

⚠	Observe the following instructions to prevent the hazard.

(1) Never use the welding power source for other than welding purpose. (e.g. Never attempt to use the welding power source for pipe thawing.)
(2) It is very important to comply with all instructions, safety warnings, cautions and notes mentioned. Failure to do so can result in serious injury or even death.
(3) Work of driving source at the input side, selecting work site, handling, storage and piping of high pressure gas, storage of welded products and also disposal of waste should be performed according to the operating instruction and national, state and local codes and regulations.
(4) Prevent any unauthorized personnel to enter in and around the welding work area.
(5) Only educated and/or skilled persons who well understand this welding power source should install, operate, maintain and repair the unit.
(6) Never use filtering devices to cover vents of power source. Filters will restrict airflow and can cause unit to overheat. Use of filter voids warranty.

Against electric shock

⚠	Observe the following instructions to prevent the hazard.

(1) Grounding of the case of the welding power and base metal or a jig electrically connected to the base metal must be performed by educated and/or skilled persons.
(2) Before installation or maintenance work, turn off power at the power box, wait it for at least five minutes to discharge capacitors. Significant voltage may exist on capacitors after turning off power at the power box so it is imperative to check to make sure that no charged voltage present at capacitors before touching any parts.
(3) Do not use undersized, worn, damaged or bare wired cables.
(4) Connect cables completely and insulate connection parts.
(5) Keep all cases, panels and covers securely in place.
(6) Do not handle the welding power source with torn or wet gloves.
(7) Wear safety harness in case of working above floor level.
(8) Perform periodic checks without fail and repair or replace any damaged parts before using the power source.
(9) Turn off all equipment when not in use.
(10) In case of AC arc welding in a confined area or above floor level, check related national, state and local codes and regulations for any special treatment and comply with it if any.

Electromagnetic disturbance

⚠	Observe the following instructions to prevent the electromagnetic disturbance due to weld current or high frequency at arc start.

(1) Pacemaker wearers should consult their doctor before going near arc welding. Magnetic fields can affect pacemakers.
(2) Peripheral electronics or safety device may cause electromagnetic disturbance. Ground all of such devices without fail. Provide an electromagnetic shielding if necessary.
(3) Weld cable should be as short as possible and also lay it as near to the floor or ground as possible if not on.
(4) Never provide grounding of base metal and welding machine in common.
(5) Do not operate the torch switch if not necessary.

Ventilation and protective equipment

	Oxygen deficit, fume and gas generated during welding can be hazardous.

(1) When conducting welding in the bottom of the tank, boiler or hold as well as legally-defined sites, use a local exhauster specified by the applicable laws and regulations (occupational safety and health regulation, rules on preventing suffocation or etc.) or wear protective breathing gear.
(2) To prevent dust injury or poisoning by the fume generated during welding, use a local exhauster specified by the applicable law (occupational safety and health regulation, rules on preventing injury by inhaled dust or etc.), or wear protective breathing gear.
If a protective breathing gear is used, it is recommended to use one with an electric fan with high protection performance.
(3) When conducting welding in a confined area, make sure to provide sufficient ventilation or wear protective breathing gear and have a trained supervisor observe the workers.
(4) Do not conduct welding at a site where degreasing, cleaning or spraying is performed. Conducting welding near the area where any of these types of work is performed can generate toxic gases.
(5) When welding a coated steel plate, provide sufficient ventilation or wear protective breathing gear. (Welding of coated steel plates generates toxic fume and gas.)

Against fire, explosion or blowout

Observe the following cautions to prevent fires explosion or blowout.

(1) Remove any combustible materials at and near the work site to prevent them from being exposed to the spatter. If they cannot be relocated, cover them with a fireproofing cover.
(2) Do not conduct welding near combustible gases.
Do not place the welding power source near combustible gases, otherwise, such gases may catch fire from a spark of electricity inside the welding power source as it is electric equipment.
(3) Do not bring the hot base metal near combustible materials immediately after welding.
(4) When welding a ceiling, floor or wall, remove all flammables including ones located in hidden places.
(5) Wire the cables correctly and connect them tightly. Insulate the connected parts surely so that no exposed conductive part touches the cases or housings. (Poor cable connection or incomplete current path on the base metal side, such as steel, if any, can cause fire due to the heat generated by energization.)
(6) Connect the base metal cable as close to the welding position as possible. (If not, unexpected current path may be created, which can cause fire due to the heat generated by energization.)

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CAUTIONS

Installing shielding (curtain etc.)

Arc flash, flying spatter, slugs, and noise generated during welding can damage your eyes, skin and hearing.

(1) Install a protective curtain around the welding manipulator site to prevent the arc flash from entering the eyes of people in the surrounding area.
(2) When welding or monitoring welding, wear safety glasses with sufficient light blocking performance or use a protective mask designed for welding operation.
(3) When welding or monitoring welding wear protective closes designed for welding operation, such as leather gloves, leg cover and leather apron, and also wear long-sleeve shirts.
(4) Be sure to wear noise-proof protective equipment if the noise level is high.

Gas cylinder and gas flow regulator

Overturn of gas cylinder and blowout of gas flow regulator can cause injury.

(1) The gas cylinder must be handled properly according to the applicable law and in-house standards.
(2) Use the gas flow regulator that is supplied or recommended by our company.
(3) Read the instruction manual of the gas regulator prior to using it, observe the cautions in the manual
(4) Secure the gas cylinder to a dedicated gas cylinder stand.
(5) Do not expose the gas cylinder to high temperature.
(6) When opening the valve of the gas cylinder, do not bring your face close to the discharge outlet.
(7) When the gas cylinder is not used, be sure to install a protective cap.
(8) Do not hang the welding torch on the gas cylinder, or touch the gas cylinder with the electrode.

Rotating parts

Rotating parts can cause injury.

(1) Keep away from rotating parts such as cooling fans, feed roller of the wire feeder, or hand, finger(s) hair or part of your clothes may be caught by the parts resulting in injury.
(2) Keep all covers, panels and cases closed when using the product.
(3) Maintenance work and repair should be perform only by educated and/or skilled persons who thoroughly understand welding machines. While performing maintenance or repair work, provide fence or the like around the welding machine so that unauthorized person can not come close carelessly.

Welding wire

Welding wire, especially wire tip part can cause injury.

(1) Wire extends out from the end of the welding torch and may stick into the eye, face or body.
(2) Do not perform inching operation or pull the torch switch with your eyes, face or body close to the end of the welding torch - wire may stick into your eye, face or body.

Against insulation deterioration

Insulation deterioration can cause fire of welding power source.

(1) Keep enough distance from welding power source when performing welding or grinding work so as to prevent such spatters or iron particles from getting into the power source.
(2) Perform check and maintenance work periodically so as to prevent insulation deterioration due to accumulated dust or dirt.
(3) When spatters or iron particles get into the welding power source, turn off the power switches of the welding power source and power distribution box, and then blow out.

2. Rated Specifications

Rated input voltage			V	200
Number of Phase				3
Rated frequency			Hz	50/60
Rated input				11kVA, 8.8kW
Efficiency			%	73
Idle state power consumption			W	62
Rated output current			A	DC 300, AC 300
Rated output voltage			V	DC 22, AC 22
Duty cycle			%	40
Output, initial and crater current(See Note)	DC TIG		A	4 - 300
	AC TIG	Standard	A	10 - 300
		Hard	A	20 - 300
		Soft	A	10 - 200
	MIX TIG		A	10 - 300
Maximum non-load voltage			V	DC 65
Up slope time			s	0 - 10 (Increment: 0.1)
Down slope time			s	0 - 10 (Increment: 0.1s)
Pre-flow time			s	0 - 10 (Increment: 0.1s)
Post-flow time			s	0 - 30 (Increment: 0.1s)
(AC TIG) AC frequency			Hz	50 - 400 (STD: 70) (50 - 200Hz: In increments of 1Hz) (200 - 400Hz: In increments of 10Hz)
(MIX TIG) MIX frequency			Hz	0.5 - 10 (STD: 1.0)(In increment of 0.1Hz.)
(MIX TIG) DC ratio			%	10 - 90 (STD: 30)(In increments of 5%)
Pulse frequency			Hz	0.8 - 500 (0.8 - 9.9Hz: In increments of 0.1Hz) (10 - 99Hz: In increments of 1Hz) (100 - 500Hz: In increments of 10Hz)
Pulse width			%	5 - 95
AC balance adjustable welding method				ACTIG, MIXTIG
AC balance			%	EP 10 - 50 (Standard: 30)(Increment: 1%)
Arc spot time			s	0.1 - 5(Increment: 0.1s)
Control system				IGBT inverter method
Crater control system				Selectable from crater control “ON”. “OFF” or “Repeat”
High-frequency-wave generating equipment				High frequency arc start type
Communication function				RS-232C, RS-422
Memory function				50ch storage and reproduction
Robot interface function				Enables communication with Panasonic robot controllers.
Cooling system				Forced air-cooling
Type of insulation				Class H
Dimension (Width: W x Depth: D x Height: H)			mm	380 x 510 x 656
Mass			kg	59
Protection grade				IP21S
Classification for RF emission tests				Class A
List of equivalent				-

Note

- As arc is stable in the low current range, select an appropriate welding condition.
- In the case of AC TIG or MIX TIG, when AC frequency is increased, the rated output current may not be available due to the voltage drop caused by the impedance (AC resistance) of the output-side cable. However, this is not the error of this product.

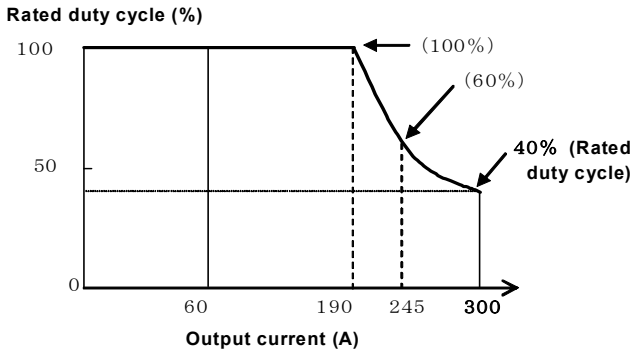
2.1 Standard accessories

Name	Part number	Q'ty	Remarks
Glass tube fuse (3A)	BET3.15A	1	Rear fuse (Fu1): Rush-resistant
Gas hose	CWG30101	1	TBV6X11, 3m
Fingertip joint	MET00001	1	For output (base material side) cables: Plug side
Hose band	WHB12	1	For gas regulator

2.2 Duty cycle

Do not use this product at any usage rate over the rated duty cycle.

- The rated duty cycle for this product is 40%.
- Using this product at any usage rate over the rated rate of use may cause the increase of equipment temperature over the permissible maximum, and result in the deterioration or burnout of the equipment.
- Set the output current (A) at the pulse welding to an average value between the pulse current and the welding current.
- When using the product in combination with other devices, such as the welding torch, etc., use it at the lowest rated rate of use in those devices

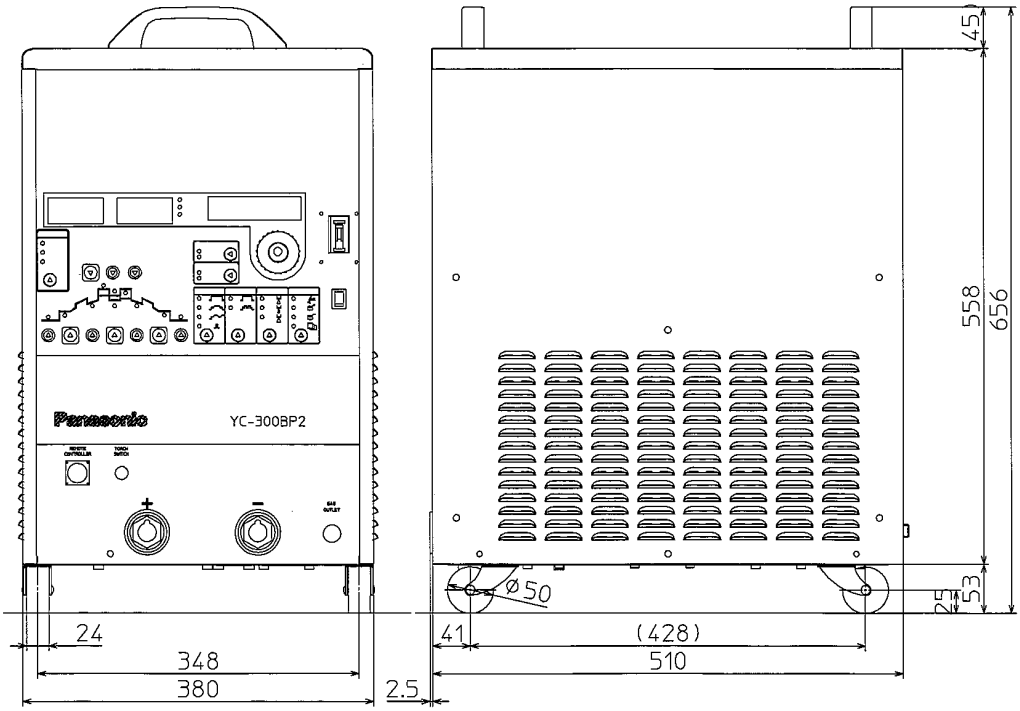


- "The duty cycle is 40% at the rated output" means for 40 percent of the ten-minute period (4 minutes), the power source can maintain operation with the rated welding output without overheating. The remaining six minutes must be operated at no-load to allow proper cooling.
  Calculation formula:
  (4 minutes/10 minutes) x 100% = 40%
- When using any output current different from the rated output current, obtain the permissible rate of use from the following calculation formula.
- (The rated output current of this product: 300 A)
- Allowable duty cycle (%) =

$$\left(\frac{\text{Rated output current}}{\text{Actual output current}}\right)^2 \times \text{Rated duty cycle (\%)}$$

For your reference
Duty cycle: he percentage ratio of loading time to full time. A cycle of the full time shall be 10 minutes. **Rated duty cycle:** means the rate of use when loading the rated output current intermittently at the rated input voltage of the rated frequency. Regarding the engine-driven welding power unit, however, it means when driving it at the rated number of revolution.

2.2.1 Dimensions



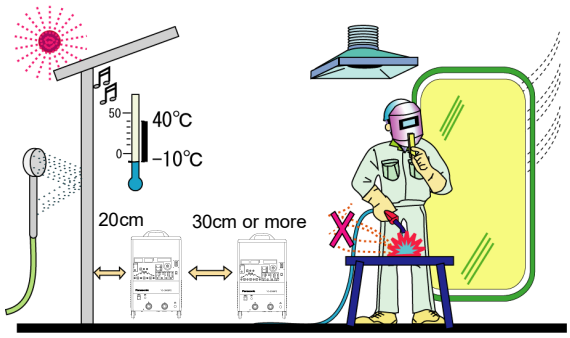
3. Installation

3.1 Installation siter

CAUTION	**This product is designed for indoor use only.** Do not install it in any places subject to rain or water spray.

CAUTION	**Do not use this product in a vertical position** (i.e.: with its control panel side up). Using it in the vertical position may reduce its cooling effect, and cause any troubles like equipment burnout, etc. Therefore, make sure to use it in the horizontal position (in the proper position).

(1) Locate indoors only in industrial environment area.
(2) Avoid exposure to the direct sun light or the rain or water spray.
(3) Range of temperature of the ambient air:
  (a) during welding:10 to 40 deg-C,
  (b) after transport and storage:-20 to 55 deg-C
(4) Humid:
  (a) up to 50% at 40deg-C,
  (b) up to 90% at 20deg-C
(5) Altitude above sea level: up to 1000 m.
(6) Installing distance to maintain adequate airflow:
  (a) 20 cm or more from any wall,
  (b) 30 cm or more between power sources installed side-by-side.
(7) Base of the welding power source inclined:max. 10deg.
(8) Avoid wind to the arc (provide windshields.)
(9) Free from abnormal amounts of dust, acid, corrosive gases or substances etc. other than those generated by the welding process (Especially, avoid where the metallic substance may get into the power source.)



Note
When the product, which is installed on the floor, is too low to operate, customers are required to prepare a table to mount it. (And, in that case, provide such a table with a flange, etc. so that the product does not slip down from the table.)

3.2 Power supply equipment

CAUTION	Observe the following to prevent burnout, destruction of parts and unstable arc.

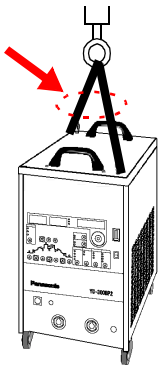
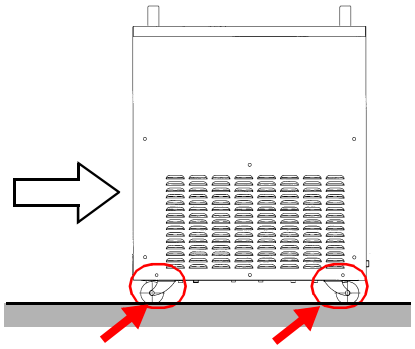
Input voltage	200 VAC
Input current	32 A
Input protective devices (Breaker, fuse etc.)	Type and capacity to be applied should conform to all national and local codes.
Cable cross section area for input cable and ground wire	Type and size of cables to be applied should conform to all national and local codes.

Note
- This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There can be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radiated radio-frequency disturbances.
- This equipment does not comply with IEC 61000-3-12. If it is connected to a public low voltage system, it is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator, that the equipment may be connected.

3.3 Transportation

		**Do not use the handles to hang the product.** • Hanging with the handles, which is unstable, may cause an accident. • When hanging this product by using a crane, etc., make sure to use the eyebolts.

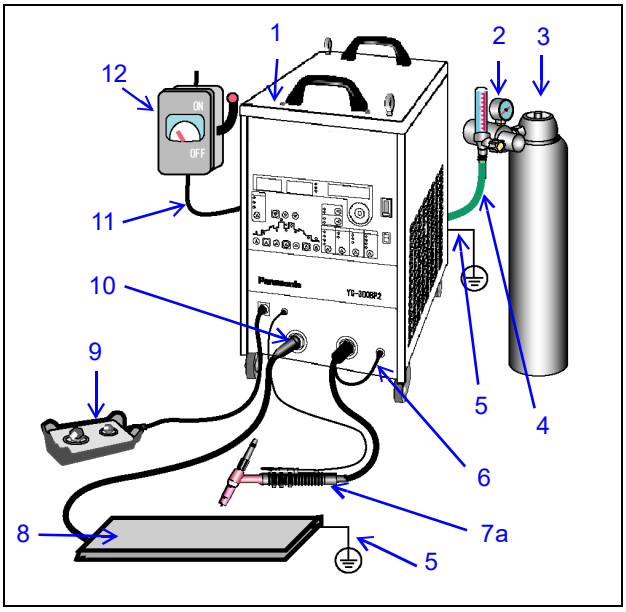
		**Do not lift the product on your own.** • As this product is so heavy (mass: 51kg), it is dangerous to lift it on your own. • Involve plural number of persons with its lifting. • When putting this product down, do not cause a shock to it.

When hanging it for transportation	When pushing it for transportation
Make sure to hang it at 2 points. 	As this product is provided with wheels (not universal wheels.) in the front and rear of its bottom, you can push it for its transportation. 

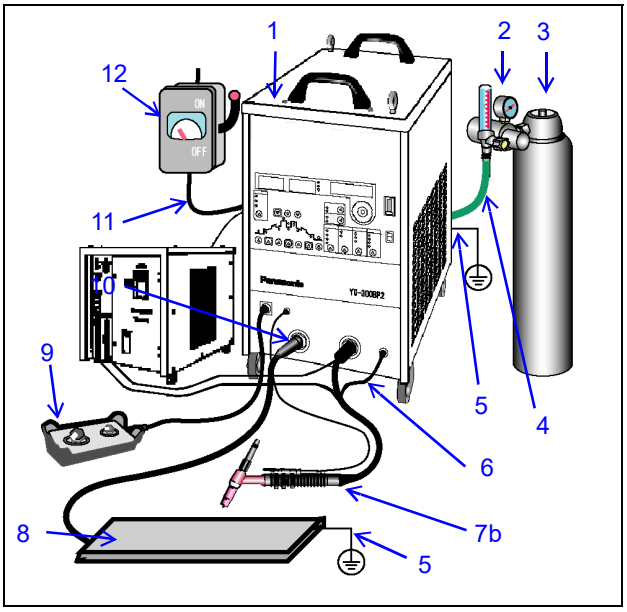
3.4 Configuration

- Customers are required to prepare the items other than marked as “This product” or “Accessory”.
- The items marked with “*” are available as peripheral equipment (optional items), with separate sales. (See section “Peripheral equipment”).
- Cable for the base metal side:
  To prevent overheat of the cable and provide with proper welding, prepare a cable which is a welding cable or cabtire cable (excluding the class-1 cabtire cable and vinyl cabtire cable) of 38mm2 or more.

3.4.1 When using the special air-cooling torch



3.4.2 When using the special water-cooling torch



No.	Item	Remarks
(Common)		
1	Welding power source	This product
2	Argon gas regulator	
3	Argon gas	
4	Gas hose	Accessory
5	Grounding wire	
6	Gas hose*1	
7a	Air-cooling TIG welding torch*2	
7b	Water-cooling TIG welding torch*2	
8	Base metal	
9	Remote controller	
10	Fingertip joint*3	Accessory
11	Input power cable	
12	Distribution box	

No.	Item	Remarks
(For water-cooling torch)		
13	Supply water hose	Accessory of cooling water unit.
14	Return water hose	
15	Flow-rate switch cable	
16	Cooling water unit and cooling water*4	

*1 The gas hose lead-out point of the air-cooling TIG welding torch is different from that of the water-cooling TIG welding torch.

*2 In the case of arc spot welding, use the special arc spot nozzle.

*3 Connect it to the output cable of the base metal.

*4 Do not put the cooling water system on top of the welding power unit.

3.5 Peripheral equipment (Optional items)

3.5.1 TIG Welding torch

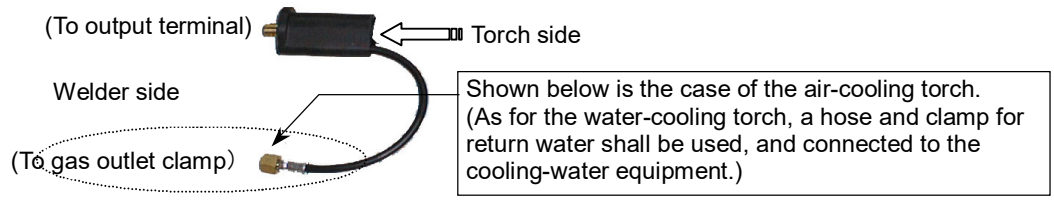
(1) Special torch (Fingertip joint)

Air-cooling 200A torch	Water-cooling 300A torch
YT-20TS1TAG (4 m)	YT-30TSW1TAG (4 m)
YT-20TS1TAH (8 m)	YT-30TSW1TAH (8 m)

(2) Type-1.8 TIG welding torch

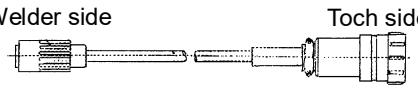
You are required to purchase the torch connection adapter separately.

TIG welding torch (Non-fingertip joint)	Torch connection adapter	
	Product number	Descriptions (See also Fig.1)
YT-08TS1, YT-088T YT-12TS1, TP1, YT-128T(P) YT-15TS1, TP1, YT-158T(P)	YX-151AJ1J1	[Replacement cable clamp]TJM00046 [Control cable assembly]TWX00018
YT-20TS1, YT-208T	YX-201AJ1	[Replacement cable clamp]TJM00038 [Control cable assembly]TWX00018
YT-20TSW1 YT-30TSW1,TPW1 YT-208TW,TPW YT-308TW,TPW	YX-301A J1	[Replacement cable clamp]TJM00041 [Control cable assembly]TWX00018



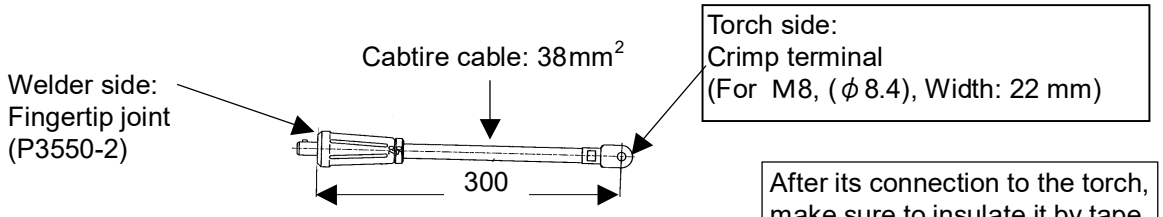
Remove the torch cable clamp, and connect it to the torch side as shown in the above figure. (The welder side uses a fingertip joint, and the torch side uses a screw-type clamp.)

<Fig. 1 Replacement cable clamp>



<Fig.2 Control cable assembly (TWX00018)>

(3) When using any TIG welding torch other than those described in the above items (1) and (2):
You are required to purchase the terminal adapter (CWC00180: See the figure shown below) and the control cable assembly (TWX00018: See the upper right figure) separately. (Quantity: one each)



<Fig.3> Terminal adaptor (CWC0018)

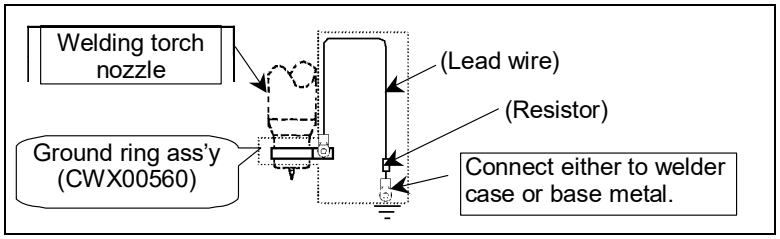
3.5.2 Ground ring assembly (CWX00560)

In case of an insufficient arc start, you can install this ground ring to improve it.

How to install the ground ring assembly

As for its initial installation, consult with our CS center.
(An installation error may cause damage to the torch, or make it impossible to improve an insufficient arc start.)

(For details, see the instruction manual supplied with the ground ring assembly.)



3.5.3. Extension cable (Made to order)

- Use an extension cable when the welding torch cable is not long enough. (It is connected between the welding torch and this product.)
  * It is not possible to connect extension cables each other because of their structure. (Use one extension cable only.
- To use an extension cable, you are required to purchase the terminal adapter (CWC00180) and the control cable assembly (TWX00018) separately. (Quantity: one each) (See Fig.2, Fig.3)

Note
As the output terminal of this product employs a fingertip joint, the extension cable, which employs a bolt-fixing terminal, cannot be connected to this product without using a terminal adapter.
Also, as the torch switch outlet of the extension cable is different in type from the outlet of this product, it cannot be connected to this product without using a control cable assembly.

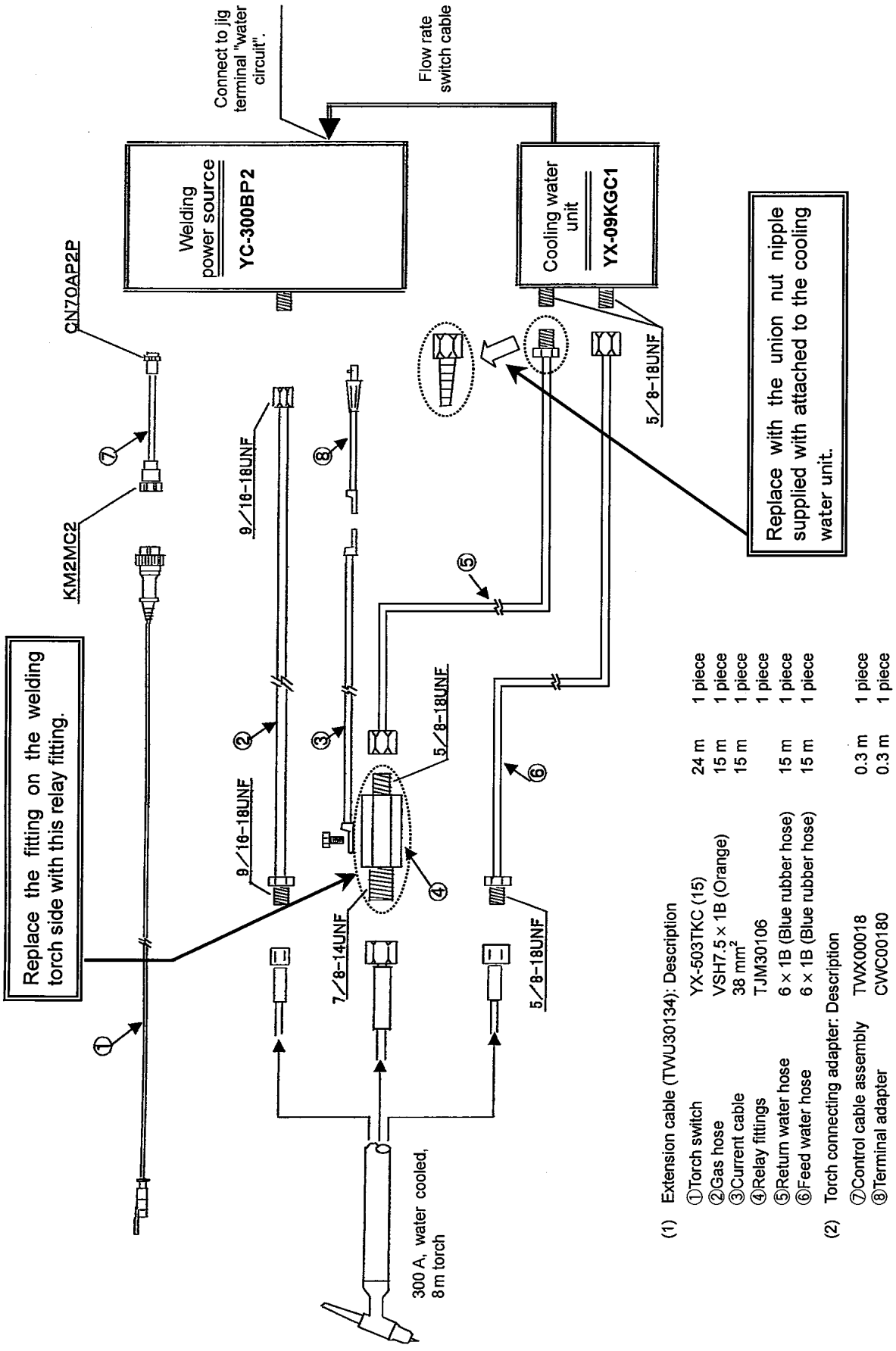
- When connecting the special torch to an extension cable, remove the replacement cable clamp (Fig.1) attached to the welding machine side of the special torch. (Remove the rubber cover of the replacement cable clamp, and the screw appears. Remove that screw, and the replacement cable clamp comes off.)

Note
The torch connection side of the extension cable employs a screw connection. As the special torch with the replacement cable clamp removed also employs a screw connection, it can be connected with the extension cable

Applicable torches		Extension cable length		
		5 m	10 m	15 m
Air-cooling	YT-15TS1 YT-15TS1C1	TWU15125	TWU15126	TWU15127
	YT-20TS1TAG*1 YT-20TS1TAH*1 YT-20TS1 YT-20TS1C1 YT-208T YT-208TC1	TWU20131	TWU20132	TWU20133
Water-cooling	YT-30TSW1TAG*1 YT-30TSW1TAH*1 YT-30TSW1 YT-30TSW1C1 YT-208TW YT-208TWC1 YT-308TW YT-308TWC1	TWU30132	TWU30133	TWU30134*2

*1: Special torch
*2: Refer to the "Example of extension cable connection" on the next page.

<Example of extension cable connection>



(1) Extension cable (TWU30134): Description

①Torch switch	YX-503TKC (15)	24 m	1 piece
②Gas hose	VSH7.5 × 1B (Orange)	15 m	1 piece
③Current cable	38 mm^2	15 m	1 piece
④Relay fittings	TJM30106		1 piece
⑤Return water hose	6 × 1B (Blue rubber hose)	15 m	1 piece
⑥Feed water hose	6 × 1B (Blue rubber hose)	15 m	1 piece

(2) Torch connecting adapter: Description

⑦Control cable assembly	TWX00018	0.3 m	1 piece
⑧Terminal adapter	CWC00180	0.3 m	1 piece

3.5.4 Argon gas regulator (YX-251A)

- The maximum flow rate is 25L/min.

3.5.5 Cooling water unit and cooling water

(1) Cooling water unit (with built-in flow-rate switch)

Note **Cooling water unit** (Product number: YX-09KGC1)

- No flow-rate switch is incorporated in this welding power unit.
- When using a water-cooling torch, use the cooling-water system with a flow-rate switch incorporated to prevent the torch from burnout.
- Connect the cable of the flow-rate switch to the “water circulation path” terminal of the jig terminal block within this welding power unit.

(2) Cooling water
Use our genuine cooling-water (Pana-coolant K), which keeps its quality for a long time.
Product number: CWU00098
(Service temperature: -20 to +90 deg-C)

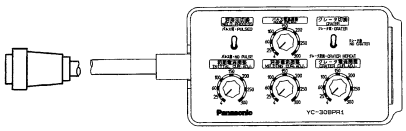
3.5.6 Potentiometer-type remote control unit (YC-30BPR1,YC-30BMR1)

Note **TIG welding remote control unit**

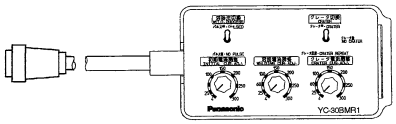
The conventional YC-301URTRK1 cannot be used. (Due to the difference in connectors and signal lines)

(1) The remote control unit enables you to set the presence, absence or repeat of the crater control and the presence or absence of the pulse control, and to adjust the initial current, welding current, crater current and pulse current (Only YC-30BPR1) at a distance. (Cable length: 5 m)

YC-30BPR1



YC-30BMR1



* After connection of the remote control unit, such setting and adjustment can be done via the remote control unit only.

(2) To have a current value displayed when adjusting each current, switch the LCD display to the screen of each current item. Then, the current value of each item appears on the set-value display.
* Details: See chapter 6 (Name and function of each part) and chapter 9 (Operation).
* It is also possible to make the adjustment of each current without switching the LCD display to the screen of each current item. (In that case, however, no current value appears on the set-value display.)

(3) As the analog input is employed for the input of current values from the remote control unit, current values appearing on the set-value display may vary by about plus or minus 1A. (It becomes stable if you change the position of a potentiometer slightly.)

3.5.7 External equipment connection unit (YX-CB009)

- This connection unit enables this welding power source to change over the pages of stored welding conditions by connecting with external equipment (sequencer).
- The sequencer is not included in this welding power unit and the attachment unit.
- When using this connection unit: See”Connection: Connecting to external equipment connection unit”

Note

Observe the followings to prevent troubles caused by the incorporation of high frequency waves.

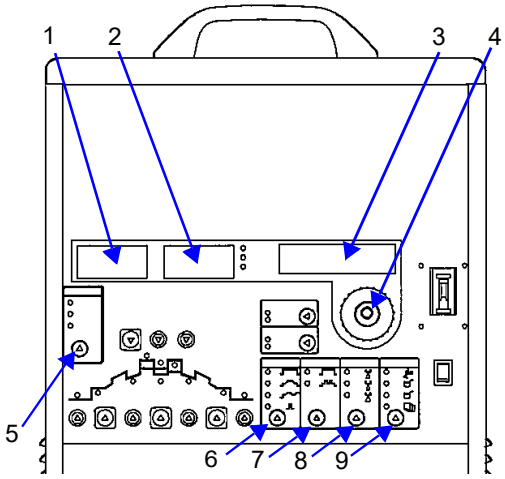
- Keep the signal line connected to the external-equipment attachment unit away from the welding arc area, welding torch, base-material-side cable, base-material grounding wire, power input line, grounding wire, etc.
- The length of wiring shall be 10m or shorter.
- Make sure to connect the grounding wire of this welding power unit to the ground.

4. Names and Functions

4.1 Front panel

4.1.1 Data display/setting section and welding conditions selecting section

For details of functions, see “Welding conditions” in this chapter.”



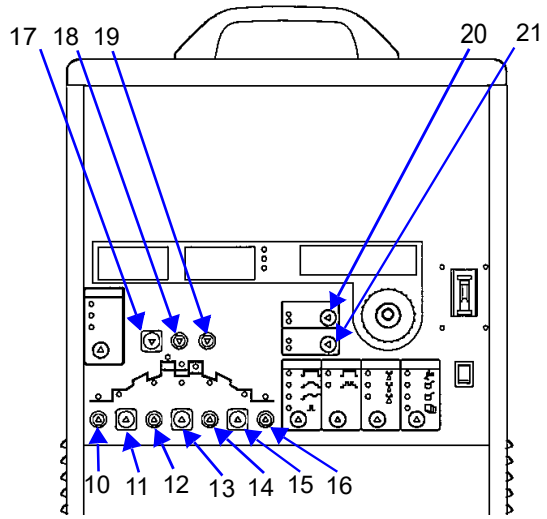
1	**Digital ammeter** • Indicates welding current values during the welding. (Displays an average current value measured during the period of 0.4 second in amperes.) Due to a rounding error, a resulting value may vary within the range of plus or minus 1A. As this ammeter is designed to display an average current value measured during the period of 0.4 second, it may not be able to follow the variation of current quickly enough when the current changes frequently during the pulse welding, etc. • Indicates an “Err” (error) mark in case of a trouble.
2	**Set-value display** • Indicates the set values*1 of current (A), time (S), frequency (Hz), pulse width (%), AC balance (%), DC ratio (%), welding voltage (V)*2, etc. • The unit display lamp changes according to the type of indicated set values. • Indicates an “Err” (error) number in case of a trouble.
3	**LCD display** • This is the information display area. • Indicates condition-setting items in letters. • Indicates error contents in letters in case of a trouble.
4	**Jog dial** • This is a dial to carry out the function of a potentiometer (setup of current and time). For example, to set welding current to 125A, turn the dial to the right (increase) or to the left (decrease) until such a value is indicated (on the set-value display). Note: Turning the jog dial without discretion may result in the change of a set value for the item currently indicated on the LCD display. • Use the press button function of the jog dial in the following situation. In the reproduction, storage or details mode (See item 9 in the right column.)
5	**“Weld conditions” selection button** Selects a required welding method (DC TIG, AC TIG or MIX TIG).
6	**“Crater control” selection button** Regarding the selected welding method, selects the “absence, presence or repeat” of the crater control, as well as the “spot” (arc spot welding). The arc spot welding can be done only in the case of “DC TIG” and “AC TIG” welding.
7	**“Pulse” selection button** Regarding the selected welding method, selects the absence or presence” of pulses.
8	**“AC waveform” selection button** In case the AC welding method is selected, selects an AC waveform (standard, hard or soft).
9	**“Mote” selection button** Selects an operation “mode” of this product (welding, reproduction, storage, or details). Welding: Can be used to set welding conditions and conduct a welding operation. Reproduction: Can be used to reproduce stored welding conditions. Storage: Can be used to store the present welding condition. Details: Can be used to change the factory-set mode of this product.

*1: In the case of a welding voltage, indicates the welding voltage (between output terminals of this product) during the welding operation rather than the set value.

*2: See section “Operation” for how to display welding voltage.

4.1.2 Welding conditions setting buttons section

For details of the function of each button, see section “Welding conditions” or “Operation”.



When the “mode” selection is set to “welding”, the display lamp of the welding-condition setting button section turns on according to the set details of the welding-condition selecting section In other words, the display lamp for sections, to which welding conditions are required to be set, is turned on.]

The display lamp indicated above (indicated within __) normally remains turned on. When pressing a button corresponding to the display lamp, which is turned on, that display lamp starts flashing, the LCD display indicates the name of that item, and the set-value display indicates a set current value. (By turning the jog dial at this point, the set value can be changed.)

Note

Do not turn the jog dial without discretion. (Doing so may result in the change of the present set value.)
The above operation also applies to the welding mode. (If the display lamp is flashing, a set value can be changed even during the welding operation. When there is no need to do so, press the jog dial, and the display lamp is turned on. Then, it becomes impossible to change the set value by means of the jog dial. Therefore, it serves the prevention of an operation error.)

10	**Pre-flow:** Sets the time required until the output voltage is turned on (i.e. arc start) after the torch switch is turned on. Make sure to set it so that the shield gas covers the welding area before the start of arc.
11	**Initial current:** Sets the current required for starting the welding. The initial current can be used only when the “crater control” is set to “presence” or “repeat”.
12	**Up-slope:** Sets the time required to increase the welding current gradually to the set value after the initial current. The up-slope can be used only when the “crater control” is set to “presence” or “repeat”.
13	**Welding current:** Sets the welding current.
14	**Down-slope / spot time** **Down-slope:** Sets the time required for decreasing the welding current gradually and having the crater current started after the self-holding is turned off. The down-slope can be used only when the “crater control” is set to “presence” or “repeat. **Spot time:** Sets the spot time of arc spot welding, only when the “crater control” is set to the “spot” mode.
15	**Crater current:** Sets the crater current. The up-slope can be used only when the “crater control” is set to “presence” or “repeat”.
16	**Post-flow:** Sets the time period for the shield gas to keep flowing for a certain period of time after the output voltage is turned off (i.e. arc stop).
17	**Pulse current**[*1]: Sets the pulse current.
18	**Pulse frequency**[*1]: Sets the pulse frequency (0.8 to 500Hz).
19	**Pulse width:** Pulse width[*1]: Sets the pulse width.
20	**AC TIG (AC BALANCE / AC frequency):** Sets the AC balance* or AC frequency* (50 to 400Hz) when the “welding method” is set to “AC TIG” or “MIX TIG”. (To select the AC balance or AC frequency, press this “AC TIG” button once or twice until the applicable display lamp start flashing.)
21	**MIX TIG (MIX frequency / DC ratio)**: Sets the MIX frequency or DC ratio* when the “welding method” is set to “MIX TIG”. (To select the MIX frequency or DC ratio, press this “MIG TIG” button once or twice until the applicable display lamp start flashing.)

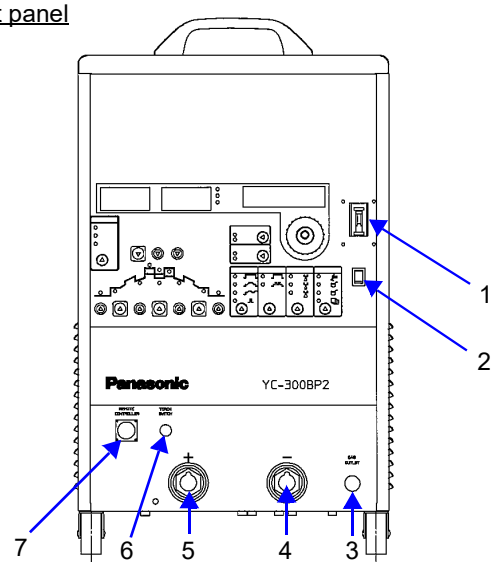
*1: It can be used when the “welding method” is set to “DC TIG” or “AC TIG”, the “pulse” is set to “presence”, and the “crater control” is set to a mode other than the “spot”.

4.1.3 Switches and rear side

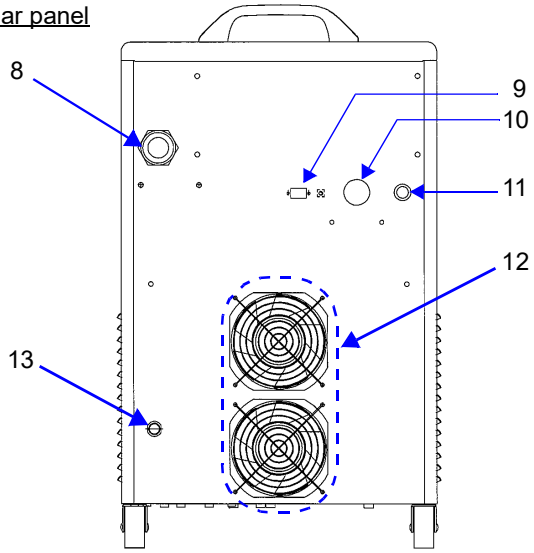
DANGER	**When removing or replacing a fuse:** To prevent an accident caused by an electric shock, make sure to turn the power switch off before such removal or replacement

CAUTION	**About power switch:** • When the power switch is turned off automatically, do not turn it on again. (Consult with sales distributor of Panasonic representatives.) • When activating a power generator, turn off the power switch.

Front panel



Rear panel

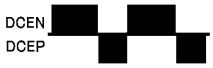


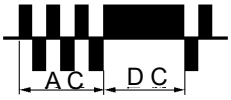
1	**“Power” switch (NFB)** Turns the power supply on and off. Turn it on and off from outside of the case. The lever position at the time of tripping (means that the switch is turned off automatically due to over-current) is same as the off position.
2	**Gas supply switch** Normally set it to the “welding” side. When checking the gas flow rate, set it to the “inspection” side.
3	**Gas outlet joint**
4	**Negative (-) terminal (fingertip joint)**
5	**(+) Terminal (fingertip joint)**
6	**Torch switch outlet**
7	**Outlet for remote control unit** Insert the plug of a remote control unit (optional item), and it is securely fixed.

8	**Input power cables** (with PE): The PE cable is connected to the PE terminal in the power distribution box.
9	**Wiring port** (with grommet) **for the communication connector**
10	**Wiring port** (with grommet) **for the jig terminal**
11	**3A power fuse (FU1)** This is a fuse for the control power circuit. This fuse is resistant to rush current.
12	**Cooling fan air-outlet:** This is the cooling fan air-outlet to cool this product. Do not leave any obstacles near this outlet.
13	**Gas inlet joint** (Screw size: U9 / 16 Thread 18): Connect the welding shield gas from the gas regulator securely. Any gas incorporation may affect the result of welding.

4.2 Welding methods and output waveform

Note The “applicable material” section of the following table lists the general material.
In the case of special metal, etc., welding results may be different from your requirement.

Welding method		Output waveform (Image)	Main materials	Features
DC TIG		 The polarity is electrode minus (DCEN).	Stainless steel Mild steel Copper Titanium Brass	• Widely used for metal other than aluminum in TIG welding. • An arc-start method is selectable according to applications. • When the pulse is set to “OFF”: Stable DC output is available for any current including low current and high current. • When the pulse is set to “ON”: Pulse frequency: 0.8 to 25Hz Suitable for the welding of a joint between a thick plate and a thin plate, which have considerable difference in their thermal capacity, and the welding that requires wave-patterned bead or penetration welding. Pulse frequency: 10 to 500Hz Suitable for the thin plate welding, fillet welding and butt welding.
AC TIG	Standard	 A rectangular wave with the same peak value of output current for both electrode minus (DCEN) and electrode plus (DCEP) periods.	Aluminum Magnesium Brass	• The general AC TIG welding can be done widely for the range of material from thin plates to thick plates. • Applying the pulse “present” mode works better in the welding of a joint between a thick plate and a thin plate, which have considerable difference in their heat capacity. (Use the pulse frequency of 0.8 to 25Hz.)
	Hard	 Shows a pulse overlap waveform.		• Arc with high heat input and strong convergence is available. (Suitable for welding with narrow bead width.) • Suitable for the gap welding of a thin plate. • Suitable for the fillet welding of an intermediate plate. • Using the pulse “present” mode enables the welding of a joint created by plates with different thickness as well.
	Soft	 A sine wave for electrode minus (DCEN) and electrode plus (DCEP) periods.		• Soft arc is available. • (Suitable for welding with wide bead width.) • Suitable for the butt welding of an intermediate plate.

Welding method	Output waveform (Image)	Main materials	Features
MIXTIG	 Outputs an AC (standard) TIG waveform and a DC TIG waveform alternately.	Aluminum Magnesium Brass	• Due to the difference in heat input between AC and DC, neatly wave-patterned bead appearance is obtained. • With DC TIG and AC TIG mixed together, good weld penetration can be achieved. • Arc with strong convergence is available. • Suitable for the fillet welding of a thin plate. • Suitable for vertical and upward welding. • Electrode exhaustion is considerably reduced. • Inserting filler wire during the AC period enables improvement in working property. • Setting the MIX TIG frequency to 1 through 2Hz makes it easier to control the insertion timing of filler wire.

4.3 Welding conditions

4.3.1 Welding condition setting table

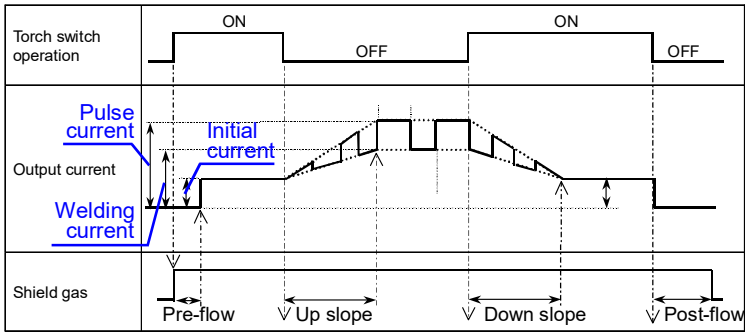
- Items marked with (P) in the following table is applied to the mode of the pulse “present” (set by “pulse” selection button).
- In the case of MIX TIG welding, the spot welding is not available.

Welding method	Crater	Pre-flow time		Up slope	Welding current	Down slope	Spot time	Crater time	Post-flow time	Pulse current	Pulse frequency	Pulse width	AC balance	AC frequency	MIX frequency	DC ratio
DC TIG	OFF	(O)			(O)				(O)	(P)	(P)	(P)				
	ON Repeat	(O)	(O)	(O)	(O)	(O)		(O)	(O)	(P)	(P)	(P)				
	Spot	(O)			(O)				(O)							
AC TIG	OFF	(O)			(O)				(O)	(P)	(P)	(P)	(O)	(O)		
	ON Repeat	(O)	(O)	(O)	(O)	(O)		(O)	(O)	(P)	(P)	(P)	(O)	(O)		
	Spot	(O)			(O)		(O)		(O)				(O)	(O)		
MIX TIG	OFF	(O)			(O)				(O)				(O)	(O)	(O)	(O)
	ON Repeat	(O)	(O)	(O)	(O)	(O)		(O)	(O)				(O)	(O)	(O)	(O)

4.3.2 About welding conditions

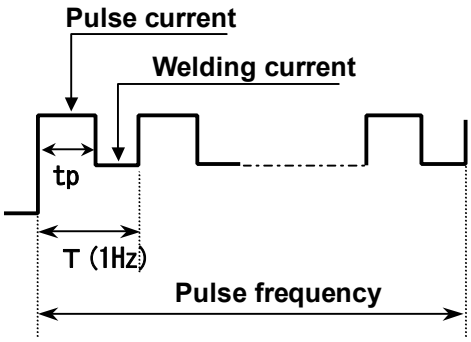
- Pre-flow time
- Initial current
- Up slope
- Welding current
- Down slope
- Crater current
- Post-flow time
- Pulse current

Fig.1 In case of DC TIG welding with “Pulse” and “Crater”



- **Pulse frequency**

  Applicable to the pulse “present” mode in AC or DC welding.
  It means the number of repeat times per second of the combined waveforms of pulse current and welding current (as shown in the following diagram as (1Hz)).

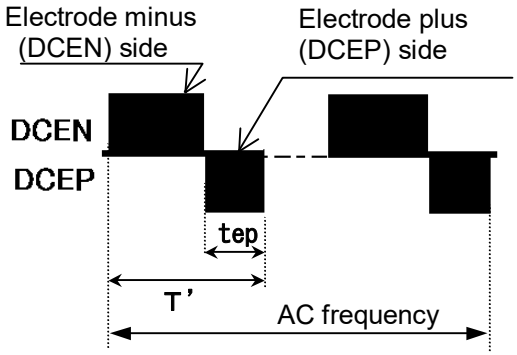


- **Pulse width**

  Applicable to the pulse “present” mode in DC TIG welding or AC TIG welding.
  With regard to the pulse frequency waveform, it is obtainable from the following formula as the ratio between pulse current width (“**tp**” in the right figure) and the total value of pulse current width and welding current width (“**T”** in the right figure).
  Pulse width (%)=(tp / T)Å~100

- **AC balance**

  Applicable to AC TIG welding or MIX TIG welding.
  (In the aluminum welding, the oxide film is removed at the time of electrode plus.)
  With regard to the AC frequency waveform, it is obtainable from the following formula as the ratio between waveform width at the electrode plus (DCEP) side (“**tep”** in the right figure) and waveform width per Hz (**“T**” in the right figure).
  AC balance (%)=(tep / TÅf)Å~100

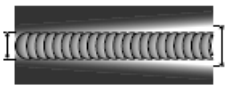


(Waveform of AC standard TIG “without pulse”)

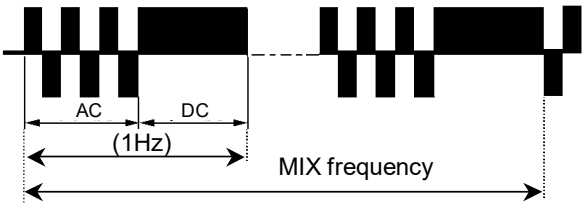
About “AC balance adjustment”

- The cleaning activity, which is imperative for aluminum welding, exerts a considerable influence upon the quality of welding including bead appearance, weld penetration and so on.
- In the following cases, expanding the AC balance may make the welding operation easier.
  - (a) In case welding have to be done with the surface of base material contaminated,
  - (b) In case base material is coated with a thick oxide film,
  - (c) When welding aluminum alloy,
  - (d) When welding surface-treated aluminum,

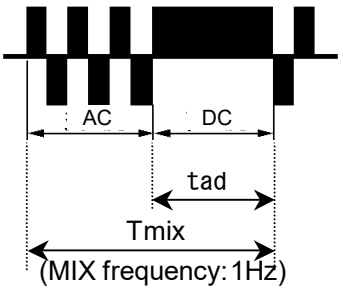
<Variation of weld penetration and electrode wear in relation to the AC balance.

AC balance	Narrow		Wide
Penetration	Deep		Shallow
Electrode wear	Minor		Major

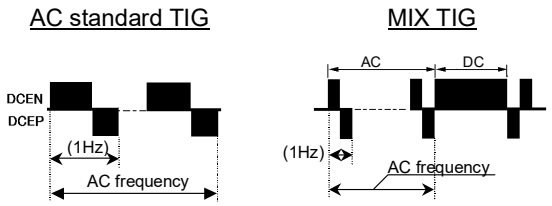
- **MIX frequency**
  Applicable to the MIX TIG welding.
  It means the number of repeat times per second of the waveform shown as (1Hz) in the right diagram.



- **DC ratio**
  Means the MIX (DC) ratio and is applicable to the MIX TIG welding.
  With regard to the MIX frequency, it is obtainable from the following formula as the ratio between the width of a DC waveform (tad in the right diagram) and the width of a waveform per 1Hz in MIX frequency (Tmix in the following diagram).
  DC ratio (%)=(tad / Tmix) X 100



- **AC frequency**
  Applicable to AC TIG welding or MIX TIG welding.
  It means the number of repeat times per second of the waveform shown as (1Hz) in the rightdiagram.



Note Setting example of the AC frequency with regard to a welding joint

The following table shows some reference values as a guide for the aluminum (A5052) welding. (In the actual welding operation, they are not applied to all kinds of material/substances.)

AC frequency (Hz)	120	200	250	300	400
Welding joint	Multi-layer Butt	Circular Fillet	Butt	Fillet	FIllet (Tack welding of thin plate)
Thickness (mm)	8.0	3.0	3.0	6.0	1.0
Current (A)	180 to 200	Pulse current: 225 Welding current: 165	135	280	110
Speed (cm/min)	10Å`20	20	25	18	-
Arc spot time (S)	-	-	-	-	0.5

For your reference: Setting example of the AC frequency with regard to a welding joint
The following table shows some reference values as a guide for the aluminum (A5052) welding. (In the actual welding operation, they are not applied to all kinds of material/substances.)

5. Connection

Important	**The installation shall be done by qualified installation personnel and should conform to all national and local codes.**

DANGER	**Touching current carrying parts may cause a fatal accident like an electric shock, burn injury and so on.** To prevent physical accidents like an electric shock, burn injury and so on, make sure to observe the followings.
	• Make sure to turn off the switches of this product and the distribution box before starting connections. • Do not perform any connection work with moistened hands. • Make sure to insulate all bare current-carrying parts like joints and so on by tape, etc. • Do not strain cables, or let them make contact with the welding arc area. • For safety reasons, make sure to provide this product and base material with class D or class C grounding work done by qualified electricians.

CAUTION	**Observe the followings to prevent a fire caused by overheat of cables.** • Use cables at least with specified thickness. • Fasten all cable connections securely.

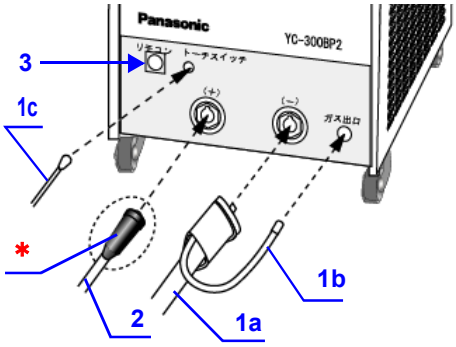
5.1 Connecting output cables

This section explains the connection in case of using a special torch. (The same applies to connections for the arc spot.)

When using other torches and/or extension cables: see section “Installation: Peripheral equipment”.

	Name	Connect to (Power source side)
1	Weld torch side	
(1a)	Torch cable	“Negative (-)” terminal[Note]
(1b)	Gas hose	“Gas output” joint
(1c)	Torch switch	“Torch switch” outlet
2	Base metal side (Attach the fingertip joint*)	“Positive (+)” terminal[Note]
3	Remote controller (Optional unit)	“Remote” outlet

Note: Insert it into the “(-)/(+) terminal” in line with the guide respectively, and turn it clockwise until it is locked.



The polarity relation between the torch and base material is electrode minus (DCEN).

5.1.1 About output cables (Below figures are images)

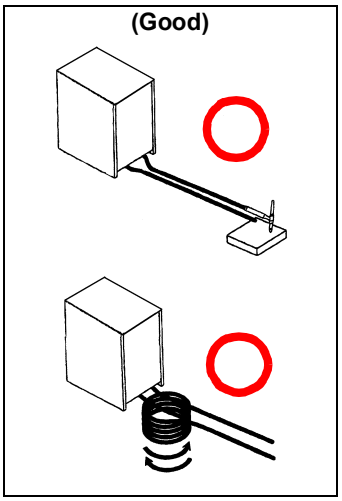
Lay the torch cable and base-material-side cable side by side without winding to keep down their impedance (alternating current resistance in the circuit)

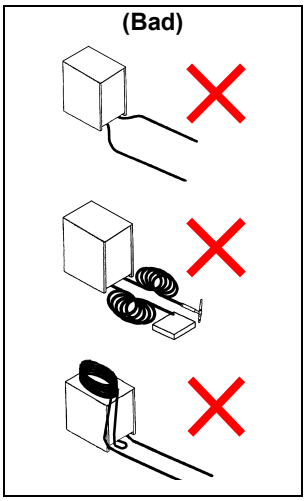
<u>If it is necessary to wide the cables:</u>

- Wind the torch-side cable and the base-material-side cable respectively in opposite directions.
- Wind in the same winding number.
- Wind each of the winding piled alternately.

Note

Large impedance may cause Err-13 (secondary overvoltage error. See section “Troubleshooting”.)





5.2 Input and ground (PE) cable connection

WARNING		The frame of this power source must be grounded to protect operating technician from potentially deadly electrical shock.

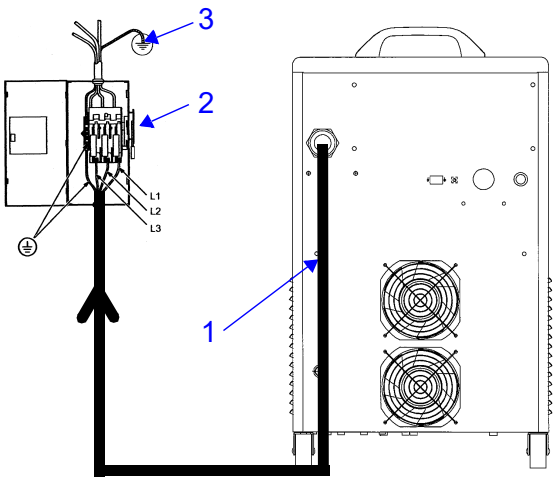
WARNING		Never pull or apply undue force on primary cable once it has been installed. Cable could disconnect from terminals and pose a threat of potentially deadly electric shock.

WARNING	TURN OFF the power switch at the power distribution box before connecting ground and input cables

CAUTION	The wiring and grounding work should be performed by educated and/or skilled person.

Input power cable	Diameter	Length	Note
	AWG 8	8.2 ft. (2.5 m)	4 conductors (including grounding conductor.)
Ground cable	Make sure to use one with diameter equal to or larger than that of the input power cable.		

(1) Turn off power at the distribution box.
(2) Connect grounding conductor to supply grounding terminal.
(3) Connect input power conductors to (-) minus terminals of the power box.



1	Input power cable
2	Power box
3	GND/PE

5.3 Connecting gas regulator

DANGER	This is a high-pressure gas apparatus. Its mishandling may cause a physical accident, such as the direct hit of parts due to the high-pressure gas. Make sure to read the instruction manual of the gas regulator carefully before connection.

Note **About shield gas**

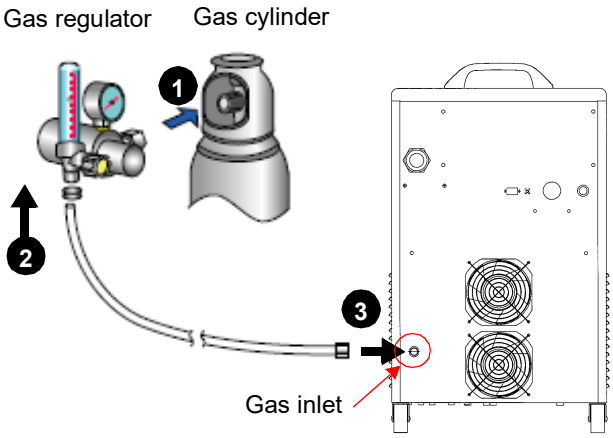
- Use the high-purity welding argon gas JISK1105 (99.9% or more in purity) as a TIG welding shield gas.
- Incorporation of impurities, such as oxygen, moisture, nitrogen, etc., into the argon gas may deteriorate the shield performance and eventually reduce the welding quality.

5.3.1 Connecting procedures

(1) Attach the gas regulator to the gas bottle.
  (a) Prior to attaching them, clean their mouthpieces.
  (b) Fasten the tightening nut with a monkey spanner, etc. securely.

(2) Connect the gas hose (accessory) to the gas hose joint of the gas regulator.
  Fasten it with the supplied hose band securely.

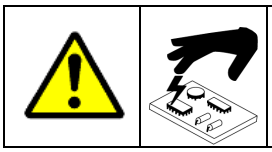
(3) Connect the other end of the gas hose to the “gas inlet” joint on the rear face of this product.
  Screw size: U9/16. THread 18)



<To increase the maximum gas flow-rate>

- The factory-set inside diameter of “gas outlet” joint is 1.0mm, and the maximum flow-rate is set to 20L/min.
- To increase the maximum flow rate, remove the setscrew* inside the “gas outlet” joint.
  Eventually, the maximum flow rate is set to 45L/min. However, the gas regulator shall also be replaced with that prepared for the maximum flow rate of 45L/min.
  *: It can be removed from the front of the “gas outlet” joint with a slotted screwdriver.

5.4 Connecting with jig(s)



When touching a printed circuit board, observe the following item to prevent electrostatic destruction of the printed circuit board.
Before starting an operation, for example, touch any metal part of the case with your hand to discharge static electricity

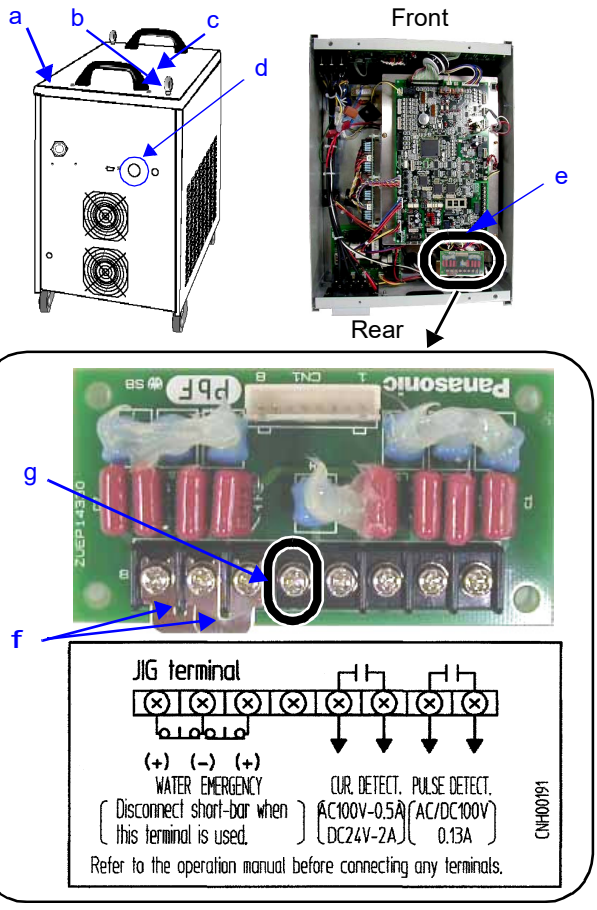
5.4.1 Applications

- To send out a command for the emergency stop or temporary stopping from a jig or a robot to this product.
- To provide a jig or a robot with the current detection signal or pulse signal of this product, use the jig terminal.

Note
Keep the signal lines from a jig and/or a robot away from the welding arc area, the welding torch, the base-material-side cable, etc. to prevent troubles caused by incorporation of the high frequency wave. And keep the wiring length within 10m.

5.4.2 Position of jig terminal

It is located **(e)** inside the product. (Loosen four crews **(a)** and two eyebolts **(b)** and then remove the top panel **(c)**.Åj



5.4.3 Cautions at wiring

(d)Wiring port (with grommet cover) (Rear side):
Draw signal wires from jigs via this wire port.
* Make a cut in the grommet wall to insert it.

(f)Jumper: When using a terminal with a short-circuit line inserted, make sure to remove the short-circuit line from that terminal. (Otherwise, that terminal does not work properly.)

(g)Open terminals: Do not use them.

- To these terminals, make sure to connect a no-voltage contact signal or an open-collector transistor signal. (Connecting a signal with voltage may cause a circuit burnout to this product.)
- Between these terminals, the voltage of 15VDC is applied when the circuit is open, and the current of DC 3mA is generated when the circuit is closed. [Connect a signal not likely to cause any damage or contact failure under this voltage or current to these terminals.]

5.4.4 Functions of jig terminal

	Terminal names	Function
INPUT	WATER	• When the circuit is opened between these terminals, the operation of this product is suspended.(Such suspension results in the stoppage of the welding output, gas supply and gas inspection.) • When using the water-cooling torch, connect a signal for reduced-water-level detection, etc. • To release such suspension, close the circuit between these terminals.
	EMERGENCY	• When the circuit is closed between these terminals, the emergency stop function of this product is activated.(Such suspension results in the stoppage of the welding output, gas supply and gas inspection.) • To release this emergency top, close the circuit between these terminals after turning the power switch off, and then turn it on again. • Even if the power switch is turned on with the circuit between these terminals opened, this product does not operate. Close the circuit between these terminals, and then turn the power switch on again. (In other words, turn the power on with the circuit between these terminals closed.)
OUTPUT	CUR. DETECTION	• Between these terminals, the normally-open relay contact (contact a) is connected, and it is closed at all times while output current* is detected. *: Initial current, welding current (pulse current and base current) and then crater current. • If there is something to be operated at the jig side while such output current is detected, use these terminals for such an operation. • Contact rating: 100VAC 0.5A, 24VDC 2A
	PULSE DETECTION	• Between these terminals, the normally-open contact (contact a) of a photo MOS relay is connected, and it is closed in synchronization with the pulse output current only. • Contact rating: 100VAC/DC 0.13A

5.5 Connecting with Robot

5.5.1 Applications

- **Robot:** In case of perform welding operation using Panasonic robots “VR-2 or TA-G2 series” by connecting to the robot controller.
  (For details, see manuals of individual products.)

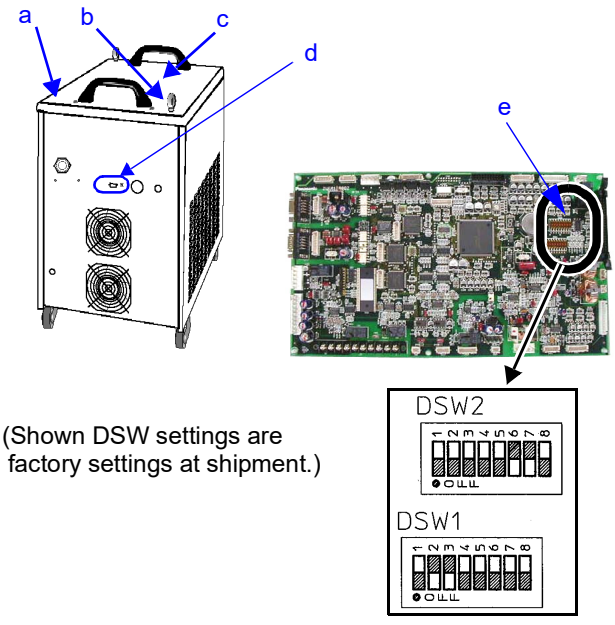
Note

Keep the signal lines from a jig and/or a robot away from the welding arc area, the welding torch, the base-material-side cable, etc. to prevent troubles caused by incorporation of the high frequency wave. And keep the wiring length within 10m.

5.5.2 Connection

Connect the communication cable from a robot to the D-Sub connector **(d)**on the rear panel.

	Connecting connector	DIP switch (DSW1)
Robot	RS-422(CN22)**(d)**	#6: ON



(Shown DSW settings are factory settings at shipment.)

5.5.3 Cautions at connecting cables

- To enable the function of communication, make sure to turn the power off, and then set the DIP switch.
  (When not using the function of communication, turn off the DIP switch #6.)
- Turn the switch **(e)** on and off from on top of the orange cover.

5.6 Connecting with external device connecting unit

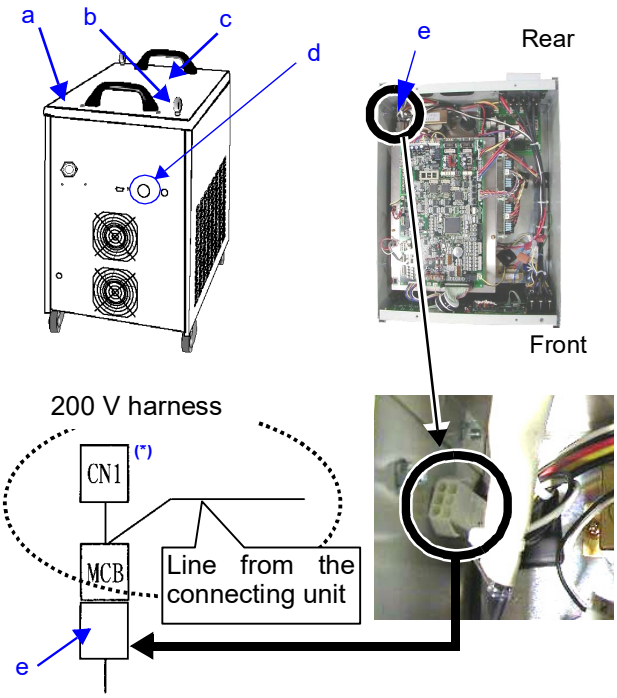
5.6.1 Applications

To switch the pages of stored welding conditions by connecting external equipment (sequencer) to the product.
(For details, see manual of the external device connecting unit.)

Note
For preventing troubles caused by incorporation of the high frequency wave, see “Installation: Peripheral equipment”.

5.6.2 Connection

- Draw harnesses or cables from the connecting unit via this wire port**(d)**. (*Loosen four crews **(a)** and two eyebolts **(b)** and then remove the top panel **(c)**.
- To enable the function of the connecting unit, make sure to turn ON the DIP switch DSW2 #10.
  (When not using the function of communication, turn it off again.)



(*): [**CN1**] is for an external device.

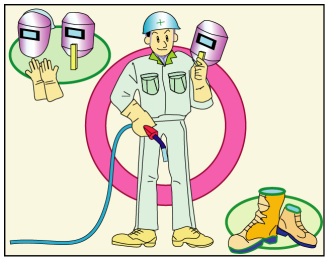
6. Operation

6.1 Preparation steps

6.1.1 Use of protective equipment

DANGER	To protect you and other people from gases, fumes and lack of oxygen that may be generated during the welding operation, make sure to prepare ventilation facilities and use protective equipment, etc.
	• Welding operations in narrow spaces may cause asphyxia due to lack of oxygen. • Prepare ventilation facilities to prevent the inhalation of gases and fumes generated during the welding operation. Otherwise, wear a respirator.

CAUTION	To protect you and other people from arc light, flying spatters, slag, and arc noises generated by welding, use protective equipment.
	• Wear leather gloves and safety shoes to protect the exposed parts of your eyes and skin. • Prepare light-shielding glasses or a welding face-shield with a light-shielding filter plate appropriate to the applied welding current. • Prepare the ear protection device.



6.1.2 Confirmation of completed connection

Check to confirm the following connections

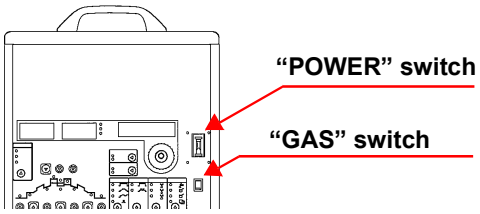
- Connections to input power unit and grounding wire.
- Connections to base metal, welding torch and of gas.

(See sections “Configuration” and “Connection.”

6.1.3 Turning ON power

(1) Turn on the switch of the distribution box.

(2) Turn on the “POWER” switch. (The set-value display and the LCD display on the front panel are turned on.)



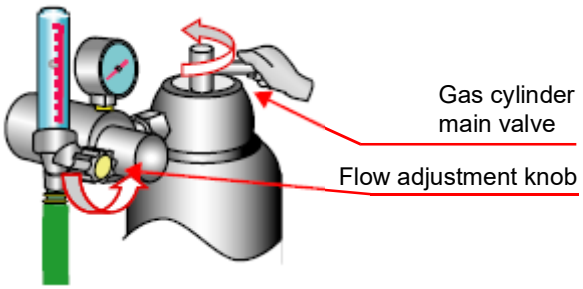
6.1.4 Adjusting gas flow rate

(1) Place the “GAS” switch to the “PURGE” position.

(2) Open the main valve of the gas cylinder. (Make sure that the flow adjustment knob is at the side of [SHUT] before opening the main switch.)

(3) Turn the flow adjustment knob in the direction of [OPEN], and adjust it until the flow meter indicates the required value.

(4) On completion of the flow rate, set the “GAS” switch to the “WELD” position.



6.2 Steps after welding operation

6.2.1 Shutting off Gas

Close the main valve of the gas bottle first of all, and then take the residual pressure out of the pipe through the gas checking process.

6.2.2 Shutting off power

Important	To allow the inside of this product to cool down, turn the power off at least 5 minutes after the completion of welding operations.

(1) Turn off “POWER” switch.
(2) Turn off the switch of the distribution box.

Note
At that time, even if the “Err-5: Low primary voltage” appears, it does not mean that an error has occurred. (It just means that the reduction of the primary voltage has been detected due to the shutdown of the power switch.)

6.2.3 Precautions for winter season (when using the water-cooling torch)

In case the special cooling water (Pana-coolant K: See page 5-5) is not used yet, do not forget to take freeze-proofing measures after every welding operation to prevent possible breakage of the flow-rate switch caused by freezing. (For example: Take the cooling water out of the water-circulating path including the flow rate switch.)

6.3 Settings

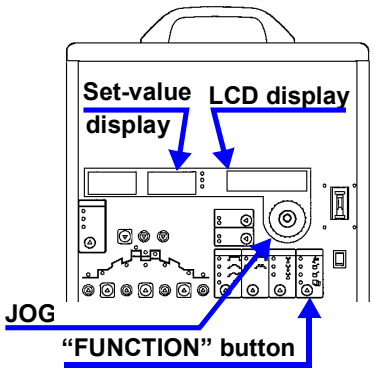
6.3.1 Factory settings

Set item	Default setting	Choice	Description
V Disp Status	○	OFF	Any output voltage (values measured between output terminals) cannot be indicated on the set-value display.\
		ON	The welding current screen and the output voltage screen appear on the LCD display alternately every time when pressing the “welding current” button of the welding-condition setting button section. In case the output voltage screen is shown on the display, the set-value display indicates an output voltage during the welding operation. Welding current can be changed even if the LCD display shows the output voltage screen.
DCTIG StartPolar			In the case of DC TIG welding, electrode polarity at start of arc can be selected.
	○	EN	Arc start method to set an electrode to the negative pole. (Suitable for continuous welding.)
		EP	Sets an electrode to the positive pole for a second at start of arc to prevent the arc from climbing. (Suitable when tentative welding is often required.)
Hot Cur Level	○	Low Standard High[a]	For better arc start, the level of instantly-applied current at arc start is selectable.
Crater End Type			The weld end method at crater control “Repeat” can be selected.
	○	Normal	Terminates the welding by withdrawing a torch.
		Torch switch[b]	Welding is terminated when the torch switch is turned on and off within 0.5 second in the crater control mode.
E.L. ShortStatus	○	OFF	During the welding operation, the output continues even if an electrode is short-circuited.
		ON	During the welding operation, the output stops when an electrode is short-circuited. (The gas post-flow continues to function as usual after termination of the output.)
Disp Hold Time	○	0.00 S to 10.0 S	This is the time period to keep the display of an average current value obtained between 2 seconds and 1 second before termination of welding, at the time of the termination of welding. [It can be set to between 0.05 and 10.05 in increments of 0.1 second.]
AC Arc Recovery	○	OFF ON[c]	In case the lack of arc is likely to occur during the AC TIG or MIX TIG welding, select “present”, and the occurrence of such an event can be prevented.

a. In case of using a thin electrode, setting to “High” causes the electrode to wear out quickly.
b. In case “torch switch” is selected, transition from crater current to welding current is delayed by 0.5 second when the torch switch is turned off, but it is not an error.
c. In case “present” is selected, the high frequency wave is generated again if lack of arc occurs during the welding operation. (Be careful when using a robot or automatic machine.)

6.3.2 How to change settings

- Change these welding conditions as desired before use.
- As for any important welding conditions, store them in the product by allocating the program numbers (See section "Storing welding conditions.")
- As for welding condition not in store, the setting of the product returns to the original factory-set welding conditions when the factory setting is restored,.



	Operation	Remarks
1	Set "FUNCTION" button to "DETAIL."	First, "**V Disp Status**" appears on the LCD display. On "Set-value" display, set contents is indicated.
2	Press the JOG dial until the set item you want to change appears.	
3	Turn the JOG dial until the required set item appears.	Turn the JOG dial either clockwise or counter-clockwise.
4	Press the JOG dial.	The present set content is stored and the next set item is displayed.
5	Then, repeat the procedure from (2) through (4) until desired change of set contents are completed.	
6	Switch the "FUNCTION" button to "WELD" to start welding operation.	

6.3.3 How to restore the original factory setting of this product

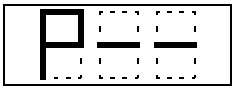
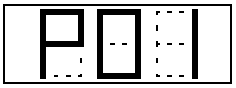
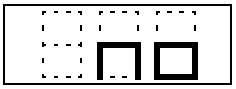
If you want to restore the original factory-setting, carry out the operation indicated in the following table. (Underlined bold character in the "LCD display" column indicates the cursor position.)

Note
If you get lost during the operation, turn the power off, and repeat the same operations from item (1) again.

	Operation	Set-value display	LCD display
1	• Hold down the JOG dial, and while holding it down, turn on the "POWRE" switch.		Rescue Menu YC-300BP Series Then indication changes to **1** Set Defaults? No
2	• Press the JOG dial to determine the choice. • *When you turn the JOG dial without pressing down, the screen displays the next set item. In that case, turn it further until the desired set item reappears.		1 Set Defaults? **N**o (Cursor flashes.)
3	• Press the JOG dial.	no	1 Set Defaults? **N**o
4	• Turn the JOG dial and have "YES" displayed.	YES	
5	• Press the JOG dial	no	Are you sure? * * * ***** (Cursor flashes.)
6	• Turn the JOG dial and have "YES" displayed.	YES	
7	• Press the JOG dial to complete.		Welding Current

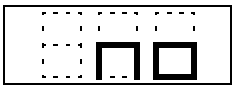
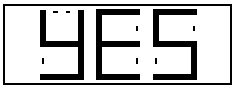
6.3.4 Memory deletion

While this product is capable of storing up to 50 different welding conditions (P01 to P50), if you want to delete any welding conditions that you programmed, follow the following steps.

	Operation	Set-value display	LCD display
1	• Hold down the JOG dial, and while holding it down, turn on the “POWRE” switch.		Rescue Menu YC-300BP Series Then indication changes to **1** Set Defaults? No
2	• Turn the JOG dial until the screen on the right appears.		**2** Delete Page P - -
3	• Press the JOG dial.		2 Delete Page P - -
4	• Press the JOG dial. **Note** The screen on the right appears on the digital ammeter. 		
5	• Turn the JOG dial to select a program number you want to delete. * Stored program numbers appear in series.	(When selecting “P01”) 	
6	• Press the JOG dial.		Are you sure? * * * -
7	• Turn the JOG dial and have “YES” displayed.		
8	• Press the JOG dial. * To continue to delete the memories of other program numbers: Go to the operation (4).		2 Delete Page P - -
9	On completion of the desired deletion of program number memories, turn the power switch off.		

6.3.5 Memory lock

While this product is capable of storing up to 50 welding conditions (P01 to P50), if it is not desired for anybody other than the administrator to conduct the storing operation, lock the stored memory in the following manner.

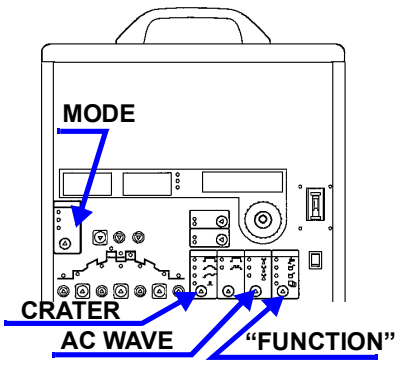
	Operation	Set-value display	LCD display
1	• Hold down the JOG dial, and while holding it down, turn on the “POWRE” switch.		Rescue Menu YC-300BP Series Then indication changes to **1** Set Defaults? No
2	• Turn the JOG dial until the screen on the right appears.		**3** Lock Memory? No
3	• Press the JOG dial.		3 Lock Memory? N**o**
4	• Turn the JOG dial and have “YES” displayed.		
5	• Press the JOG dial.		3 Lock Memory? Ye**s**
6	• Turn the JOG dial and have “YES” displayed.		
7	• Turn off the power to complete the operation.		

6.3.6 Setting and checking welding conditions

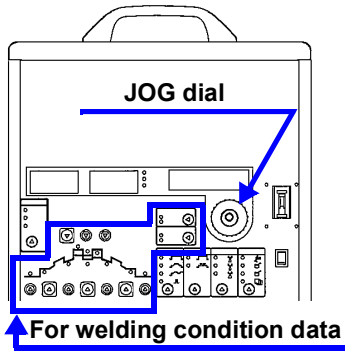
After trial of welding, if you want to have higher welding quality and performance, try to change the factory-set condition as shown in page 9-1 to suit such a welding condition as desired.

[To keep a note of the result after change, make use of the “Welding condition memorandum” (Appendix).]

(Button location)



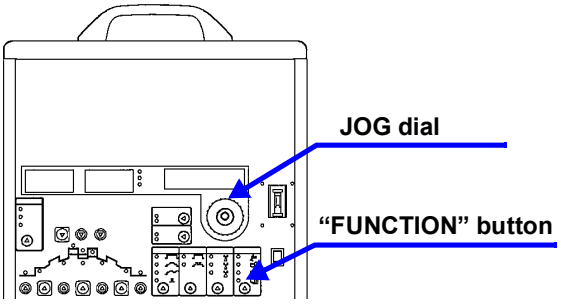
	Operation	Remarks
1	• Set “FUNCTION” button to “WELD.”	
2	• With “MODE” button, select a desired weld method.	When the arc spot welding is desired: Choose “DC” or “AC”.
á	• <In case of “AC TIG” mode> • With “AC WAVE” button, select a desired wave type.	
4	• With “CRATER” button”, select a crater type or “ARC SPOT”.	When the arc spot welding is desired, select “ARC SPOT”. Otherwise, (no arc spot), select crater control “OFF”, “ON” or “REPEAT”.



Note
Do not turn the jog dial without discretion. (It may result in the change of the present set value.)

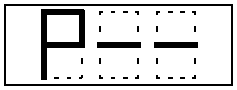
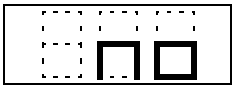
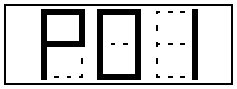
5	• Set (or check) the welding condition data.	
	Press a button, which is desired to be set and confirmed, related to an indication lamp turned on	Indication lamp starts flashing, the name of that item appears on the LCD display, and the present set value is indicated on the set-value display.
	Under that condition, turn the JOG dial and you can change the set value or that time.	As long as that indication lamp is on, the set value can be changed even during the welding operation. *The set welding current can be changed even when the LCD display is showing the output voltage screen.
	Press the JOG dial to complete the setting (checking).	Then, the indication lamp of that item is turned on, and it becomes impossible to change the set value by turning the jog dial.

6.3.7 Storing welding conditions

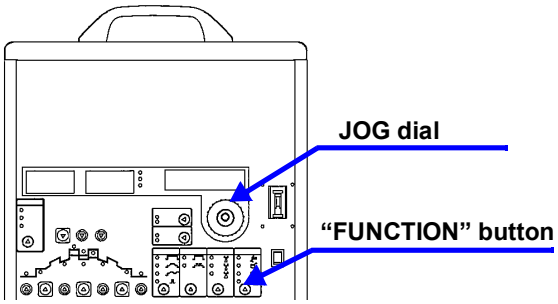


• Up to 50 welding conditions (P01 to P50) set by customers can be stored.
Just reproduce your stored welding condition, and you can proceed with the welding immediately without additional selection or setup under the stored condition. As for the note of the condition, refer to section "Appendix: Welding conditions memorandum."

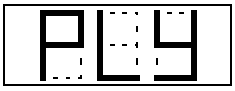
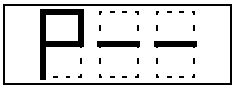
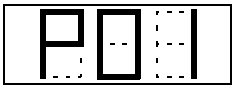
Note
When the memory locking is on, no information can be stored.

	Operation	Set-value display	LCD display
1	• Set "FUNCTION" button to "RECORD." **Note** The screen on the right appears on the digital ammeter. 		JOG to Sel. No. Press to Confirm
2	• Turn the JOG dial and select a program number to be stored. * Numbers starting with "P01" are indicated in order. (Numbers already stored flash.)		
	<New storage> **• Select a solidly lit (no-flash) number.**	When solidly lit "P02" is selected.) 	
	• Press the JOG dial, then the "FUNCTION" button automatically returns to "WELD.		
	<Overwriting> • **Select a number you want to overwrite (the number flashes)**. **Note** The screen on the right appears on the digital ammeter. 	When flashing "P01" is selected.) 	Overwrite? (Y/N) JOG to YES/NO
	• Turn the JOG dial and have "YES" displayed.		
	• Press the JOG dial, then the "FUNCTION" button automatically returns to "WELD."		

6.3.8 Reproducing welding conditions



- Welding can be done by reproduction of any desired condition selected from the stored welding conditions.
- A reproduced welding condition can be changed as desired. (Once changed, it turns to be different from the original condition any more.)
- To store any revised welding condition, use a new program number, or store it with the original number by overwriting unless any inconvenience is caused.

	Operation	Set-value display	LCD display
1	• Set “FUNCTION” button to “PLAY.” **Note** The screen on the right appears on the digital ammeter. 		JOG to Sel. No. Press to Confirm
2	• Turn the JOG dial and select a program number to be reproduced. * The stored program numbers are indicated in ascending order. (If there is no program stored, the display is still indicating “**P--**” when turning the JOG dial.	(In case of reproducing "P01") 	
3	• Press the JOG dial to reproduce. • To cancel the reproduction or if there is no program to reproduce, set “FUNCTION” button to “WELD”.		

6.4 Welding operation

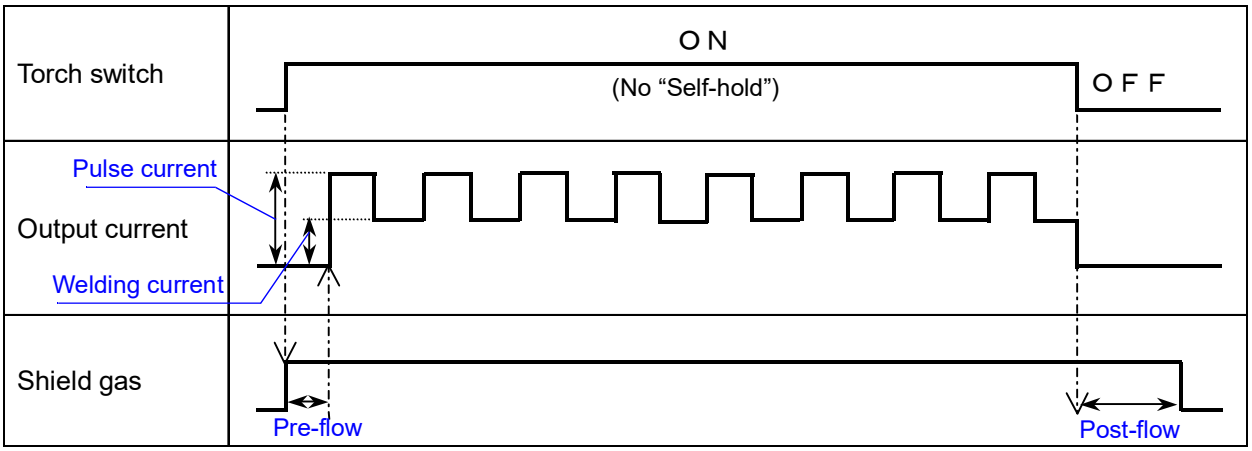
DANGER	• Pressing the torch switch by mistake may cause an electric shock. • When inspecting or replacing any torch parts, make sure to turn the power switch off in advance.

- The on/off operation of the torch switch enables you to perform welding as shown in the following diagram.
- Turn the torch switch on with the torch put close to base material, the high frequency wave comes first, and arc follows.
- In the case of AC TIG welding and MIX TIG welding, adjust the AC balance according to the conditions of an object to be welded.

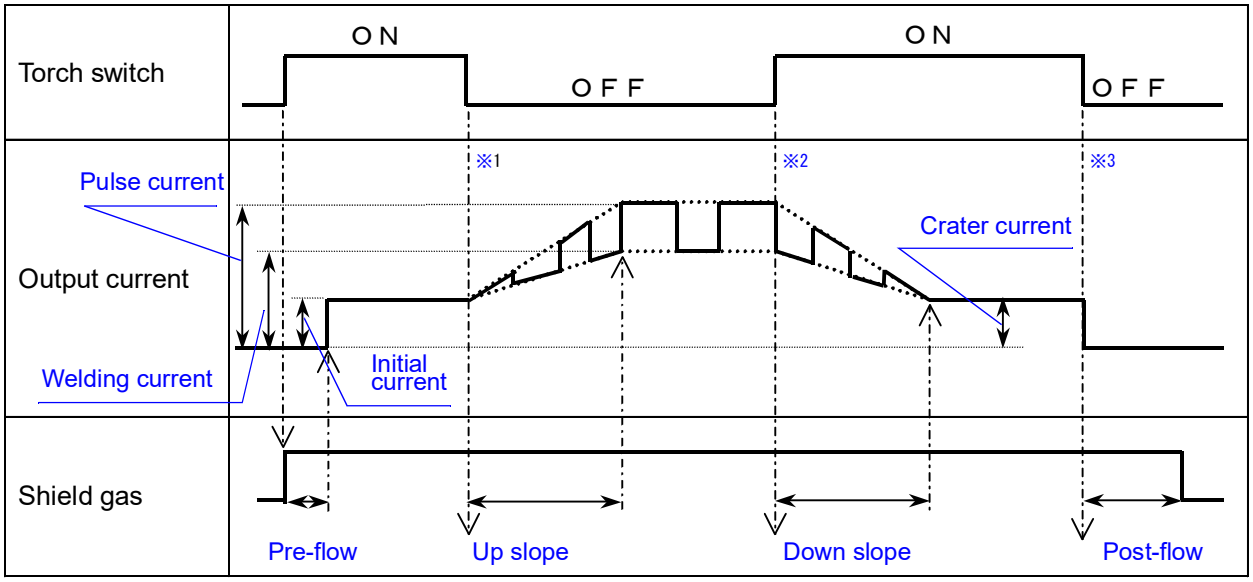
<Regarding the following diagrams>

- The following diagrams presume the employment of DC welding. They are based on the premise that each time period for the pre-flow/post-flow and the up-slope/ down-slope is set to any value other than “0”.
- They assume that the output current is set to pulse “present”. (In the case of pulse “absent”, there should be no pulse current or pulse width.)

6.4.1 “No Crater”



6.4.2 ”Crater”



*1: When the torch switch is turned OFF (= self-hold starts), the “Up slope” starts.

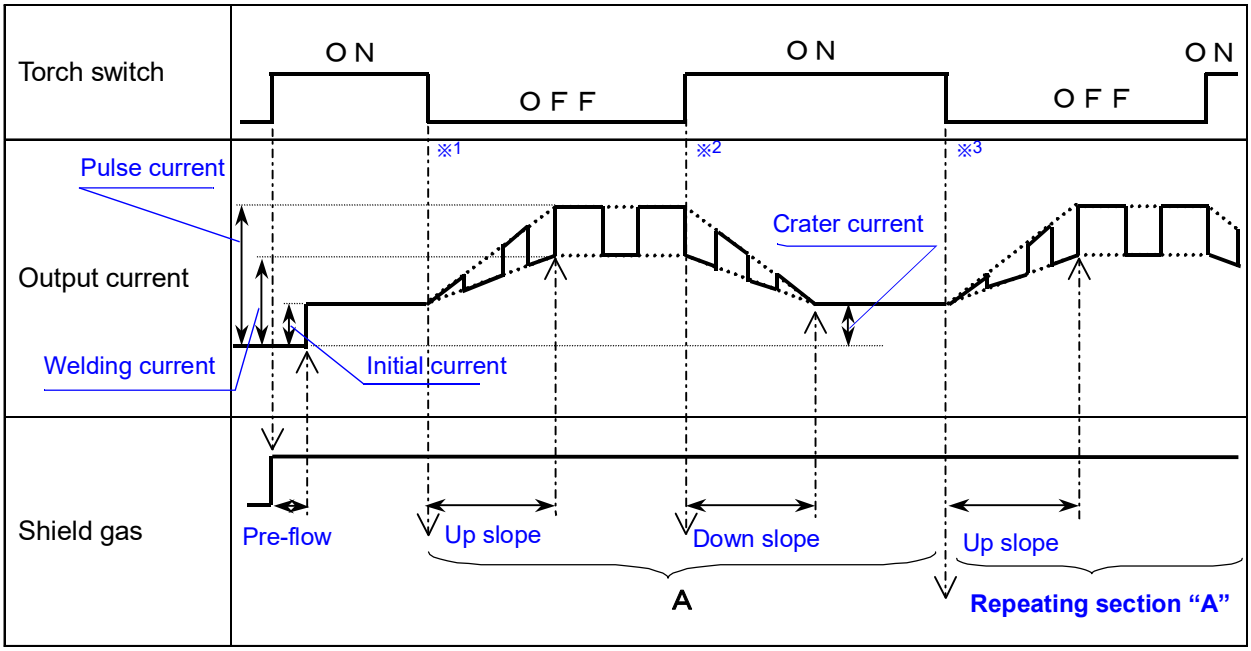
*2: When the torch switch is turned ON (=self-hold ends), the “Down slope” starts.

*3: When the torch switch is turned OFF, the “Post-flow” starts.

6.4.3 “Crater repeat”

- Weld end method depends on the setting of the factory setting item “**Crater End Type**.”

The following shows in case of “Standard” (end welding operation by lifting up the torch.)

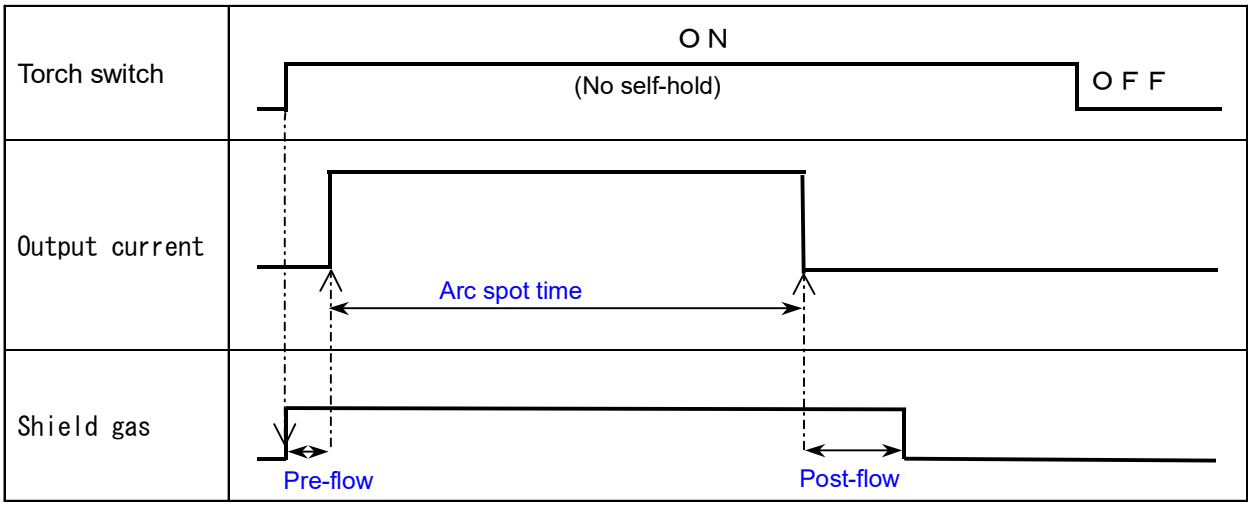


*1: When the torch switch is turned OFF (= self-hold starts), the “Up slope” starts.
*2: When the torch switch is turned ON (=self-hold ends), the “Down slope” starts.
*3: When the torch switch is turned OFF, the “Post-flow” starts.

6.4.4 “SPOT”

- There is no pulse function in the case of the Spot welding.
- Even with the torch switch turned on, welding terminates when the arc spot time has elapsed.

Note
When the torch switch is turned off during the arc spot time, the welding operation is terminated immediately.



7. Maintenance and inspection

7.1 Daily check

 **DANGER**	**Touching any current-carrying parts may cause a fatal electric shock or burn injury** To prevent a fatal accident, such as an electric shock, burn injury, etc., make sure to observe the followings.
	Make sure to turn off the power switch and the switch of the distribution box before making a daily check. (However, any external check made without touching current-carrying parts or their surrounding area is excluded.)

- The daily check is important to make the most of the performance of this product and to secure the safety of daily operations.
- Perform the daily check for sections indicated in the following table, and conduct the cleaning and replacement of parts when necessary.
- For replacement of parts, make sure to use our genuine parts for Panasonic welding machine to keep its performance and functions

● Welding machine (This product)

Check item		Check point	Remarks
Front	Control or display devices	Breakage or loose attachment. Operation or indication error.	If there is any defect, an inside check, additional fastening, parts replacement, etc. are required.
	Fingertip joint, Connector and gas outlet joint	Breakage or loose attachment.	
Rear	Input power terminal cover	If the cover is attached correctly. Breakage or loose attachment.	
	Gas inlet joint	Breakage or loose attachment.	
	Cooling fan	If it makes any unusual rotation noise. If it generates cooling wind all right.	
Top Bottom Sides	Handle	Breakage or loose attachment.	If there is any defect, additional fastening, parts replacement, etc. are required.
	Casters		
	Cases	Loose attachment.	
Overall	• Is there any trace of heat generation, such as discoloration, etc.? • After power “ON” and during the welding operation: Are there any unusual vibrations, beats or odor?		If there is any unusual events, an inside check is required.

● Cables and hoses

Check item		Check point	Remarks
Grounding wires	Of this product	If it is removed. If it is fastened securely.	To prevent a physical accident caused by electric leakage, make sure to check it.
	Of the base metal		
Input cables	Each connection (Load side terminal of the distribution box, Input power terminal of this product)	If it is fastened securely.	To secure the physical safety and stable arc, check those cables in an appropriate manner according to the conditions of shop floors. Daily check: Inspect roughly and quickly by the daily check. Period check: Inspect in details.
	Cable coating	Wear or damage.	
Output cables	Fingertip joint	If it is inserted completely.	
	Each connection	If it is fastened securely.	
	Cable coating	Wear or damage.	
	overall	If any current-carrying parts is exposed other than the base-material-side connection.	
Remote controller and torch switch cables	Connector	If it is inserted completely.	

Check item		Check point	Remarks
Hoses	Joint	If it is fastened securely. In case a hose band is used, if there is any loose attachment.	If there is any defect, additional fastening, hose replacement, etc. are required.
	Overall	Wear or damage.	
Overall	If any heavy items not placed on the cable.		

7.2 Periodic check

DANGER	Touching any current-carrying parts may cause a fatal electric shock or burn injury. To prevent a fatal accident, such as an electric shock, burn injury, etc., make sure to observe the followings.
	• To secure physical safety, make sure that a qualified person or a person who is familiar with the welding machine takes care of a regular check. • Make sure to turn off the power and other switches of all devices* for safety reasons before starting a regular check, unless there is the absolute necessity of keeping them turned on. *: Means this product, distribution box and any other related devices (a jig, robot, etc.) • As for the inside check, make sure to conduct it at least 5 minutes after turning the power off in consideration of electric discharge from a capacitor. • When removing the case's top panel, etc., take care so that no other person approaches this product without discretion (for example, by enclosing the product).

	Allow static electricity to escape by, for example, touching the metal parts of the case with your hand before touching the equipment, the conductor of wire and/or the printed circuit board.

Notice	About cleaning of plastic parts
• Plastic parts may be melted or deformed when they are subjected to organic solvent (benzin, toluene, kerosene, gasoline, etc.). • When cleaning them, soak a soft cloth with a small amount of water or diluted mild detergent for home use, and wring it and use for wiping those parts.	

- Daily checks are not enough to keep the proper performance of this product for a long time.
- In the regular check, a careful and detailed inspection including the checking and cleaning of the inside of this product is performed.
- As for the regular check, conducted it every 6 months normally.
  [If there is a mass of fine dust, oily smoke, etc. around this product, perform the regular check every 3 months as a guideline.]
- - As this product has the following label attached on its side panel, fill it in on every inspection and cleaning.

7.2.1 Check guideline

• While details for checking are shown below table, consider any additional check items according to your conditions of use.

Check item	Guideline
Removal of inside dust	• Remove the top panel before cleaning. • Blow off internally-accumulated dirt and dust by compressed air without moisture included (dry air).
Overall check	• Remove the top panel before checking. • Check the followings and other items that are not covered by the daily check intensively. - The presence of odor, discoloration, and traces of heat generation - Loose connections - Additional fastening
Cables and hoses	• Regarding the grounding wire (for this product, base material, etc.), input and output cables, cables for the torch switch, remote control unit, etc., and hoses (for gases, and for water supply and drainage when using the water-cooling torch), check those items that are not covered by the daily check (See page 12-1) intensively.
Inspection and maintenance of consumable parts	• A cooling fan and electrolytic capacitor have a given electrical and mechanical life respectively. • [When they are used under the rated specifications, the life of the cooling fan is about 10,000 hours, and that of the electrolytic capacitor is about 8,000 hours. Their actual duration depends on how those items are used by customers.] • In case of a regular check, perform their inspection and maintenance on the basis that the cooling fan and the electrolytic capacitor are a kind of consumables. • When replacing them, make sure to use genuine parts for Panasonic welding machine to maintain the performance and functions of the product.
Change of cooling water for cooling water equipment	When using cooling water equipment, change its cooling water with fresh water regularly. (For details, follow the instruction manual of the cooling water equipment.)

7.2.2 [Time period for which customers-set conditions can be maintained]

In case this product is left unused, and if it is desired to maintain its set conditions, turn the power on once every two weeks for about 10 minutes. (No need to do welding)

It is about 3 weeks without the power turned on.
In about 3 weeks without the power turned on, each set condition returns to the factory setting.

7.3 Precautions in performing withstand voltage test and insulation resistance measurement

Do not perform the withstand voltage test and the insulation resistance measurement carelessly, or failures may be caused as the unit is equipped with semiconductor parts including transistors.

- If your internal regulations define to carry out these test, observe the following
  test preparation procedure. (The following procedure is explained under the condition with the top panel and the right and left panel removed.

7.3.1 Test preparation

- **Connection cables and signal wires**

(1) Disconnect connection cable and signal wire connected to the following terminals and connectors.
Output terminals, Wire feeder connector, the Jig terminal, RS-232C connector and RS-422 connector.

(2) Before disconnecting the unit input cable from the power box switch secondary side and the unit input terminal, make sure to switch OFF the power box.

- **Primary side**

		**Make sure to work at least 5 minutes after the power is turned off.** The capacitor may still have some voltage left even if the power switch is turned off. To prevent a physical accident caused by an electric shock or a spark,

(3) Short-circuit the unit input terminals collectively (total 3 terminals).

(4) Keep the power switch ON side.

(5) Short-circuit the diode D1(+)(wire #8) and (-)(wire #9).

(6) Short-circuit the capacitors: C1 (+) and (-)*.
The capacitors may still have voltage. Wait for 5 minutes or more after the power is OFF before starting to work.

(7) Short-circuit output terminal of IGBT-Q1(wire #7), and output terminal of IGBT-Q2 (wire #11).

(8) Short-circuit output terminal of IGBT-Q3 (wire #117) and IGBT-Q4 (wire #12).

(9) Further collectively short-circuit the above 3, 5, 6, 7 and 8.

- **Secondary side**

(10) Short-circuit anode and cathode of Diode D2.

(11) Short-circuit anode and cathode of Diode D3.

(12) Short-circuit the (-) output terminal and (+) output terminal.

(13) Further collectively short-circuit the above 10, 11, and 12.

- **Primary and secondary side**

(14) Further collectively short-circuit the above 9 and 13.

- **Case ground cable**

(15) Disconnect a case ground cable near the transformer Tr1.

(16) Disconnect two case ground cables near the DCL L2.

- **PC board**

(17) Disconnect all the connectors put in the PC board.

- Prepare jumper cables (cross section 1.25 mm^2 approx.) with a clip to short-circuit each device.
  (The figure on the following page shows the locations of the device to be short-circuited. The numbers in the figure agree with the numbers in the following test preparation procedure.)
- When cables and connectors are disconnected, put tags or take notes to return as they were.

7.3.2 After the test completes

WARNING	If power is ON without removing the jumper bar for test, devices may be damaged or burnt out.
CAUTION	Unless cables removed for test are returned, the unit may not operate or may malfunction.

Remove all the short-circuited cables for the test and return the disconnected cables as they were according to the following procedure.

- Reconnect the ground cables and connectors on the PC board as they were.
- Return the dust cover, top panel, right panel, and left panel as they were.
- Connect the input power cable to the input terminal and return the terminal cover.
- Connect the input power cable to the power box switch.

8. Troubleshooting

DANGER	**Touching the current-carrying parts may cause a fatal electric shock or burn injury.** To prevent a physical accident, such as an electric shock, burn injury, etc., make sure to observe the followings.
	• Make sure to turn off the power and other switches of all devices* for safety reasons before taking any actions for correcting an error. *: Means this product, the distribution box and other related devices (jigs, robots, etc.) • As for the inside inspection, make it at least 5 minutes after turning the power off in consideration of electric discharge from a capacitor.

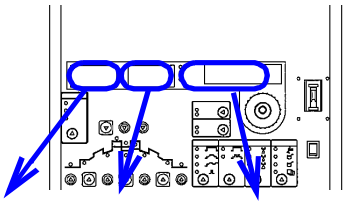
CAUTION	• When the power switch is turned off automatically, contact sales distributor or Panasonic representatives without turning it on again. • The power switch uses a non-fuse circuit breaker. If over-current occurs for some reasons, the power is turned off automatically (tripping). Do not turn it on again. • (It is dangerous to turn the power on again without removing the cause of such over-current.)

Notice **Do not turn the power on with the top panel and/or side panel of this product removed.**

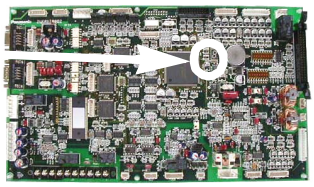
The electromagnetic force may cause troubles (deformation, mechanical contact, etc.) to the inside devices and parts, and may break them and/or affect their functions and performance.

8.1 Error codes and messages

- This product is designed to indicate an error status on the front panel (See the following figure) as shown in the following table when an error occurs and it can be self-examined.
- In the case of welding errors that are not covered in the following table, see “Troubleshooting” table.



- Those error code is also indicated on the 7-segment LED on the PC Board (ZUEP1398) inside the product.



Err	Code	Message	Remedy
Err	-01	EmergencyStop	**An emergency stop signal was input from external equipment connected to the jig terminal.** • Turn off the power switch of this product, remove the causes of the emergency stop signal of the external equipment, and then turn the power on.
Err	-02	Sec. OverCurrent	It may be failure of this product. Please contact sales distributor or Panasonic representative.
Err	-03	Temp. Over Error	**The temperature inside this product has been increased.** • Do not turn the power off until the temperature inside this product is reduced. (When the inside is cooled down, such error indication disappears automatically.) • Remove the causes of such temperature increase (excessive usage ratio, the presence of foreign substances near the side ventilator and/or the rear air inlet, etc.).
Err	-04	Pri. OverVoltage	**The input voltage has exceeded the permissible limit.** • Turn off the power of this product, set the input voltage to the rated voltage plus 10% or less, and then turn it on again.
Err	-05	Pri. Low Voltage	**The input voltage is lower than the permissible limit.** • Turn off the power of this product, set the input voltage to the rated voltage minus 10% or more, and then turn it on again.

Err	Code	Message	Remedy
Err	-06	Arc StartError	**The arc did not start within 30 seconds after the torch switch was turned on.** • Turn the torch switch off, and the error indication disappears automatically. • Refer to page 14-3, and remove the causes why the arc did not start accordingly.
Err	-07	TorchSW Error	**This product was switched on with the torch switch turned on.** • Turn off the power of this product and the torch switch, and then turn on only the power switch again. • As for the torch switch, turn it on at least 3 seconds after turning the power switch on for safety reasons.
Err	-08	Curr.DetectError	It may be failure of this product. Please contact sales distributor or Panasonic representative.
Err	-11	WaterCircuitErr	**A "WaterCircuitErr" signal was input from external equipment, such as cooling-water equipment, etc. connected to the jig terminal.** • When the input of the **"WaterCircuitErr"** signal is stopped, the error indication disappears automatically. • Check for the clogging of cooling-water equipment, the concentration of coolant solution, the bending of supply and return hoses for the torch cable, etc. to secure the flow rate of cooling water.
Err	-12	GAS Protection	It may be failure of this product. Please contact sales distributor or Panasonic representative.
Err	-13	Sec. OverVoltage	**During the MIX TIG and AC TIG welding, the output-side cables are used winding them in small coils.** • Use the output-side cables preferably without winding them in coils (When using them in a state of coils unavoidably, wind them in 300É" or larger coils.) (See section "Connection: Output cables") • To reset, turn the power off.
Err	C30 | C39	A status is indicated according to each number indication.	Indicates the contents of a communication error between external devices (personal computer, etc.) and this product. • When this error occurs, turn off the power of the external device and this product. (Power reset)
-	-	CT Offset Error	It may be failure of this product. Please contact sales distributor or Panasonic representative.
-	-	System Mem.Fail!	

Notice **About "Err-06:Arc StartError**

When the arc does not start for more than 2 seconds after turning the torch switch on, the high frequency wave is generated intermittently for safety reasons on the basis that some failure (See page 14-3) has occurred, and after additional 30 seconds or more, the "Err-06 Arc start error" is indicated and the operation is stopped.

Notice **About "Err-05:Pri. LowVoltageÅh at power off**

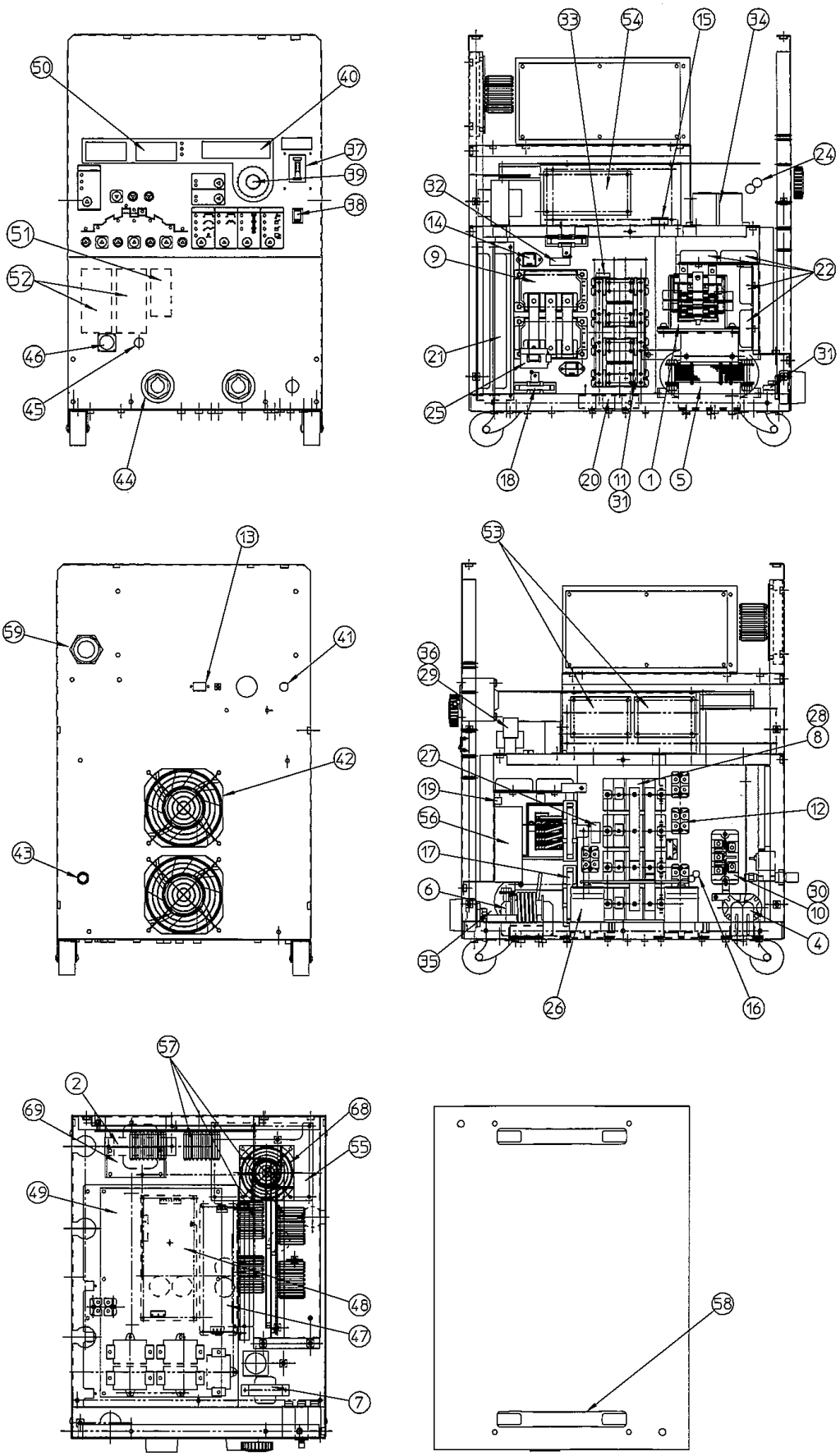
when turning the power off, it is not an error. (It is just indication of detection of the reduced primary voltage due to the power cutoff.)

8.2 Troubleshooting table

* In the case of welding errors without any error (Err) indication, refer to the following table to search for their causes.

Check item	Probable causes	Front panel display is not turned on	Neither high frequency wave nor arc is generated.	High frequency wave is generated without arc.	Bead turns black.	Lack of arc occurs.	Insufficient arc start	No gas supply	Gas flows without stop
Distribution box (Input protection device)	• Switch is not ON. • Blown fuse. • Tripping of circuit breaker. • Loose connections.		O					O	O
Input cable	• Cable is disconnected or severed. • Loose connections. • No phase.		O					O	O
Switches	• Switch is not ON.		O					O	O
	• “GAS” switch is placed to “Purge”.	O							
Gas cylinder and Gas regulator	• Main cock is not open. • Gas nearly runs short. • Insufficient flow rate.		O	O	O	O	O		
	• Excessive flow rate.			O	O				
Gas hose (From gas cylinder to torch.)	• Loose connections • Hose is damaged.		O			O			
Torch cable	• Torch is bent at acute angle. • Coating is damaged. • Sign of insulation deterioration.		O	O		O			
	• Torch switch is not ON.							O	
Around the torch body	• Insufficient fastening of the collet. • Sizes of collet body, collet and electrode do not match. • Insufficient fastening of the torch body.					O	O		
	• Attach an earth ring ass’y.			O					
Cables on the base metal	• Insufficient cable size (sectional area.) • Loose connections • Poorly energized base metal.			O	O		O		
Welding conditions	• Check torch angle, distance between electrode and base metal once again.			O	O		O	O	
Factory settings	• Try to set “**Hot Cur Level**” to “High”			O					
	• Try to set “**AR Arc Recovery**” to “ON”.				O				

9. Parts list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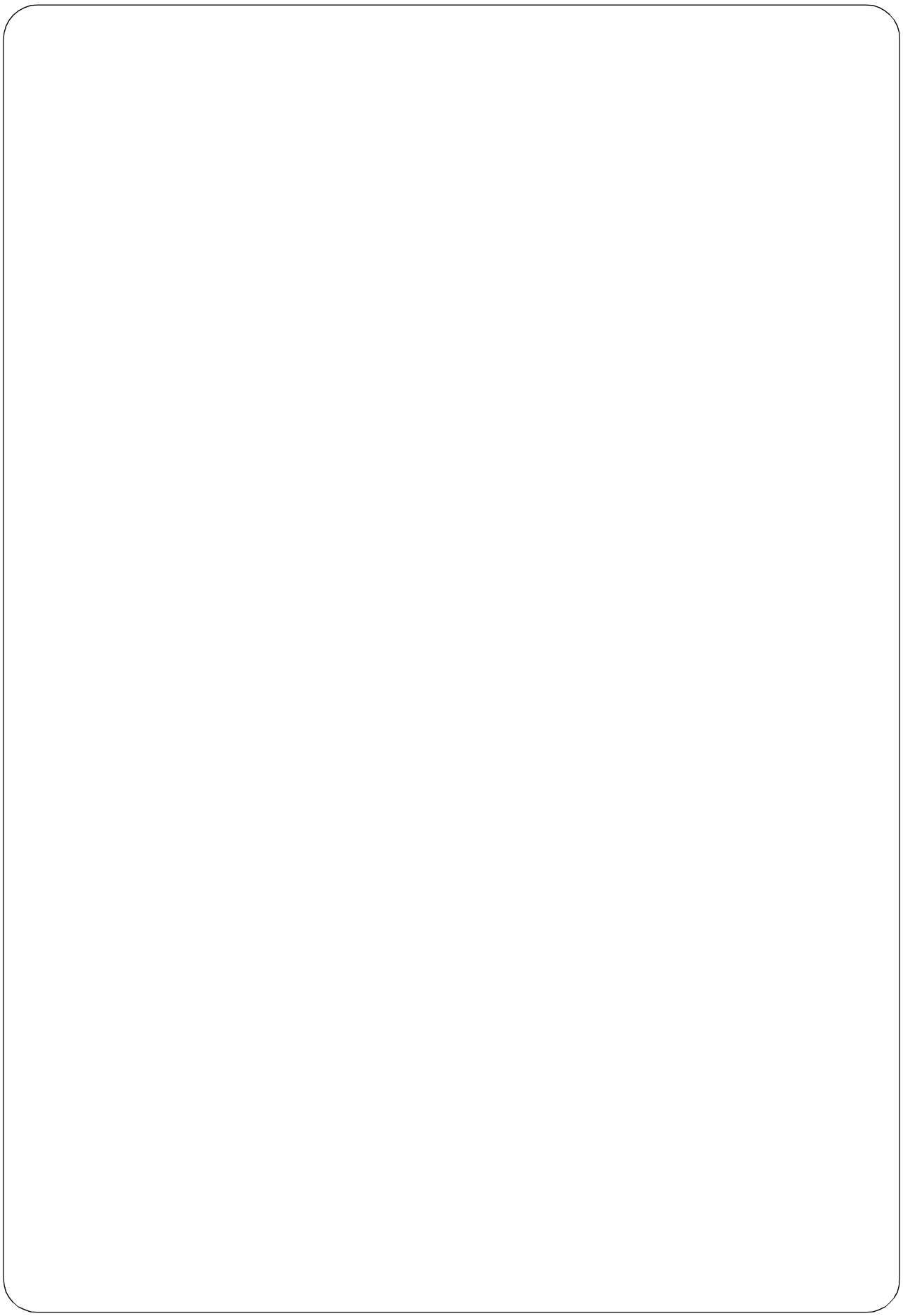
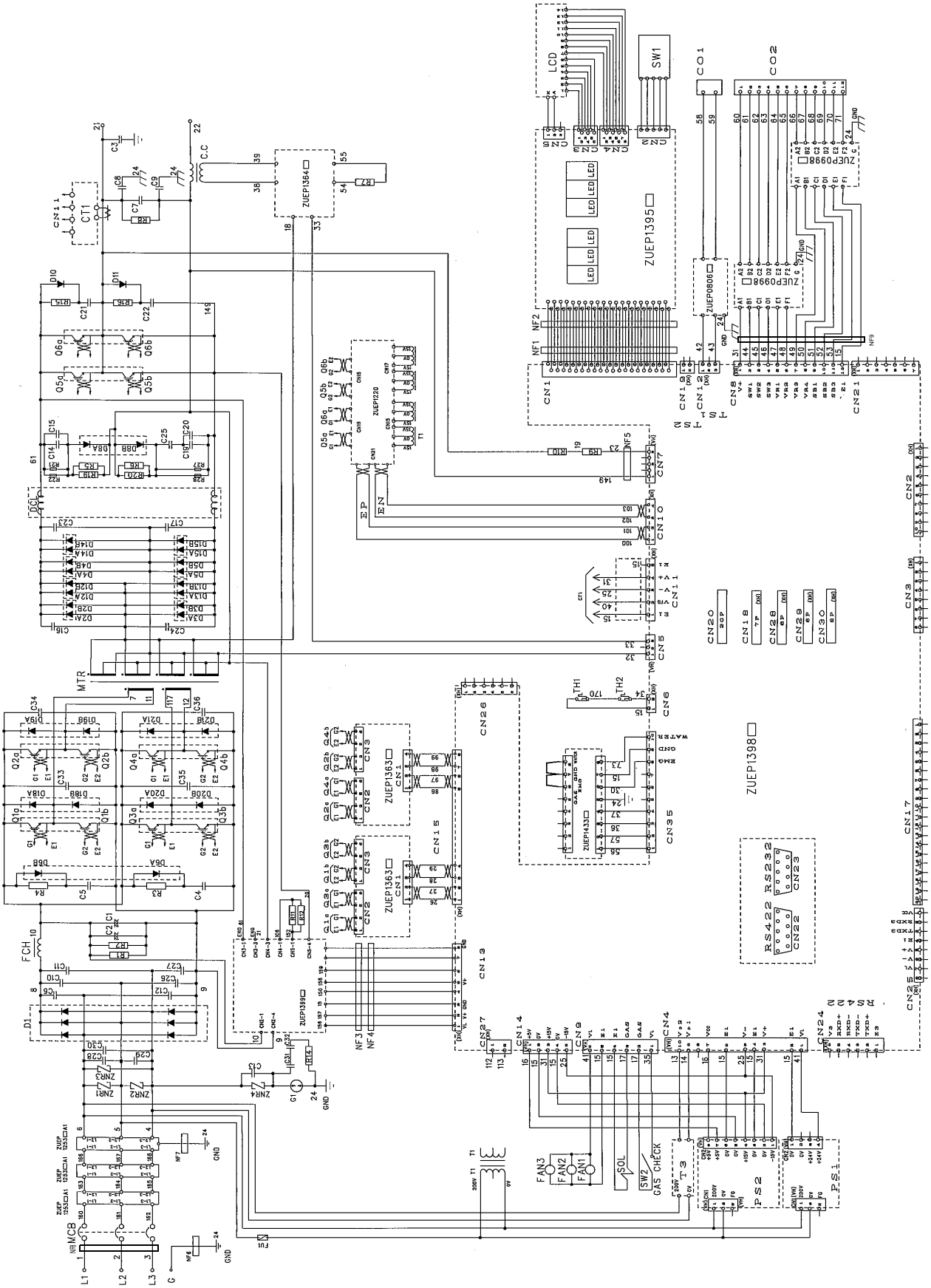
No.	Mark	Parts number	Description	Q'ty	Note	Internal code
1	MTr	CTU00039	Main transformer	1		CTU00039
2	TI	UTU19750	Control transformer	1		UTU19751
4	FCH	CLU00031	FCH	1		CLU00031
5	DCL	CLU00041	DC reactor	1		CLU00041
6	CC	CLU00042	Coupling coil	1		CLU00042
7	T3	UTU20880	Control transformer	1		UTU20880
8	Q1-4	YCAD39	IGBT	4		CM100DUS12
9	Q5-6	YZA/EEA003	IGBT	2		CM300DU12F
10	DI	YCA16	Diode	1		DF75LB160
11	D2-5,D12-15	YCAD38	Diode	8		DSE12X101-06
12	D6,D18-21	YCAD38	Diode	5		DSE12X101-06
13		JEZ-9S	D-sub connector	1		JEZ-9S
14	D10,11	FRG25BA60	Diode	2		FRG25BA60
15	D8	YCAD38	Diode	1		DSE12X101-06
16	RI,2	CEX00083	Resistor	2		CEX00083
17	R3,4	SFW40A5R0AP	Resistor	2		SFW40A5R0A
18	R15,16	SFW40A5R0AP	Resistor	2		SFW40A5R0A
19	R7	SFW20A151	Resistor	1	20W,150Ω	SFW20A151
20	R9,10	SFW40A750	Resistor	2	40W,75Ω	SFW40A750
21	R11,12	SMRK220W101K	Resistor	2		SMRK220W10
22	R5,6,19,20	SMRK220W200K	Resistor	4		SMRK220W20
24	R21,22,27,28	CEX00083	Resistor	2		CEX00083
25	CTI	YCA6	C.T.	1		TN300A4VB15
26	C1,2	YCA23	Capacitor ass'y	2		RWE45LGSN1
27	C4,5	CEX00111	Capacitor ass'y	2		CEX00111
28	C33-36	CEX00109	Capacitor ass'y	1		CEX00109
29	C28-30	CEX00094	Capacitor ass'y	1		CEX00094
30	C6.10-12,26,27	DEX00114	Capacitor ass'y	1		DEX00114
31	C3	CEX00112	Capacitor ass'y	1		CEX00112
32	C21,22	CEX00110	Capacitor ass'y	、2		CEX00110
33	C16,17,23,24	CEX00113	Capacitor assembly	4		CEX00113
34	C14,15,19,20,25	YCA12	Capacitor	5	350V 20	SS351206PPQ
35	C7-9,R8	CEX00115	Capacitor ass'y	1	Cleaning unit	CEX00115
36	ZNRI-4	CEX00108	ZNR ass'y	1		CEX00108
37	MCB	YCA22	Power switch	1	Power	1AL60A250V/C
38	SW2	SLE6A2	Switch	1	Gas purge	SLE6A2
39	SWI	YCA11	Encoder	1	Jog dial	RE21BARE100
40	LCD	CORE103-200	LCD	1		CORE103-200
41	FUI	BET3.15A	Fuse	1		BET3.15A
42	FAN1,2	SCNDM24Z791	Cooling fan	2		SCNDM24Z79
43	SOL	CEX00117	Gas valve	1		CEX00117

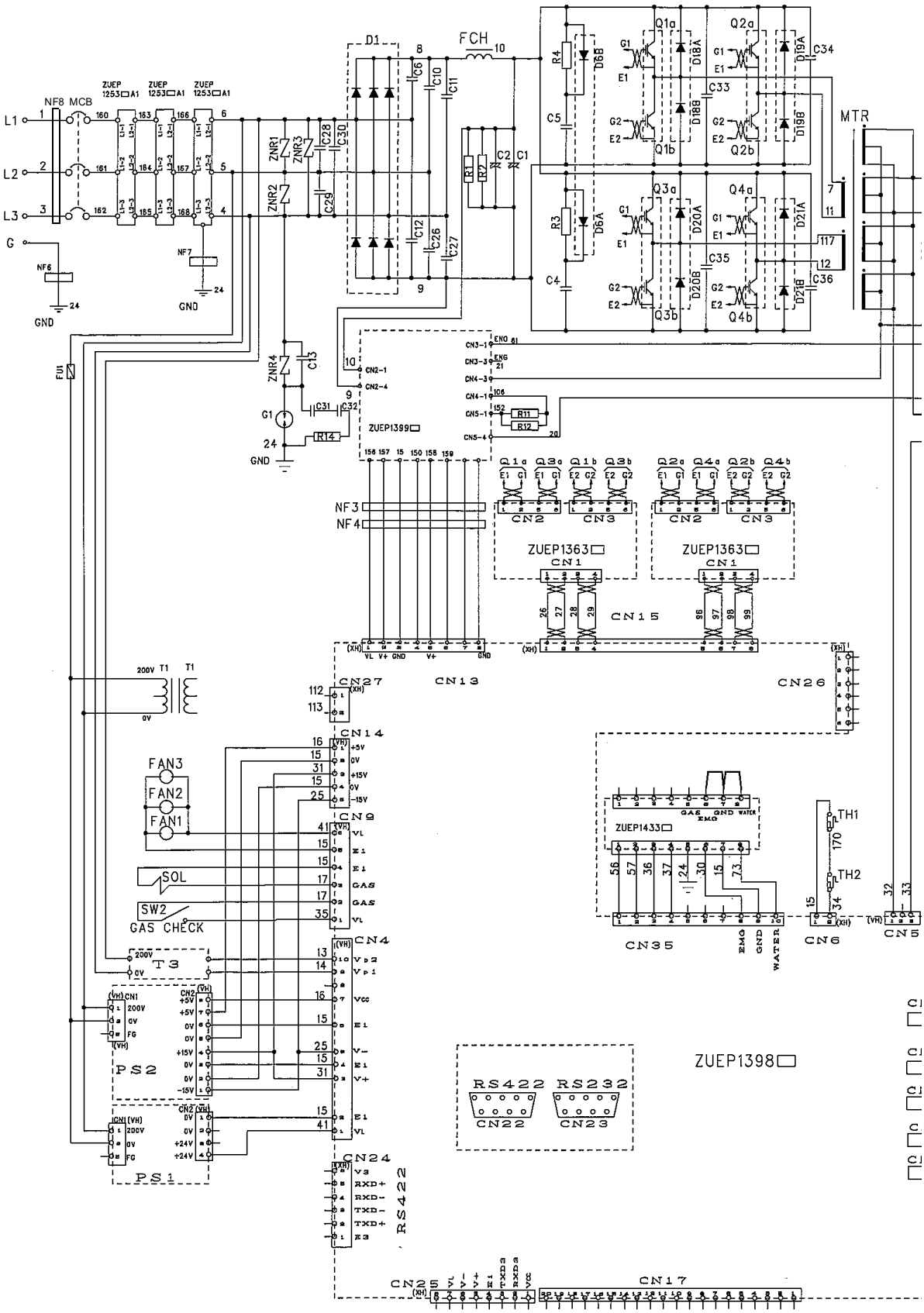
No.	Mark	Parts number	Description	Q'ty	Note	Internal code
44		YCA4	Output terminal	2		D1XBE50
45	CO1	CN70AJ2P	Receptacle	1	Torch switch	CN70AJ2P
46	CO2	YCA5	Receptacle	1	Remo-con	NR2012RF
47	PS1	YCAD44	DC power supply	1		LDA50F24-1
48	PS2	YCAD45	DC power supply	1		LDA60F2-1
49		ZUEP1398	PC Board	1	Main control	ZUEP1398
50		ZUEP1395	PC Board	1	Operation	ZUEP1395
51		ZUEP0806	PC Board	1	Filter	ZUEP0806
52		ZUEP0998	PC Board	2	Filter	ZUEP0998
53		ZUEP1363	PC Board	2		ZUEP1363
54		ZUEP1220	PC Board	2	Driver	ZUEP1220
55		ZUEP1399	PC Board	1	Super-impose	ZUEP1399
56		ZUEP1364	PC Board	1		ZUEP1364
57		ZUEP1253A1	PC Board	3		ZUEP1253A1
58		YMW4	Handle	2		AP829-2
59		-	Cord lock	1		
68		YZA/EEP001	Cooling fan	1		PUDC24D4
69		ZUEP1433	PC Board	1	Jig terminal	ZUEP1433



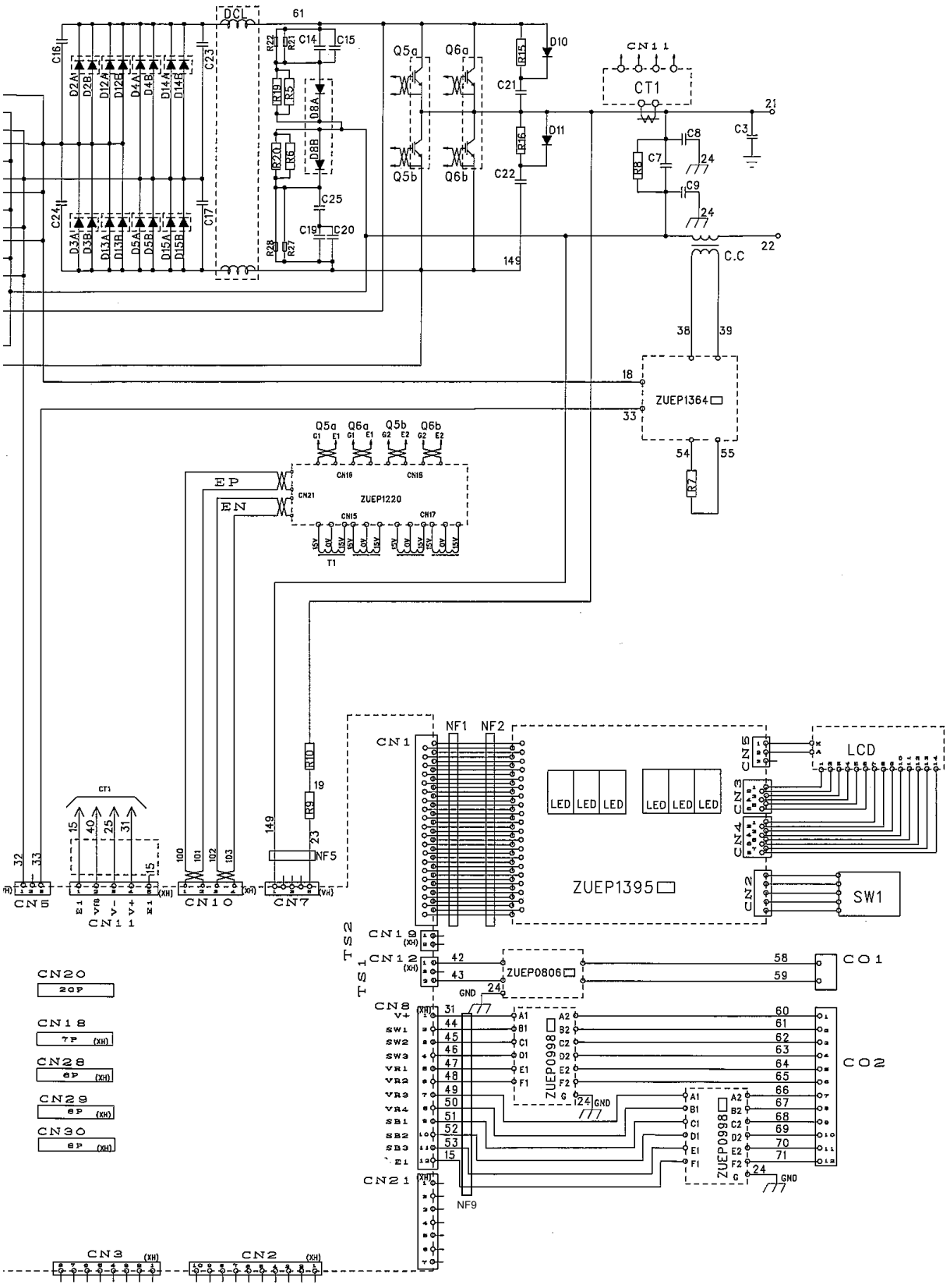
10. Circuit diagram



10.1 Enlarged (left half)



10.2 Enlarged (right half)



11. Appendix

11.1 Welding conditions table

11.1.1 TIG welding conditions table (Reference)

- The list of TIG welding conditions shown in this chapter is a reference value as a guideline for standard welding conditions.
- In actual welding operations, work out an appropriate condition in consideration of the shape of substances to be welded, a welding position, etc.
- In case arc is not stable in the low current range, refer to section “Troubleshooting.”

TIG welding conditions table: Stainless steel (DC)

Thickness of base metal	Joint	Welding current (A)			Welding speed	FIller wire size (Dia.)	Gas flow rate
mm		Downward	Vertical	Upward	cm/min	mm	L/min
0.5	Butt	10 - 15	10 - 15	10 - 15	40	- 1.0	4
	Lap	10 - 15	10 - 15	10 - 15	20		4
	Fillet	10 - 20	10 - 20	10 - 20	40	- 1.0	4
	T-shape	15 - 20	15 - 20	10 - 20	35		4
1.0	Butt	30 - 40	30 - 40	30 - 40	15 - 40	1.0 - 1.6	5
	Lap	40 - 50	40 - 50	40 - 50	15 - 30	1.0 - 1.6	5
	Fillet	45 - 60	45 - 55	45 - 60	20 - 40	1.0 - 1.6	5
	T-shape	50 - 60	50 - 60	50 - 60	10 - 35	1.0 - 1.6	5
1.5	Butt	60 - 100	60 - 80	60 - 70	15 - 80	- 1.6	5
	Lap	60 - 100	70 - 100	80 - 90	15 - 80	- 1.6	5
	Fillet	60 - 80	60 - 70	60 - 70	20 - 40	- 1.6	5
	T-shape	70 - 80	70 - 90	70 - 90	10 - 20	- 1.6	5
2.5	Butt	100 - 120	90 - 110	90 - 110	20 - 80	1.5 - 2.5	5
	Lap	110 - 130	100 - 120	100 - 120	20 - 80	1.5 - 2.5	5
	Fillet	100 - 120	90 - 110	90 - 110	28 - 30	1.5 - 2.5	5
	T-shape	110 - 130	100 - 120	100 - 120	15 - 25	1.5 - 2.5	5
3.0	Butt	120 - 140	110 - 130	105 - 185	30	2.5	5
	Lap	130 - 150	120 - 140	120 - 140	25	2.5	5
	Fillet	120 - 140	110 - 130	115 - 135	30	2.5	5
	T-shape	130 - 150	115 - 135	120 - 140	25	2.5	5
4.5	Butt	200 - 250	150 - 200	155 - 200	25	3.0	6
	Lap	225 - 275	175 - 225	175 - 225	20	3.0	6
	Fillet	200 - 250	150 - 200	150 - 200	25	3.0	6
	T-shape	225 - 275	175 - 225	175 - 225	20	3.0	6
6.0	Butt	275 - 350	200 - 250	200 - 250	25	4.5	6
	Lap	300 - 375	250 - 250	225 - 275	20	4.5	6
	Fillet	275 - 350	200 - 250	200 - 255	25	4.5	6
	T-shape	300 - 375	225 - 275	225 - 275	20	4.5	6
12.0	Butt	350 - 450	225 - 275	225 - 275	15	6.0	7
	Lap	375 - 475	230 - 280	230 - 280	15	6.0	7
	Fillet	375 - 475	230 - 280	235 - 280	15	6.0	7

TIG welding conditions table: Aluminum (AC, MIX)

Thickness of base metal	Joint	Welding current (A)			Welding speed	FIller wire size (Dia.)	Gas flow rate
mm		Downward	Vertical	Upward	cm/min	mm	L/min
0.8	Butt	20 - 40	10 - 20	10 - 20	20 - 40	- 1.2	5
	Lap	20 - 50	10 - 20	10 - 20	15 - 40	- 1.2	5
	Fillet	20 - 40	10 - 20	10 - 20	20 - 40	- 1.2	5
	T-shape	20 - 40	10 - 20	10 - 20	5 - 15	1.0 - 1.2	5
1.2	Butt	30 - 60	20 - 30	20 - 30	15 - 40	- 1.6	6
	Lap	30 - 60	20 - 30	20 - 30	15 - 40	- 1.6	6
	Fillet	30 - 60	20 - 30	20 - 30	15 - 40	- 1.6	6
	T-shape	30 - 75	24 - 35	25 - 35	15 - 30	- 1.6	6
1.6	Butt	60 - 80	40 - 60	40 - 60	15 - 40	- 1.6	7
	Lap	60 - 80	40 - 60	40 - 60	15 - 30	- 1.6	7
	Fillet	60 - 80	50 - 70	40 - 60	30	- 1.6	7
	T-shape	70 - 80	60 - 70	60 - 70	15 - 25	- 1.6	7
3.0	Butt	125 - 145	115 - 135	120 - 140	30	2.5 - 3.0	8
	Lap	140 - 160	120 - 145	130 - 160	25	- 2.5	8
	Fillet	125 - 145	115 - 135	130 - 150	30	- 2.5	8
	T-shape	140 - 160	115 - 135	140 - 160	25	1.5 - 2.5	8
4.5	Butt	190 - 220	190 - 220	180 - 210	28	3.0	10
	Lap	210 - 240	190 - 220	180 - 210	28	3.0	10
	Fillet	190 - 220	180 - 210	180 - 210	28	3.0	10
	T-shape	210 - 240	190 - 220	180 - 210	15	3.0	10
6.0	Butt	260 - 300	220 - 360	210 - 225	25	3.5 - 4.5	12
	Lap	290 - 340	220 - 360	210 - 225	20	3.5 - 4.5	12
	Fillet	280 - 320	220 - 360	210 - 225	25	3.5 - 4.5	12
	T-shape	280 - 320	220 - 360	210 - 225	20	3.5 - 4.5	12
9.5	Butt	330 - 380	250 - 300	250 - 300	13	4.5 - 6.0	14
	Lap	350 - 400	250 - 300	250 - 300	13	4.5 - 6.0	14
	Fillet	350 - 400	250 - 300	250 - 300	13	4.5 - 6.0	14
	T-shape	330 - 380	250 - 300	250 - 300	13	4.5 - 6.0	14
12.0	Butt	400 - 450	290 - 300	250 - 300	8	4.5 - 6.0	15
	Lap	400 - 450	290 - 300	275 - 325	8	4.5 - 6.0	15
	Fillet	420 - 470	290 - 300	265 - 325	8	4.5 - 6.0	15
	T-shape	400 - 450	290 - 300	275 - 325	8	4.5 - 6.0	15

11.1.2 Tungsten welding rod

- As for the selection of tungsten welding rod diameters, refer to the following table.

Welding rod size (Dia.) (mm ϕ)	Welding current (A)			
	AC		DC	
	YWP	YWTh-2	**Electrode minus (-)** (DCEN)	**Electrode plus** (+)(DCEP)
			YWP YWTh-2	YWP YWTh-2
0.5	5 - 15	5 - 20	5 - 20	
1.0	10 - 30	10 - 40	15 - 80	
1.6	20 - 100	20 - 100	70 - 150	10 - 20
2.4	60 - 130	60 - 180	150 - 250	15 - 30
3.2	100 - 160	120 - 240	250 - 400	25 - 40
4.0	130 - 240	160 - 380	400 - 500	40 - 55
4.8	170 - 300	180 - 360	500 - 800	55 - 80

- In the range of welding current for electrode minus (DCEN), the lowest value shows the minimum service current for YWP welding rod, and the highest value shows the maximum service current for YWTh-2 welding rod.
- YWP: Pure tungsten. YWTh-2: 2% thoriated tungsten
- If arc is not stable in the low current range, refer to section “Troubleshooting.”

11.1.3 TIG welding shield gas

- As for the TIG welding shield gas, use the welding argon gas.
- The incorporation of impurities, such as oxygen, moisture, nitrogen, etc. into the argon gas, can be a cause to blowholes, and reduces the quality of welding. (In AC TIG and MIX TIG, the cleaning activities also become less efficient, and the welding quality in bead appearance, penetration, etc. is considerably affected.)

11.1.4 Filler wire

- For the filler wire, material, which is same as base material, is used in general. In special cases including the welding of different metal, etc., select material depending on your purposes.
- As for the diameter of filler wire, an appropriate thickness is decided depending on the welding current in general.

Guideline for selecting filler wire diameter

Welding current (A)	Filler wire size (Dia.) (mm ϕ)
10 - 20	- 1.0
20 - 50	- 1.6
50 - 100	1.0 - 2.4
100 - 200	1.6 - 3.0
200 - 300	2.4 - 4.5

11.2 Welding conditions memorandum

In case the monitoring software is not used, it is recommended to keep a note of your selected welding conditions* for your convenience. (*: It is preferable to store such conditions.)

- t is preferable to store such welding conditions.
- Register your conditions in the program number list on the next page.
- Make a copy of and use the following table for each welding condition.

Program number	Material to be welded	Remarks
P		

Prepared on	Prepared by

Welding method	
	DC TIG
	AC TIG
	MIX TIG

Crater	
	OFF
	ON
	Repeat
	Spot

Pulse	
	OFF
	ON

AC waveform	
	Standard
	Hard
	Soft

(Column with thick frame: for “Pulse ON” / “-”: NA)

Method	Crater	Pre-flow time	Initial current	Up slope	Welding current	Down slope	Spot time	Crater time	Post-flow time	Pulse current	Pulse frequency	Pulse width	AC balance	AC frequency	MIX frequency	DC ratio
DC TIG	OFF		-	-		-	-	-					-	-	-	-
	ON, Repeat						-						-	-	-	-
	Spot		-	-		-		-		-	-	-	-	-	-	-
AC TIG	OFF		-	-		-	-	-							-	-
	ON, Repeat						-								-	-
	Spot		-	-		-		-		-	-	-			-	-
MIX TIG	OFF		-	-		-	-	-		-	-	-				
	ON, Repeat						-	-		-	-	-				

Factory setting item	Factory settings
V Disp Status	OFF
DCTIG StartPolar	EN
Hot Cur Level	Standard
Crater End Type	Normal
E.L. ShortStatus	OFF
Disp Hold Time	0.0 s
AC Arc Recovery	OFF

Set contents	MEMO
OFF ON	
EN EP	
Low Standard High	
Normal Torch switch	
OFF ON	
_____s	
OFF ON	

11.3 Program list

Program number	Material to be welded	Remarks	Prepared on	Prepared by
P01				
P02				
P03				
P04				
P05				
P06				
P07				
P08				
P09				
P10				
P11				
P12				
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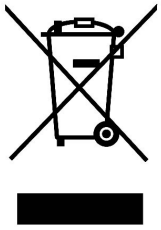
12. Information on Disposal

Information on Disposal for Users of Waste Electrical & Electronic Equipment (private households)



This symbol on the products and/or accompanying documents means that used electrical and electronic products should not be mixed with general household waste.

Please dispose of this item only in designated national waste electronic collection schemes, and not in the ordinary dust bin.

For business users in the European Union

If you wish to discard electrical and electronic equipment, please contact your dealer or supplier for further information.

Information on Disposal in other Countries outside the European Union

This symbol is only valid in the European Union.
If you wish to discard this product, please contact your local authorities or dealer and ask for the correct method of disposal.

♦CRM List

CRM	Description	Part number
Tungsten	PC board	ZUEP1364

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