

INVERTER PULSE TIG AC/DC WELDER



User Manual

English Version



Model: XTP4000ACDC





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★ Safety Precautions ★


- For proper use, please read this Operating Manual thoroughly before using the equipment.
- Safety precautions described in this Operating Manual will give you the information which enables you to handle the equipment safely to prevent any hazard or damage to you or others.
- Although this welding equipment is designed and manufactured taking into account safety adequately, be sure to observe safety precautions in this Operating Manual when operating this welding equipment. Not doing so may cause any fatal injury to the operator or others, resulting in death or serious injury.
- Improper use of the equipment may cause various levels of hazards and damages. In this Operating Manual, such hazards and damages are classified into two ranks by combination of attention attracting symbols and signal terms as follows for the purpose of warning indications. These attention attracting symbols and signal terms have the same meanings as those for warning labels on the equipment.


Attention attracting symbol	Signal term	Description
	Danger	A procedure which, if not properly followed, may cause extremely hazardous conditions, resulting in death or serious injury.
	Caution	A procedure which, if not properly followed, may cause hazardous conditions, resulting in medium or slight injury and/or only damage to objects.


※ Attention attracting symbols are intended as a guide for general warning indications.


Serious injury includes loss of sight, injury, (high temperature and/or low temperature) burns, electric shock, bone fracture, and poisoning which may cause any persistent aftereffect or which require hospitalization or long-term visit to hospitals for treatment. Further, medium and slight injury includes injury, burns, and electric shock, which do not require hospitalization or long-term visit to hospitals for treatment, and damage to objects denotes the widespread damage regarding any damage to property or equipments.

★ Safety Precautions to be Observed by Operators ★

	Danger	<p>To prevent serious injury to the operator or others, be sure to observe the following precautions.</p>
<ol style="list-style-type: none"> 1. Although this welding equipment is designed and manufactured taking into account safety adequately, be sure to observe safety precautions in this Operating Manual when operating this welding equipment. Not doing so may cause fatal injury to the operator or others, resulting in death or serious injury. 2. Perform any work of power source on the input side, select any location, handle and store and pipe high pressure gases, store workpieces welded, and treat wastes in accordance with legislations and/or regulations, and your company's standards. 3. Never allow any unqualified person to enter the surrounding area of this welding equipment or the welding area inadvertently. 4. Those who use heart pacemakers should not enter the surrounding area of this welding equipment in operation or the welding area without permission of the doctor. Welding equipment during energizing produces a magnetic field in the surrounding area which adversely affects the operation of such pacemakers. 5. For the purpose of safety, it is recommended that this welding equipment should be installed, maintained, inspected, and repaired by appropriately qualified persons or persons who are well familiar with welding equipments. 6. For the purpose of safety, it is recommended that this welding equipment should be operated by persons who have enough knowledges and skills to understand all safety precautions and instructions in the Operating Manual and to handle the equipment safely. 7. Do not use this welding equipment for applications other than welding. 		

	Danger	<p>To prevent electric shock, be sure to observe the following precautions.</p>
<p>※ Touching any parts that are electrically "live" or "hot" may cause fatal electric shock or burns.</p> <ol style="list-style-type: none"> 1. Never touch any parts that are electrically "live" or "hot". 2. Have qualified electricians perform earthing works of the Welding Power Source enclosure, base metal, and jig electrically connected to the base metal in accordance with local regulations (Electrical Facilities Technical Standards) 3. Before installing, maintaining, or inspecting this welding equipment, leave the equipment for over 5 minutes after turning off power supply at the distribution panel switch. Capacitors built-in may be electrically charged even after the power has been switched off. Before performing works, make sure that no charging voltage should be applied to such parts. 4. Do not use cables which have insufficient capacity, which are damaged, or in which any conductor is exposed. 5. Tighten cable connections securely and insulate it. 6. Do not operate this welding equipment with its cover or enclosure removed. 7. Do not wear broken or wet gloves. Always wear dry and insulated gloves. 8. Use a lifeline when performing works at any high elevations. 9. Carry out maintenance and inspection periodically, and use it after repair all damaged parts. 10. Turn off both the Mains ON/OFF switch on equipment and the distribution panel switch when not in use. 		

	<p>Caution</p>	<p>To protect you and others from arc rays, scattered spatter or slag, and loud noise produced during the welding processes, use safeguards.</p>
<ul style="list-style-type: none"> ※ Arc rays can cause your eyes irritation and burn your skin. ※ Scattered spatter or slag will damage your eyes and cause burns. ※ Loud noise can cause hearing loss. <ol style="list-style-type: none"> 1. To perform or monitor welding works, wear an eye protector with filter lenses providing sufficient scale number, or a welding face shield. 2. To protect your eyes from spatter or slag, wear goggles. 3. Wear safeguards including gauntlet type of welding safety gloves, long-sleeved clothing, leggings and spats, and leather aprons, etc 4. To protect others' eyes from arc rays, place protective booths, screens, or shields around the work area. 5. In case when noise levels exceed safe levels, wear protective earplugs and/or earmuffs 		

	<p>Caution</p>	<p>To protect you and others from fumes and gases produced during the welding processes, use safeguards.</p>
<ul style="list-style-type: none"> ※ Inhalation of gases and fumes produced during the welding processes can be dangerous and hazardous to your health. ※ Welding in confined spaces may cause oxygen deficiency, resulting in suffocation. <ol style="list-style-type: none"> 1. To prevent gas poisoning or suffocation, use local ventilating facilities set forth in legislations or regulations (Industrial Safety and Health Law, and Ordinance on Prevention of Hazards Due to Dusts and/or Fumes) or wear a respirator. 2. When welding in confined spaces, ensure that the welding area is adequately ventilated, wear the respirator, and perform the welding work under constant observation by an accredited person trained. 3. Never perform the welding work in the vicinity of degreasing, washing, and spraying operations. Doing so may cause harmful gases. 4. When welding a coated steel plate, ensure that the welding area is adequately ventilated, or wear the respirator. Welding the coated steel plate may produce harmful fumes or gases. 		



	Caution	To prevent fire, explosion, or rupture, be sure to observe the following precautions.
<ul style="list-style-type: none"> ※ Spatter or hot base metals immediately after the welding processes may cause fire. ※ Poor connections of cables or defective contacts in any current path on the base metal such as steel frame may cause overheating due to conducting current, resulting in fire. ※ Explosion can be caused by the welding arc produced on containers that may have held combustibles such as gasoline. ※ Rupture can be caused by welding enclosed tanks or pipes. <ol style="list-style-type: none"> 1. Keep combustibles away from scattered spatter. Cover combustibles that cannot be removed with incombustible shields. 2. Do not weld in the vicinity of flammable gases. 3. Keep hot base metals immediately after the welding processes away from combustibles. 4. When welding ceiling, floor, or wall, remove combustibles hidden adjacent to them. 5. Tighten cable connections securely and insulate it. 6. Connect work lead so that it should be positioned as close to the part welded as possible. 7. Do not weld a gas pipe that may have held any gas, or an enclosed tank or pipe. 8. Have a fire extinguisher handy in the vicinity of the welding area in preparation for emergency. 		

	Caution	To prevent the turnover of gas cylinder or the rupture of gas flow regulator, be sure to observe the following precautions
<ul style="list-style-type: none"> ※ Turnover of the gas cylinder may cause injury to the operator or others. ※ If gas cylinder containing a gas at high pressure is handled improperly, high pressure gas may flow out, causing injury to the operator or others. <ol style="list-style-type: none"> 1. Handle the gas cylinder according to legislations or regulations and your company's standards. 2. Use the gas flow regulator which is supplied with this welding equipment or which is in accordance with our recommendation. 3. Read and follow all warnings, safety precautions, and instructions in Operating Manual which is supplied with the gas flow regulator prior to use 4. Fix the gas cylinder on the special-purpose holder. 5. Gas cylinder shall not be exposed to high temperature. 6. Keep your face out of the gas cylinder outlet when opening the gas cylinder valve. 7. Be sure to attach a protective cap to the gas cylinder outlet when not in use. 8. Prevent the gas cylinder from being exposed to welding arc generated from the welding torch. Never touch the gas cylinder with the electrode. 		

**Caution**

To prevent injury caused by rotating parts, be sure to observe the following precautions.

- ※ Keep your hands, fingers, hair, or clothing away from rotating parts including a cooling fan or a feed roller of wire feeder. Failure to follow this may cause caught-in accident, resulting in injury.
1. Do not use the welding equipment with its enclosure or cover removed.
 2. When removing the enclosure of the welding equipment for the purpose of maintenance, inspection or repair, have appropriately qualified persons or persons who are well familiar with welding equipments perform such works, and place appropriate screen or fence around the welding equipment to prevent unqualified persons from coming close to it inadvertently.
 3. Keep your hands, fingers, hair, or clothing away from the cooling fan or feed roller in operation.



1. General Information

Thank you for purchasing our IGBT inverter controlled, complete digital type AC/DC TIG welding equipment.

This AC/DC TIG welding equipment, which is intended as a Power Source Unit for AC/DC TIG welding and manual welding, incorporates a high-performance microcomputer to achieve complete digital technology. An IGBT which is combined with the said built-in microcomputer, to provide a high-accuracy constant current circuit, accordingly, even in the event of main supply voltage fluctuation, arc voltage fluctuation due to welding torch movement, or ambient temperature fluctuation. this AC/DC TIG welding equipment is designed to maintain the welding current constantly.

In TIG welding mode, PULSE welding and AC/DC PULSE(hereinafter MULTI) welding processes are available. Further, the TIG welding provides UP-SLOPE and DOWN-SLOPE control features, enabling easy arc starting and completion control of welding.

For proper use, read and follow all safety precautions and instructions in this Operating Manual.

2. Specifications

(1) Welding Power Source Specifications

Model		XTP4000ACDC (Standard)
Welding mode		AC/DC TIG welding or Manual (STICK) welding
Rated supply voltage		Three phase 380/415V
Rated supply frequency		50/60Hz
Allowable supply voltage range		AC342V - AC457V
Rated mains power		24.0kVA
Rated welding current TIG / STICK welding		400A/400A
Rated welding voltage (TIG / STICK welding)		26V/36V
Maximum open circuit voltage (220V / 240V / 380V / 415V)		- / - / 57V/62V
Duty cycle [10min. period] (TIG welding)		60%
Adjustable range of welding current	TIG	DC5-400 AC10-400A
	STICK	DC5-400A AC10-400A
Voltage reduction function		18V + 10% / - 15%
Welding parameter memory		Available (Up to 5 programs)
Torch switch receptacle		12 pin
Water cooled torch		Available
Input cable		3.5mm ²
Cooling system		Forced air cooling by fan
Welding Power Source mass		40kg
Dimensions [W×H×L]		290mm×510mm×690 mm
Insulation class		H
Shell protection class		IP23S



Model		XTP4000ACDC (Input Dual Voltage)	
Welding mode		AC/DC TIG welding or Manual (STICK) welding	
Rated supply voltage		Three phase 220/240/380/415V Single phase 220/240V	
Rated supply frequency		50/60Hz	
Allowable supply voltage range		AC342V-AC457V/AC198V-264V	
Rated mains power		244VA	
Rated welding current TIG / STICK welding	380/415V	400A/400A	
	220/240V	250A/250A	
Rated welding voltage (TIG / STICK welding)		26V/36V	
Maximum open circuit voltage (220V / 240V / 380V / 415V)		62V/67V/57V/62V	
Duty cycle [10min. period] (TIG welding)		60%	
Adjustable range of welding current	TIG	DC5-400A AC10-400A	
	STICK	DC5-400A AC10-400A	
Voltage reduction function		18V + 10% / - 15%	
Welding parameter memory		Available (Up to 5 programs)	
Torch switch receptacle		12 pin	
Water cooled torch		Available	
Input cable		3.5mm ²	
Cooling system		Forced air cooling by fan	
Welding Power Source mass		40kg	
Dimensions [W×H×L]		290mm×510mm×690 mm	
Insulation class		H	
Shell protection class		IP23S	

(2) Welding Parameter Specifications
【Welding process selection】

Welding process selection	Welding mode					
	STICK		HF TIG		LIFT TIG	
	DC	AC	DC	AC	DC	AC
2 STEPS	O	O	O	O	O	O
4STEPS	X	X	O	O	O	O
REPEAT	X	X	O	O	O	O
SPOT	X	X	O	O	X	X
PULSE ON/OFF	X	X	O	O	O	O
MULTI	X	X	X	O	X	O

【Welding Parameters for XTP4000ACDC】

Welding Parameter	Parameter ranger	Factory setting	Incremental unit	Welding mode		
				STICK	HF TIG	LIFT TIG
PRE-FLOW	0.0 to 1.0sec	0.1sec	0.1sec	X	O	O
HOT START	0 to 70A	20A	1A	O	O	X
START CUR.	5 to 400A	30A	1A	X	O	O
RISE TIME	0.0 to 15.0sec	1.0sec	0.1sec	X	O	O
PEAK CUR.	5 to 400A	120A	1A	X	O	O
BASE CUR.	5 to 400A	80A	1A	O	O	O
SPOT TIME	0.5 to 5.0sec	2.0sec	0.1sec	X	O	X
PULSE WIDTH	15 to 80%	50%	1%	X	O	O
PULSE FREQ.	0.5 to 500Hz	100Hz	※A	X	O	O
PULSE WIDTH in MULTI mode	15 to 85%	50%	1%	X	O	O
PULSE FREQ. in MULTI mode	0.5 to 10Hz	1.0Hz	0.1Hz	X	O	O
AC FREQ.	15 to 150Hz	60Hz	1Hz	O	O	O
WAVE BALANCE	10 to 65%	50%	1%	O	O	O
FALL TIME	0.0 to 25.0sec	3.0sec	0.1sec	X	O	O
END CUR.	5 to 400A	30A	1A	X	O	O
POST-FLOW	0.0 to 60.0sec	10.0sec	0.1sec	X	O	O

※ A Incremental unit for PULSE FREQ. depends on the set PULSE FREQ. as follows.

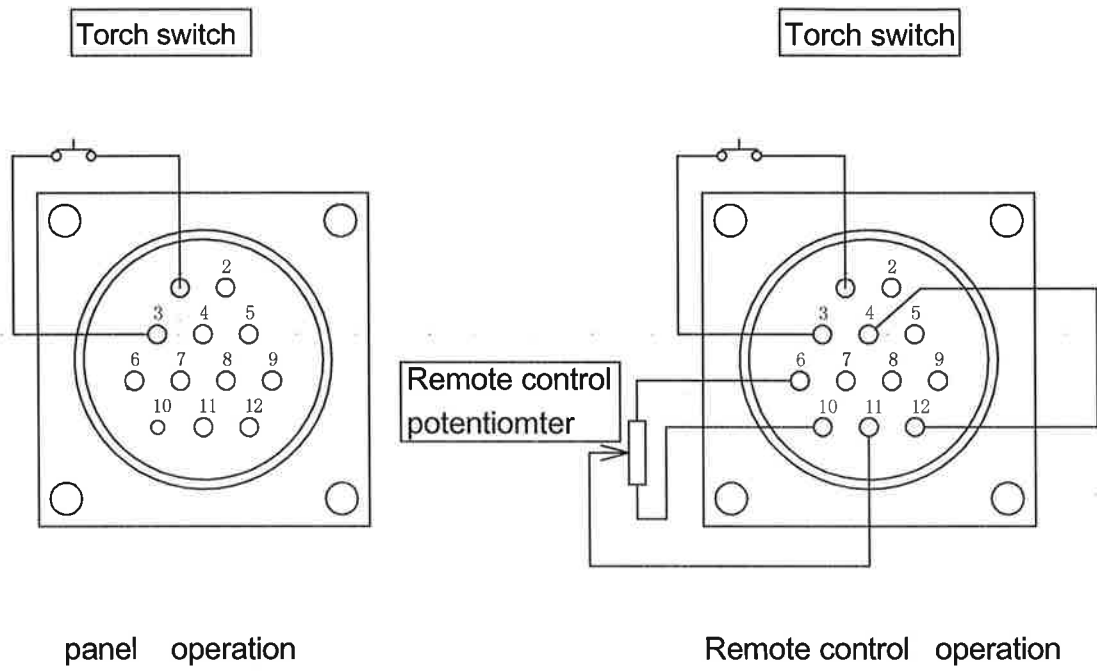
Set range for PULSE FREQ.	Incremental unit for PULSE FREQ.
0.5 to 20 Hz	0.1Hz
20 to 100Hz	1Hz
100 to 500Hz	5Hz

(3) Torch Switch Receptacle Specifications

【12-Socket Receptacle for TIG-400PACDC】

Operation	Socket pin	Connection	Reference diagram
Panel operation	1-3	Connect pins 1 & 2 to torch switch.	①
Remote control operation	1-3	Connect pins 1 & 2 to torch switch.	②
	4-12	Short-circuit between pins 3 & 7.	
	6-10-11	Connect pins 4, 5, and 6 to remote control potentiometer.	

※ The potentiometer for remote control should use 5k ohm. (Rated electric power is 0.5W or more.)



3. Installation Recommendations

(1) Preparation Prior to Installation

Before using this welding equipment XTP4000ACDC, make sure that the following facilities, which will be required, are ready.

【Main Supply Facilities】

Model	XTP4000ACDC
Installed capacity	18.0KVA or more
Mains supply voltage	380/415V
Number of phases and frequency	Three phase 50/60HZ
Fuse capacity (Class B)	30A

※ An individual distribution panel (with fuse built-in) should be provided for one unit of this XTP4000ACDC.

【Reference Cable Size】

Model	XTP4000ACDC
Input cable	5.5mm ² or more
Earth cable	5.5mm ² or more
Output cable	38mm ² or more (for electrode lead and/or work lead)

To prevent the excessive reduction of main supply voltage and to achieve the stable welding, the installation capacity and cable size should be kept as large as possible

【Gas for TIG welding】

Welding gas	Argon gas for welding in accordance with JIS K 1105(1961)
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※ Fix gas cylinders to gas cylinder holders or pillars to prevent turnover.

(2) Installation

※ Locate this XTP4000ACDC in structurally sound place such as concrete floor or sturdy base, excluding in the following ones.

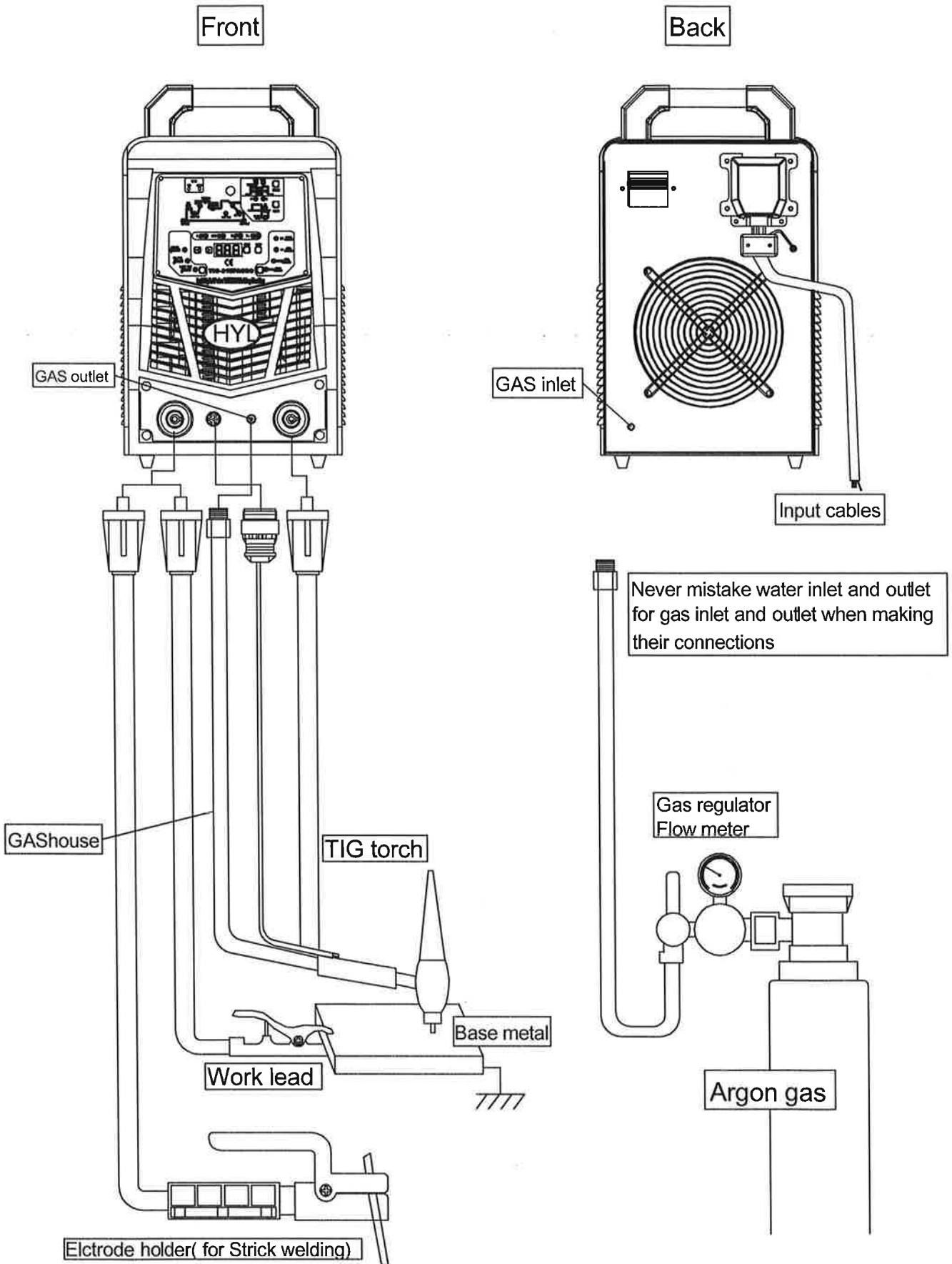
- In areas, exposed to wind or rain. .In areas where ambient temperature exceeds 40°C.
- In steam, or wet or damp areas. .In areas, exposed to oil steam.
- In areas, subjected to abnormal vibration or shock. .In areas, exposed to large amount of dust.
- In areas, exposed to harmful corrosive gases. .In areas where ambient temperature is below -10°C.
- In areas where altitude exceeds 1000m.

※ Care should be taken to ensure that the welding arc zone is not directly exposed to wind. Where necessary, have a windshield handy.

☆Note☆

- Use an input cable of 14mm² in case it is longer than 10m.
- Be sure to turn off the distribution panel switch prior to making electrical connections.
- Be sure to connect a green wire of the input cable to earth.
- Since this welding equipment is provided with a cooling system designed for intake at the front side and exhaust at the rear side, be sure to keep a distance of 20 cm or more from walls.
- In case of continuous operation for around 30 minutes at rated output or less, hot air will be exhausted from an exhaust port placed on the rear side of the Welding Power Source. Never touch the exhaust port directly. Further, be sure there is no combustible or flammable material in the vicinity of the exhaust port.
- To prevent malfunctions and/or breakdowns due to noise and lightning surge generated from the TIG welding equipments and/or other high frequency equipments, be sure to connect the earth terminal of this TIG-315PACDC to earth prior to use.

4. Connection

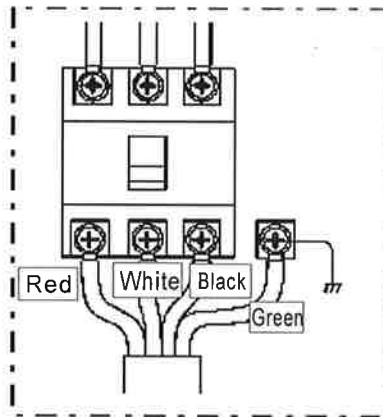


(1) Input Cable Wiring

Connect white, red, and black wires of the input cable of the Welding Power Source to the no-fuse breaker or switch (fuse built-in) on the distribution panel. Be sure to connect the green wire (bearing mark E) to earth.

Input cable	Part to which each wire is to be connected	Remark
	XTP4000ACDC	
Red wire	No-fuse breaker Distribution panel switch	
White wire		
Black wire		
Green wire	Earth	Bearing mark E

【Wiring on TIG-400PACDC】



☆ Before performing the input cable wiring, be sure to turn off the distribution panel switch.

(2) Gas Circuit Connection

Attach a regulator and then flow meter to an argon gas cylinder, and connect the flow meter to the gas inlet on the Welding Power Source using a specified gas hose which is supplied with this XTP4000ACDC.

(3) Output Side Connection of Welding Power Source

【In case of TIG welding】

- Connect a torch switch plug on torch to a torch switch receptacle on the Welding Power Source.
- Connect a quick joint plug for power feeding on the TIG welding torch to a -/TORCH AC output terminal on the Welding Power Source.
- Connect a gas fitting on the TIG welding torch to the gas outlet on the Welding Power Source.
- Connect a workpiece to be welded(base metal) to a +/WORK AC output terminal using the work le

【In case of Stick welding】

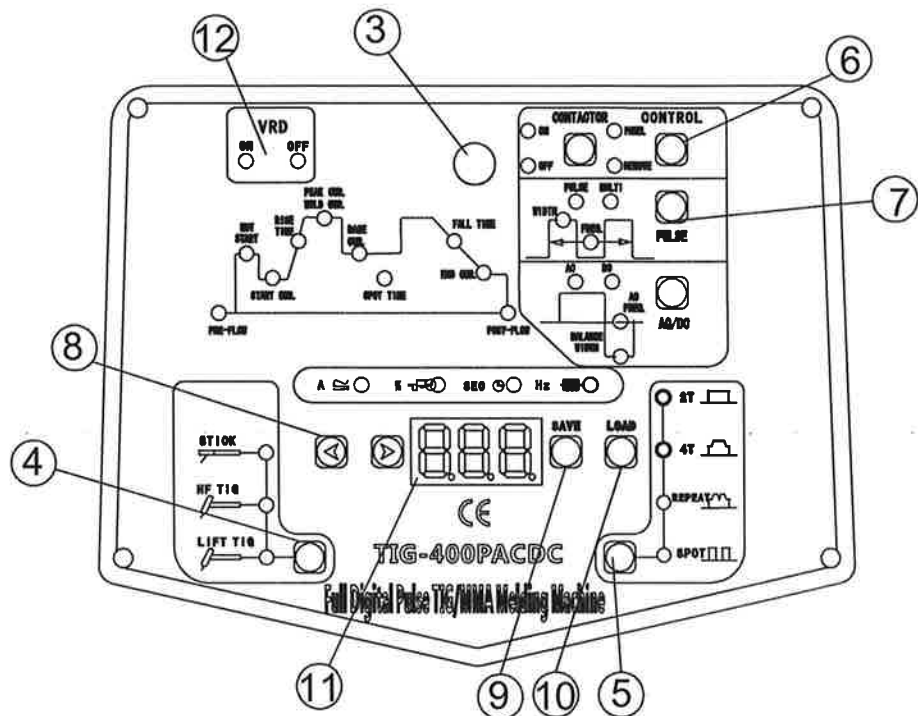
- Connect a stick the AC output terminal.
- Connect the workpiece to be welded(base metal) to the -/TORCH AC output terminal.
- ※ The work lead generally has a negative electrical connection (with the stick electrode connected to the "+" terminal) but in some cases a positive electrical connection (with the stick electrode connected to the "-" terminal).



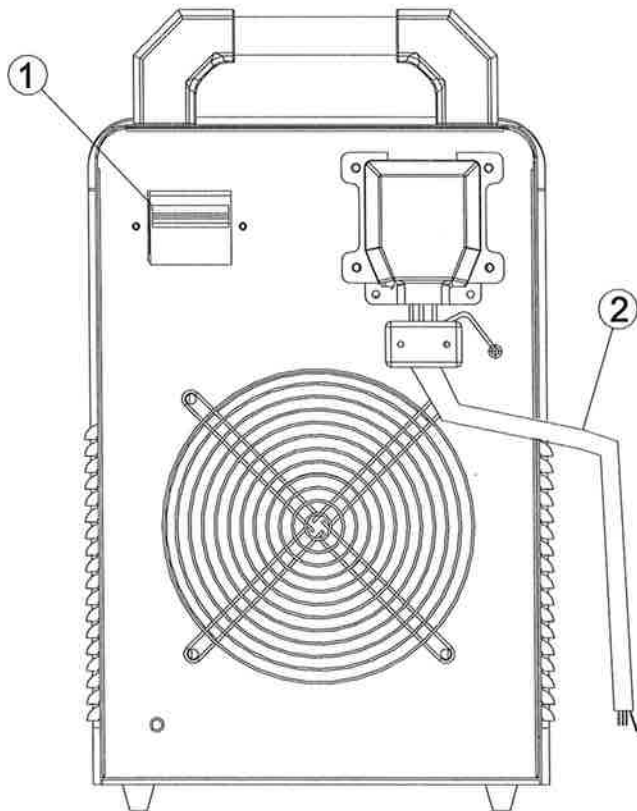
☆ Before performing the output cable wiring, be sure to turn off the Mains ON/OFF switch
 ☆ Tighten all connections securely enough to prevent poor connection and gas leakage, and insulate all exposed current conducting portions with tape.

5. Switch Selection and Regulator

[XTP4000ACDC Front panel]



[Rear panel]



【Functions of each switch and regulator】

① Main ON/OFF switch

This switch turns on/off the main power supply, but does not provide the overcurrent interruption function. Accordingly, be sure to connect any overcurrent protective device such as fuse or no-fuse breaker between this Welding Power Source and the mains power supply.

② Input cable

The input cable supplies power to the Welding Power Source. Connect this cable to the no-fuse breaker or switch on the distribution panel. Further, keep this cable straight without any coiled portion. A four-wire one for XTP4000ACDC

③ Parameter setting knob

This knob sets the selected welding parameter, and generally adjusts the welding current during operation. To change the welding current significantly/slightly, rotate this knob rapidly/slowly. Pushing this knob in provides the same function as that of pressing the right arrow of the Parameter selection buttons ⑧.

④ Welding mode selection button

This button sets the welding mode to STICK welding, HF TIG welding, or LIFT TIG welding.

☆Do not change the selected welding mode or welding process mode until POST-FLOW time has finished.

⑤ CRATER mode selection button

	STICK welding	TIG welding	Description
2 STEPS	○	○	Normal welding operation without crater
4 STEPS	×	○	Welding operation which achieves a crater control, enabling easy arc starting and completion control in TIG welding mode. Refer to Note A given below.
REPEAT	×	○	Welding operation which repeats the said crater control.
SPOT	×	○(Note B)	Arc spot welding operation designed for tack welding

Note A To set CRATER control parameters, including START CUR, RISE TIME time, FALL TIME time, and END CUR, select this TIME mode, light up the LED for the desired CRATER control parameter with the Parameter selection buttons ⑧, and set value with the Parameter setting knob ③.

CRATER control parameters to be set	Description
START CUR.	This parameter is used to increase the welding current gradually at the start of welding, and is set for the purpose of welding initiation point confirmation or preheating.
RISE TIME time	This parameter is used to adjust the time for the welding current to ramp up from INITIAL CUR. to PEAK CUR. or BASE CUR.
FALL TIME time	This parameter is used to adjust the time for the welding current to ramp down from PEAK CUR. or BASE CUR. to CRATER CUR.
END CUR.	This parameter is used to reduce the welding current gradually at the completion of welding, enabling to eliminate any indent(crater) that can form in the weld pool on the workpiece to be welded(base metal).

Note B SPOT mode is available only in case the welding mode is set to HF TIG welding mode with the Welding mode selection button ④.

⑥ PULSE /MULTI mode selection button

This button selects PULSE/MULTI OFF, PULSE, or MULTI mode. MULTI mode is available only when AC mode is selected. To set PULSE FREQ. and PULSE WIDTH in PULSE or MULTI mode, select PULSE or MULTI mode, light up the LED for the desired parameter with the Parameter selection buttons ⑧, and set value with the Parameter setting knob ③.

As for setting and operation in PULSE and MULTI mode, refer to the following table.

PULSE/MULTI mode selection	PULSE mode	MULTI mode
Welding current waveform	<p>PULSE WIDTH. = $\frac{T_p}{T} \times 100\%$ PULSE FREQ. = $\frac{1}{T}$ [Hz]</p>	<p>PULSE WIDTH. = $\frac{T_p}{T} \times 100\%$ PULSE FREQ. = $\frac{1}{T} \times$ [Hz]</p>

⑦ AC/DC selection button

This button selects AC/DC output. To set AC FREQ. and cleaning time width (hereinafter WAVE BALANCE), select AC mode, light up the LED for the desired parameter with the Parameter selection buttons ⑧, and set value with the Parameter setting knob ③.

※ The AC FREQ. is generally set to 60 to 100Hz. In particular, in case of sheet welding, setting the high AC FREQ. may enhance weld ability.

※ WAVE BALANCE can be generally described as shown in the following table.

WAVE BALANCE control point	10% Too narrow	65% Too broad
Current waveform		
Penetration	Deep 	Shallow
Electrode consumption	Slight	Significant

⑧ Parameter selection buttons

These buttons light up the LED for the desired parameter. Pressing the right/left arrow button moves to the right/left parameter. The parameters not available in each mode are skipped. Further, pressing the right arrow button is replaced by pushing the Parameter setting knob ③ in.

⑨ Parameter save button (Available only on TIG-400PACDC)

Pressing this button can save a total number of 5 programs of the current welding parameters into the TIG-315PACDC memory. After pressing this button, select a memory location by rotating the Parameter setting knob ③, and push the Parameter setting knob ③ in to confirm the desired welding parameter. (Pushing the Parameter setting knob ③ in can be replaced by pressing the right arrow button of the Parameter selection buttons ⑧.) Welding parameters which can be saved are those listed in Section 2.(2) "Welding Parameter Specifications" on pages 7 and 8.

⑩ Parameter load button (Available only on XTP4000ACDC)

Pressing this button can load any of welding parameters that have been saved with the Parameter save button ⑨. After pressing this button, select a memory location by rotating the Parameter setting knob ③, and push the Parameter setting knob ③ in to confirm the desired welding parameter. (Pushing the Parameter setting knob ③ in can be replaced by pressing the right arrow button of the Parameter selection buttons ⑧.)

⑪ Set value display panel

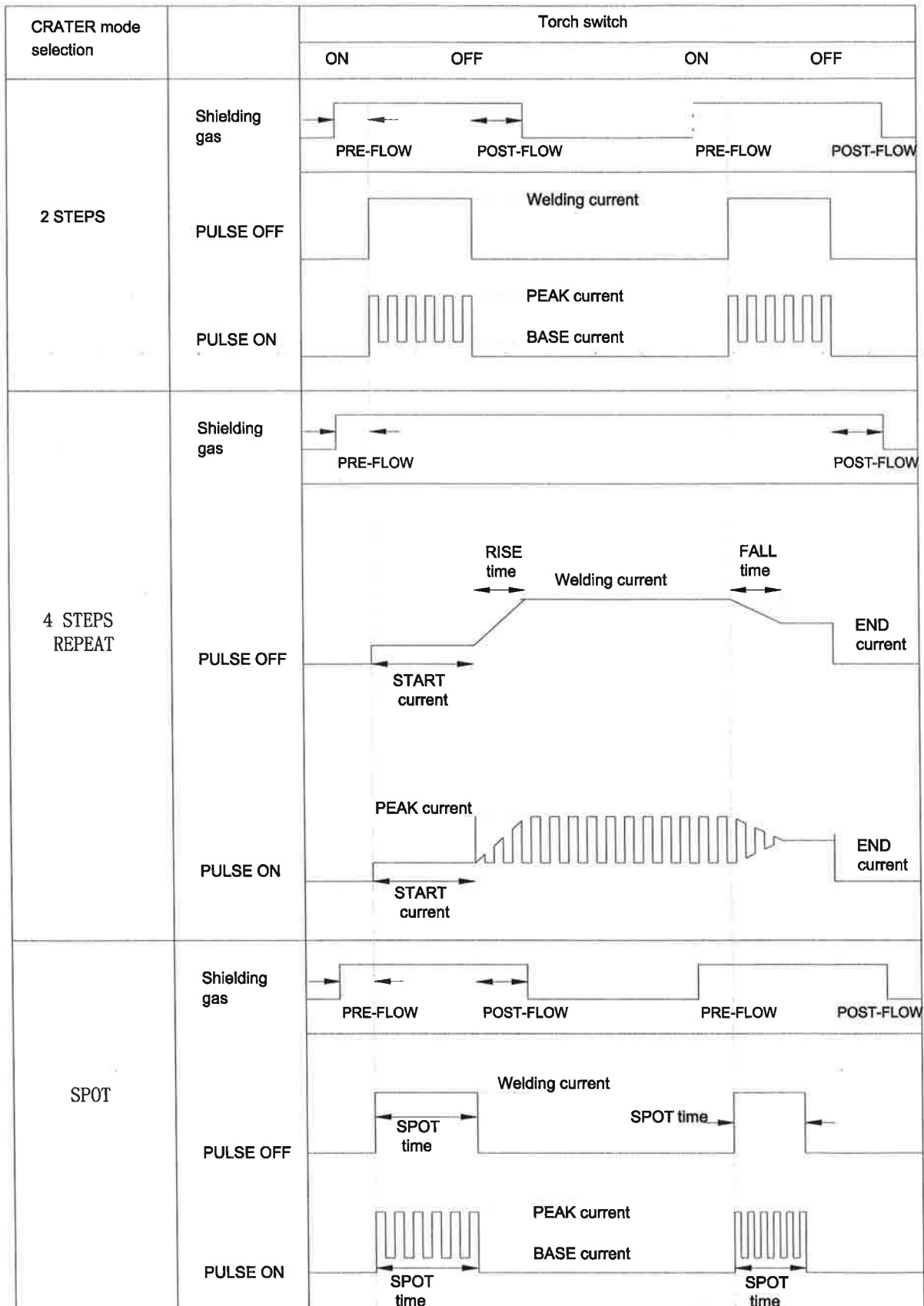
This panel displays the set welding current value generally and the measured welding current value while welding. Pushing the Parameter selection buttons ⑧ displays the set value for the parameter lit on the LED. An error code is displayed on this panel when any problem occurs with mains supply voltage.

⑫ Voltage reduction display

Voltage reduction ON (green) lamp lights up in case that the welding mode is set to STICK welding and that the output voltage is below 18V, except that this lamp lights out when welding.

Voltage reduction ON/OFF lamp status	In stand-by	In welding	Immediately after welding
ON (Green lamp)	Lights up	Lights up	Lights up
OFF (Red lamp)	Lights out	Lights out	Lights out
Remarks	18V +10% / -15%		Open circuit voltage will remain on for 0.2 to 0.3 sec. after the completion of welding.

【Setting and Operation in CRATER Control】



6. Sequence Of Operation

(1) Common Instructions

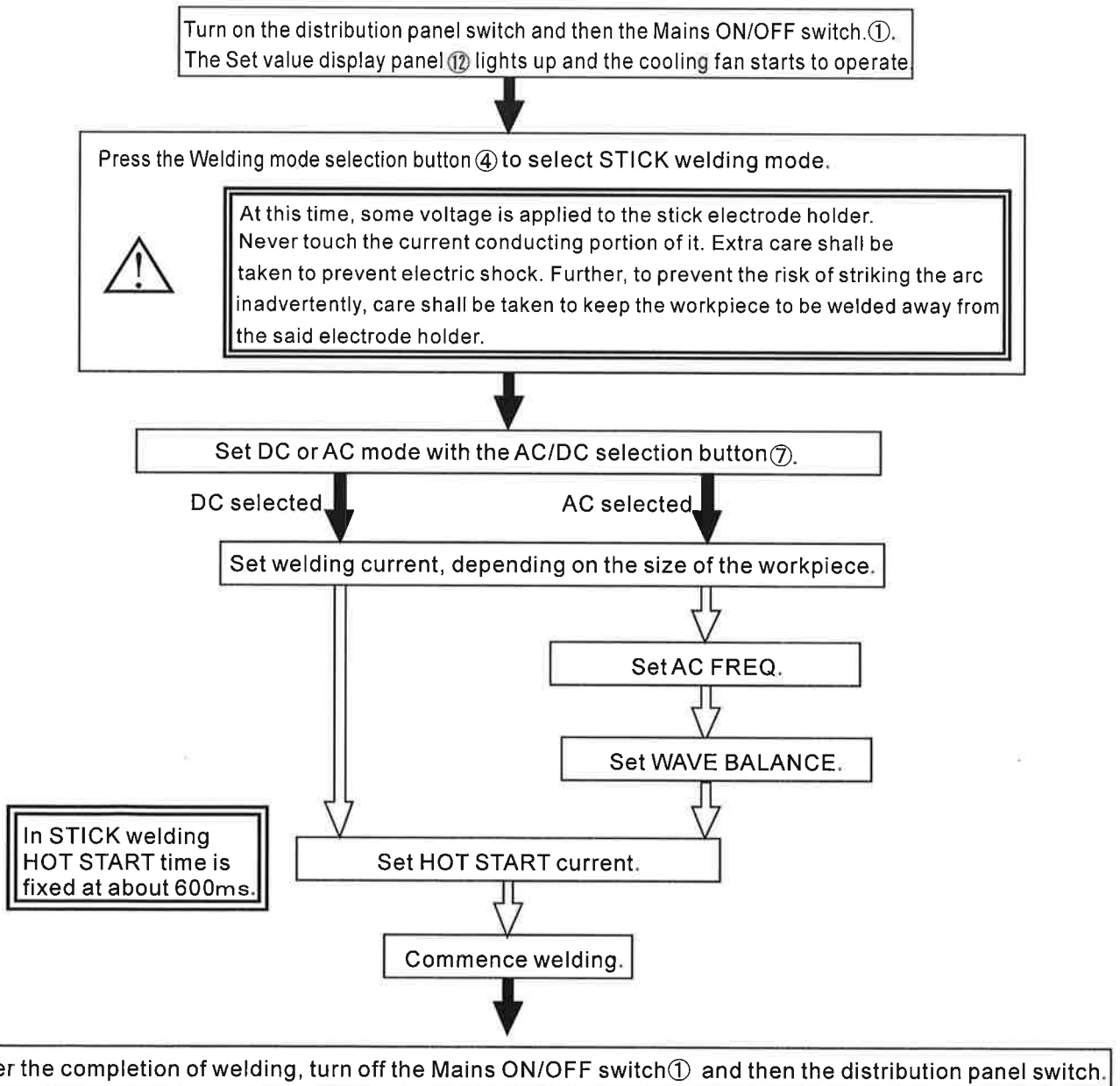
- ◆ Make input and output connections of the Welding Power Source correctly as per Section 4 "Connection".



- ☆ Before wiring the input cable, be sure to turn off the distribution panel switch. Extra care should be taken to prevent electric shock.
- ☆ Before wiring the output cables, be sure to turn off the Main ON/OFF switch ① on XTP4000ACDC.

- ◆ Do not change the selected welding mode or welding process mode until POST-FLOW time has finished.
- ◆ To proceed to the next welding parameter, push the Parameter setting knob ③ in or press the right arrow button of the Parameter selection buttons ⑧. The parameter lit on LED can be set. (Refer to the description of procedures shown with white arrow ↓ on pages 18 to 26.)

(2) AC/DC Stick Welding

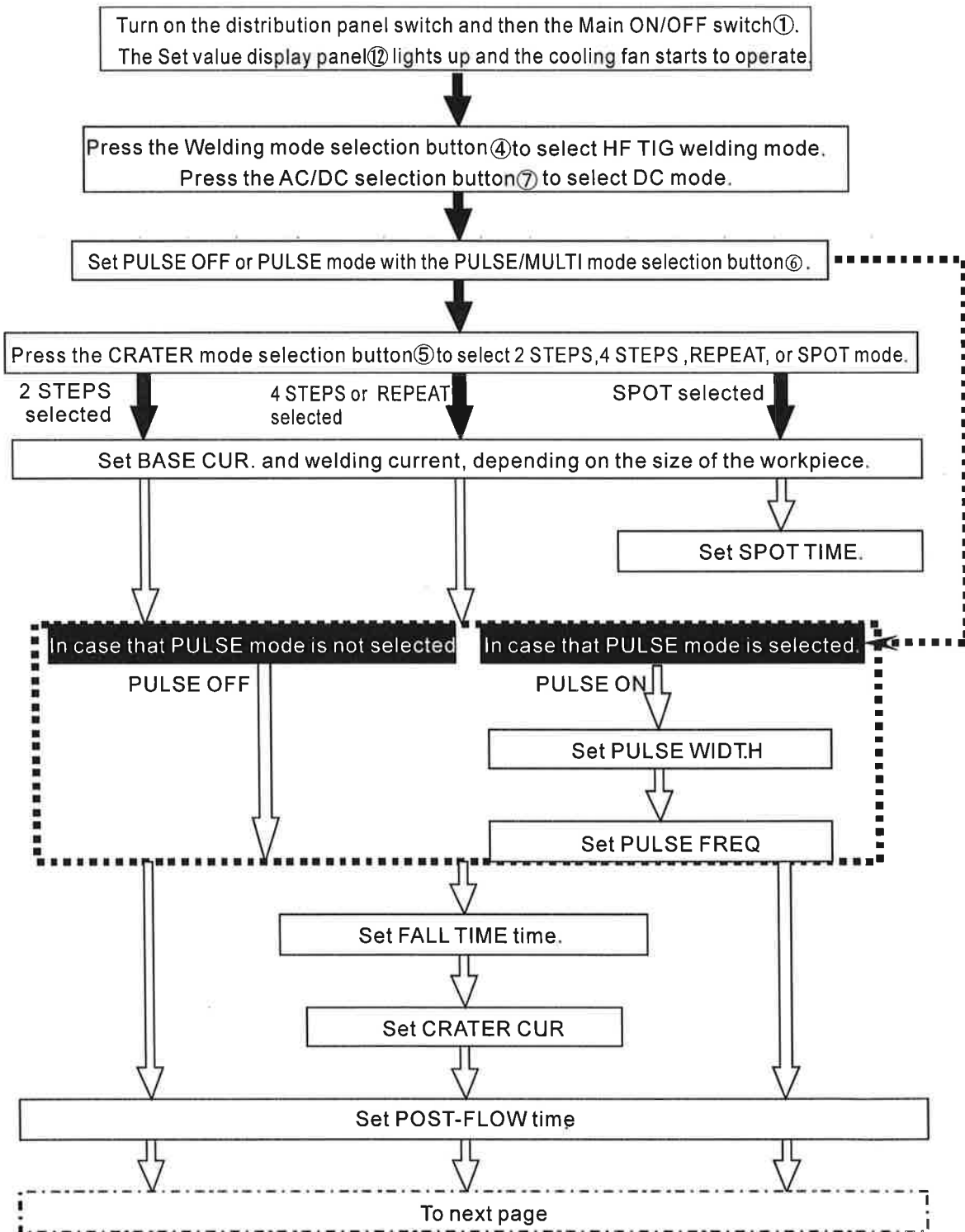


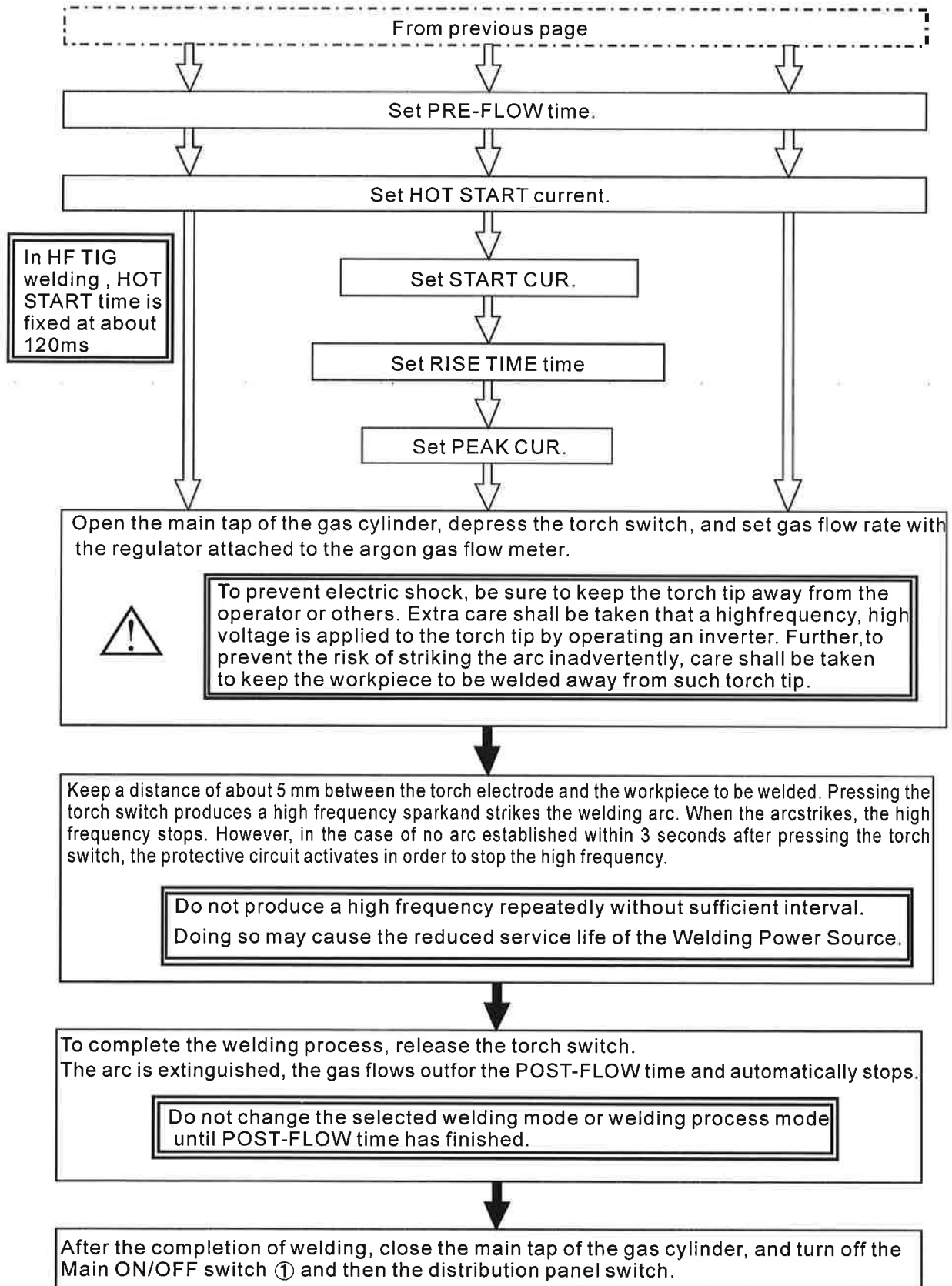


(3) DC HF TIG Welding



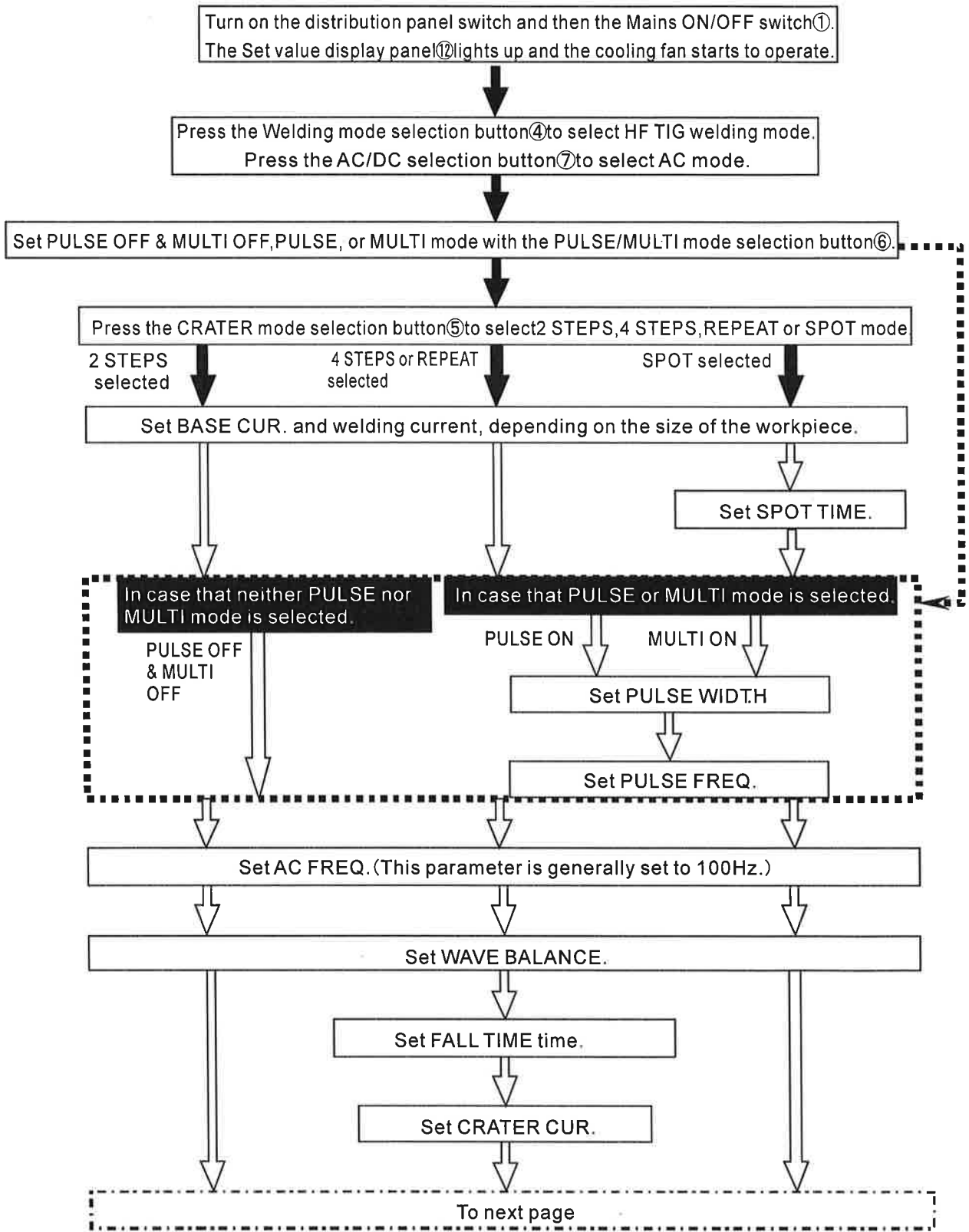
☆ This welding mode produces high frequency and high voltage. Extra care shall be taken to prevent electric shock.
 ☆ High frequency produced during this welding process will cause interference on any precision equipment operated around this XTP4000ACDC. Care shall be taken to keep such precision equipment away from this area.

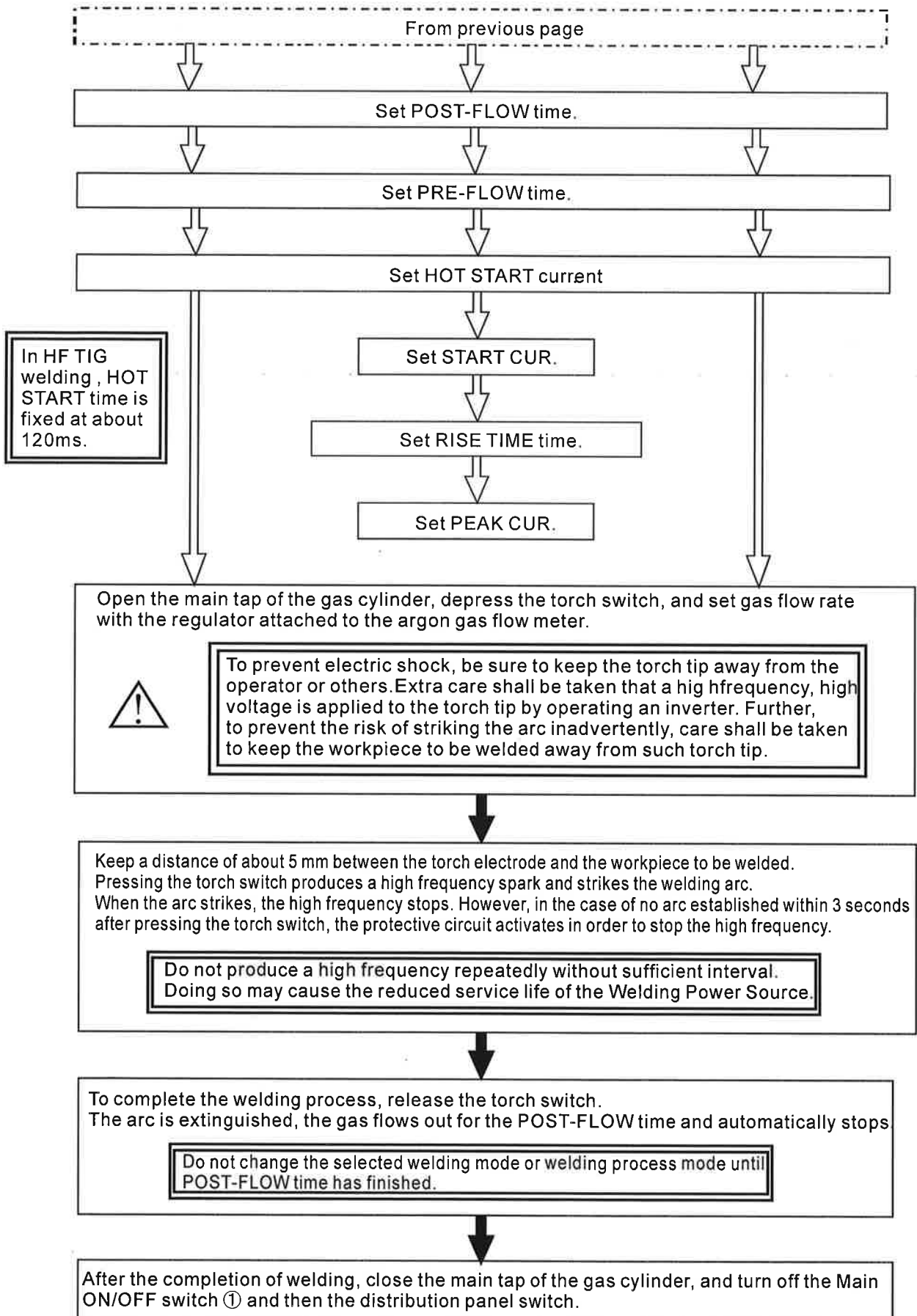




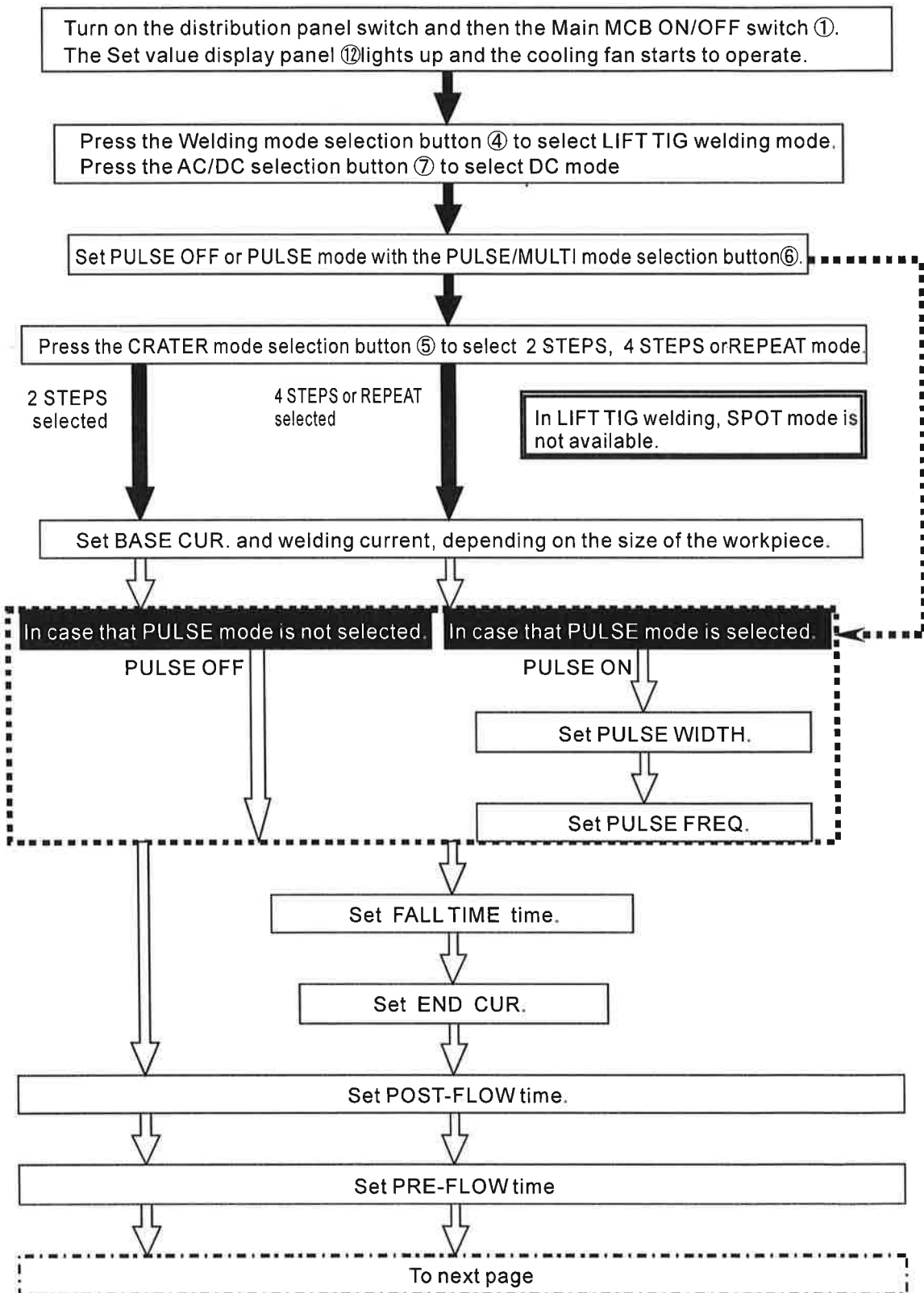
(4) AC HF TIG Welding

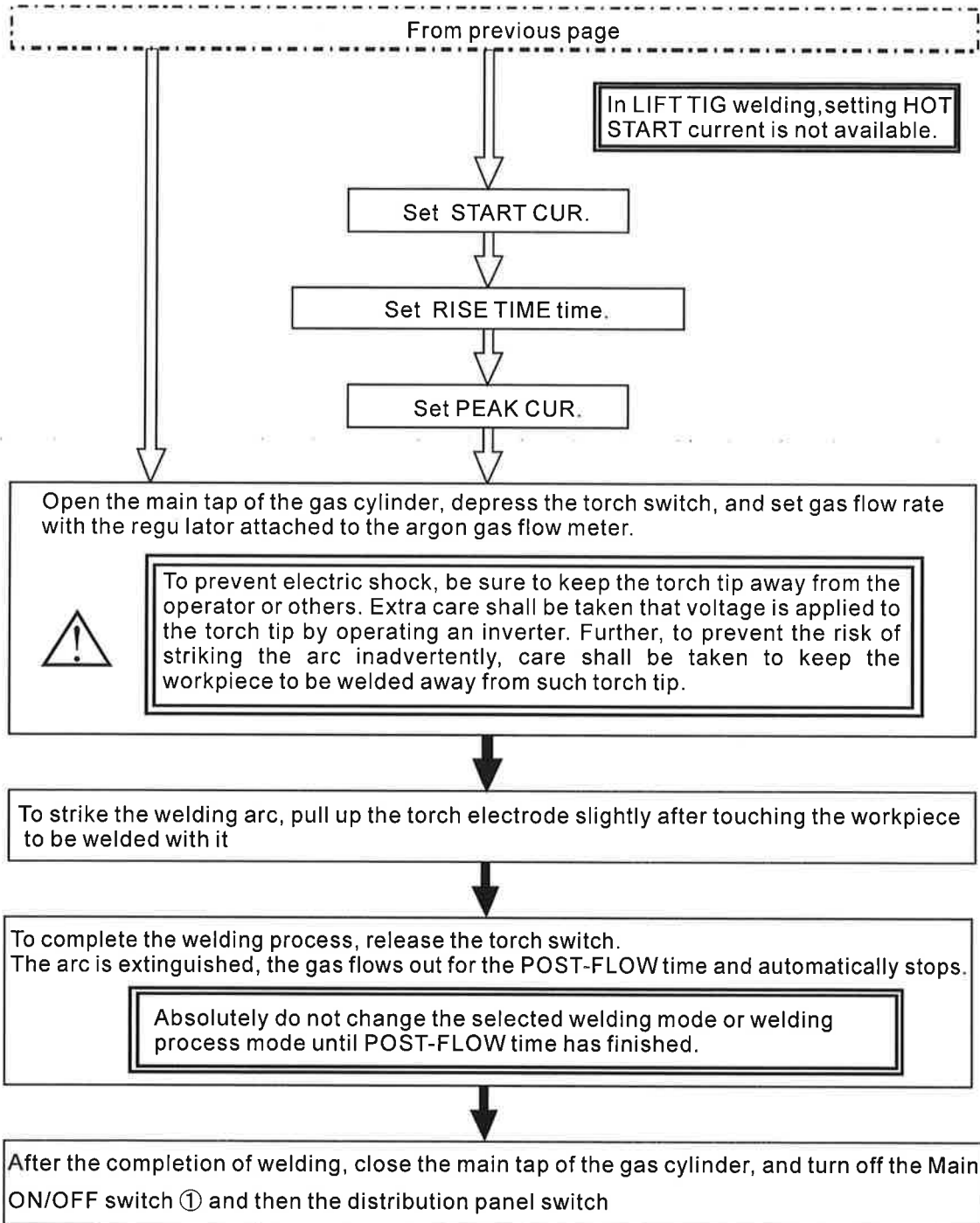
☆ This welding mode produces high frequency and high voltage. Extra care shall be taken to prevent electric shock.
 ☆ High frequency produced during this welding process may cause interference any precision equipment operated around this XTP4000ACDC. Care shall be taken to keep such precision equipment away from this XTP4000ACDC.



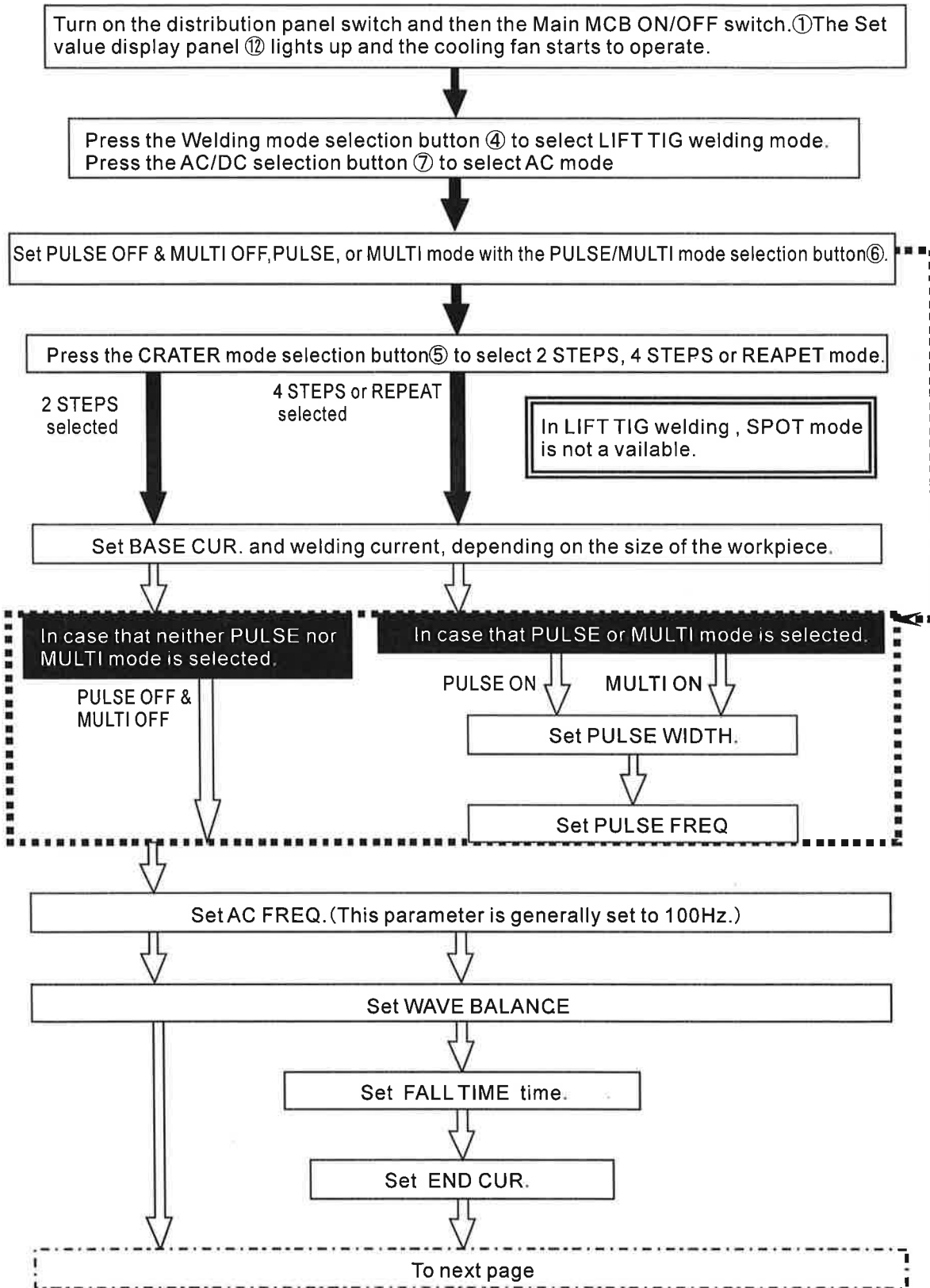


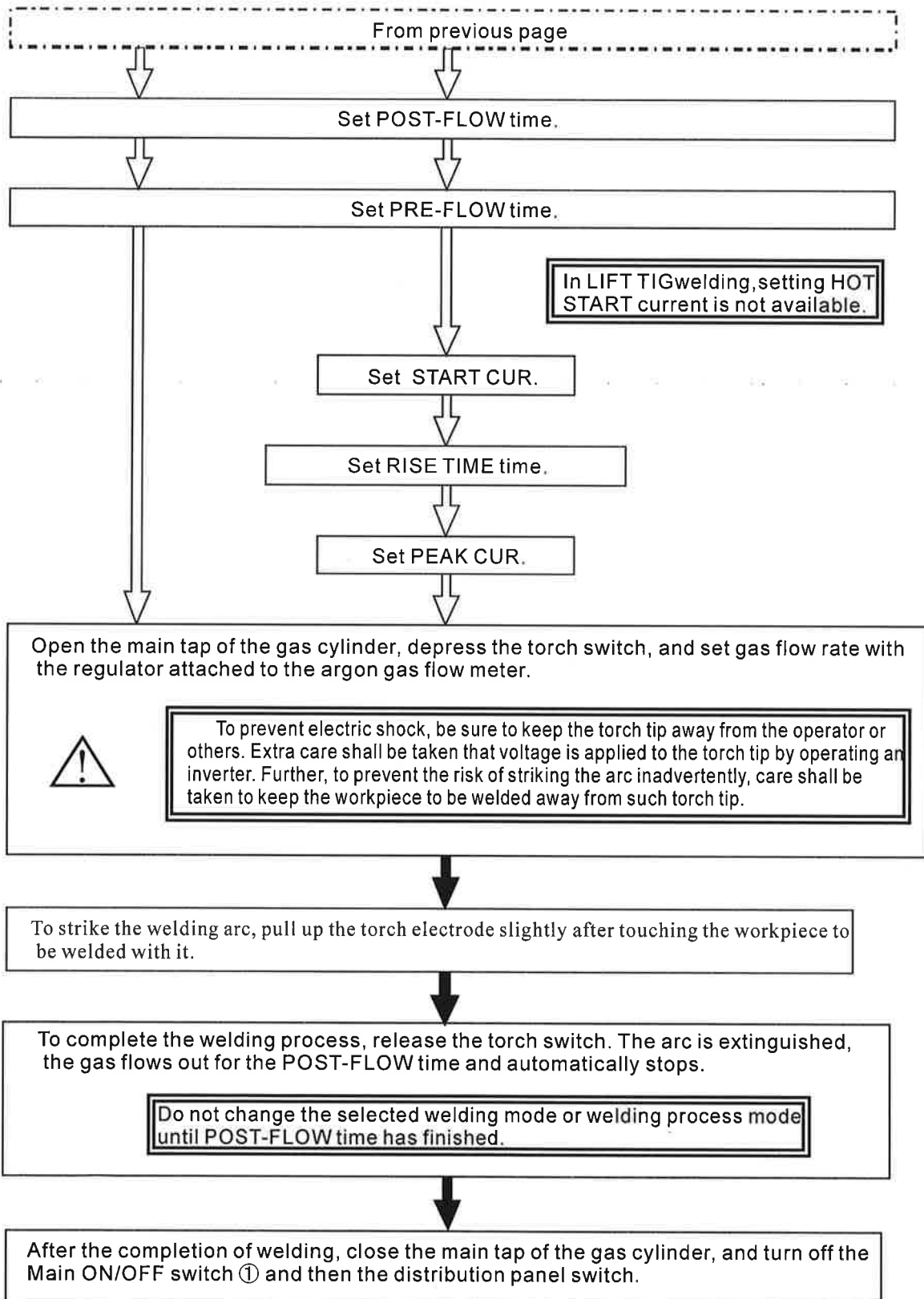
(5) DC LIFT TIG Welding





(6) AC LIFT TIG Welding

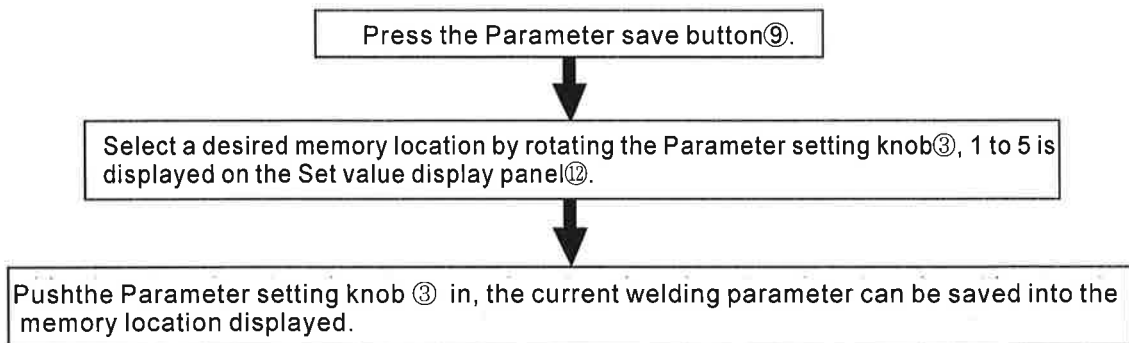




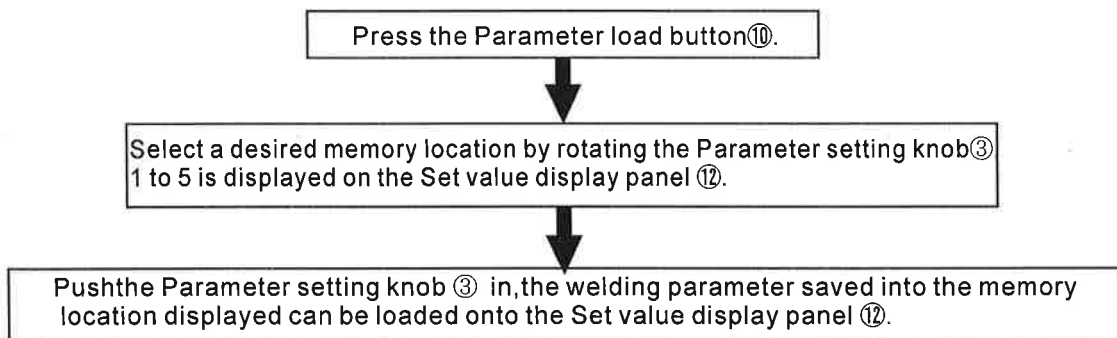
(7) Save/Load Operation of Welding Parameter [Available only on XTP4000ACDC]

- ◆ A total number of 5 programs of welding parameters can be saved into this XTP4000ACDC memory.
- ◆ Welding parameters which can be saved are those listed in Section 2.(2) "Welding Parameter Specification" on pages 7 and 8.

【Save Operation of Welding Parameter】



【Load Operation of Welding Parameter】



7. Welding Parameter

(1) TIG Welding for Stainless Steel

Base metal thickness mm	Joint type	Welding current A			Travel speed cm/min	Filler wire diameter mm	Electrode diameter mm	Argon gas flow rate Liter/min
		Downward	Vertical	Upward				
0.5	Butt	10- 15	10- 15	10- 15	40	—	1.0	4
	Lap	10- 15	10- 15	10- 15	20	1.0	1.0	4
	Corner	10- 20	10- 20	10- 20	40	—	1.0	4
	Fillet	15- 20	15- 20	15- 20	35	1.0	1.0	4
1.0	Butt	30- 40	30- 40	30- 40	15- 40	1.0-1.6	1.0-1.6	5
	Lap	40- 50	40- 50	40- 50	15- 30	1.0-1.6	1.0-1.6	5
	Corner	45- 55	45- 55	45- 55	20- 40	1.0-1.6	1.0-1.6	5
	Fillet	50- 60	50- 60	50- 60	10- 35	1.0-1.6	1.0-1.6	5
1.5	Butt	60-100	60- 80	60- 70	15- 30	1.6	1.6	5
	Lap	60-100	70-100	80- 90	15- 30	1.6	1.6	5
	Corner	60- 80	60- 70	60- 70	20- 40	1.6	1.6	5
	Fillet	70- 90	70- 90	70- 90	10- 20	1.6	1.6	5
2.5	Butt	100-120	90-110	90-110	20- 30	1.5-2.5	1.6	5
	Lap	110-130	100-120	100-120	20- 30	1.5-2.5	1.6	5
	Corner	100-120	90-110	90-110	25- 30	1.5-2.5	1.6	5
	Fillet	110-130	100-120	100-120	15- 25	1.5-2.5	1.6	5
3.0	Butt	120-140	110-130	105-125	30	2.5	1.6	5
	Lap	130-150	120-140	120-140	25	2.5	1.6	5
	Corner	120-140	110-130	115-135	30	2.5	1.6	5
	Fillet	130-150	115-135	120-140	25	2.5	1.6	5
4.5	Butt	200-250	150-200	150-200	25	3.0	2.4	6
	Lap	225-275	175-225	175-225	20	3.0	1.6-3.2	6
	Corner	200-250	150-200	150-200	25	3.0	2.4	6
	Fillet	225-275	175-225	175-225	20	3.0	2.4	6

(2) Guide for Welding Current and Tungsten Electrode Diameter

Electrode diameter (mmφ)	Welding current (A)
	DC positive polarity
	YWP·YWTh
0.5	5-20
1.0	15-80
1.6	70-150
2.4	150-250
3.2	250-400
4.0	400-500
5.0	500-800
6.4	800-1100

YWP : Pure tungsten

YWTh : 2 % thoriated tungsten

(3) Guide for Welding Current and Filler Wire Diameter

Welding current (A)	Filler wire diameter (mmφ)
10-20	0-1.0
20-50	0-1.6
50-100	1.0-2.4
100-200	1.6-3.0
200-300	2.4-4.5

Note) Filler wire material to be used is generally the same as that for base metal.
 Filler wire diameter shall be determined according to welding current.
 In case of special purpose welding such as welding of different metals, any filler wire diameter may be selected according to the welding application.

8. Maintenance & Inspection

For safe and efficient welding work under satisfactory performance of the XTP4000ACDC, it is recommended that the XTP4000ACDC be maintained and inspected periodically.

Description of routine inspection	Description of inspection to be carried out once every 3 to 6 months
Switch operation	Check torch or work lead for any damage.
Cooling fan operation	
Check for abnormal vibration, beat, or odor.	
Check for gas leakage.	
Cable connection, Covering of connections with insulating tapes	

Regarding the insulation resistance and withstand voltage tests, refer to the following table.

Part to be tested	Insulation resistance	Withstand voltage
Confirmation items	10MΩ or more when measured by DC 500V megger	To be free from any abnormality for at least 1 min. at AC 1500V.
Input-earth cable	10 MΩ or more when measured by DC 500V megger	N/A
Output-earth cable	10MΩ or more when measured by DC 500V megger	N/A



☆ Be caution when performing the insulation resistance and with stand voltage tests to prevent electric shock.

(1) Cleaning of the Inside of the Equipment

Remove the top and side panels and blow out impurities such as dust built-up inside the equipment once or twice every half year.

(2) Precautions to be Taken to Prevent Electric Shock



If any exposed portion should be detected in the current conducting part of input terminals and cables, take safety measures as soon as possible, including the insulation of such portion with insulation tape.

(3) Precautions on Maintenance and Inspection

In case when the top and side panels have been removed for the purpose of maintenance and inspection, be sure to place them back prior to resuming operation. Operating this TIG-315PACDC with such panels removed may reduce its cooling effect, resulting in burning of transformers, semiconductor devices, and the like.

(4) Inspection of Tungsten Electrode

Blunt, rounded or contaminated tungsten electrode tip may make it more difficult to produce a high frequency spark or may deteriorate the concentration property of the welding arc. Polish such consumed tip portion with a grinder. Routine maintenance of the electrode will enhance the welding performance.



☆ Capacitors inside the Welding Power Source are electrically charged even after the Main ON/OFF switch or distribution panel switch has been turned off. Before inspecting the inside of the Welding Power Source, leave it for about 5 min. after switching off power for discharging the capacitors, and then remove the top and side panels.

9. Safety Practices For The Use Of Welding Equipment

(1) Prevention of Electric Shock



Be sure to observe precautions to prevent electric shock. It is recommended that you make a habit of turning off the distribution panel switch and Mains ON/OFF switch for the purpose of safety.

(2) Error Code in the Event of any Abnormality

In the event that an error code is displayed on the Set value display panel ⑫ on page 13, the welding process in operation may often be interrupted. The following table shows the possible cause and remedial action for each error code.

Code	Description	Possible cause	Remedy
E01	Abnormal primary side temperature	The Welding Power Source's rated duty cycle has been exceeded.	Let the Welding Power Source keep within its specified duty cycle. Unblock vents.
E02	Abnormal secondary side temperature	Air flow is restricted by vents being blocked. Ambient temperature has exceeded 40°C.	Let the Welding Power Source keep within its specified ambient temperature range. Refer to Note A.
E03	Primary overcurrent	Primary current in operation has exceeded its rated current.	Let the Welding Power Source keep within its specified rated current.
E04	Wrong torch cable	Torch cable and work lead are too long.	Use torch which is supplied with TIG-315PACDC.
E11	Main supply overvoltage	Main supply voltage is greater than the Welding Power Source's rated voltage.	Adjust main supply voltage to the Power Source's rated voltage or lower.
E12	Main supply undervoltage	Mains supply voltage has been reduced below the set voltage for E14 error code. (Output shuts down.)	Increase installed capacity. Adjust main supply voltage to the Power Source's rated voltage or lower. Refer to Note B.
E14	Main supply undervoltage warning	Mains supply voltage has been reduced below the Welding Power Source's rated voltage. (Only warning display available.)	
E81	Wrong main supply voltage	Wrong voltage supplied	Adjust mains supply voltage to the Power Source's rated voltage or lower.
E82	Rated voltage selection circuit abnormality	Rated voltage selection circuit inside the Welding Power Source is not functioning properly	Contact any of our business office.
E83	Abnormal mains supply voltage	Mains supply voltage fluctuates and is not stable.	Adjust main supply voltage to the Power Source's rated voltage or lower.
E85	Pre-charge abnormality	Due to malfunction inside the Welding Power Source, primary capacitors are not charging correctly.	Contact any of our business office.
E93	Memory error	Memory chip inside the Welding Power Source cannot read/write weld parameters	Contact any of our business office.
E94	Thermistor malfunction	Thermistors for detecting temperature of internal components have malfunctioned	Contact any of our business office.
E99	Power receiving confirmation	This error code is displayed for a while after turning off the Mains ON/OFF switch	The Welding Power Source is free from any abnormality.

* Notwithstanding the above remedial actions, if the previous error code is still displayed, contact any of our business office.

Note A Overheating of the Welding Power Source can be caused by frequent use at more than its rated duty cycle and/or poor cooling due to air-flow being blocked. In the event of overheating, the Welding Power Source automatically shuts down to prevent any failure such as burning. However, due to thermal stress, frequent overheating may deteriorate and shorten the service life of internal components. Be sure to operate the Welding Power Source within its rated duty cycle. (Refer to next page for duty cycle.)

Note B At the start of welding, mains supply undervoltage(E12) or mains supply undervoltage warning(E14) may be displayed. It is possible such display may result from too small mains supply capacity, loosened connection of the input cable, or unreasonable connection of the extension cord. With reference to Section 3.(1) "Preparation Prior to Installation" on page 10, an installed capacity and cable size should be kept as large as possible, and use the extension cord of 5m or shorter. In particular, you must be careful that it is very likely that a single-phase mains supply capacity may be insufficient. (WSE-2001D is available at single-phase mains supply.)

(3) Duty Cycle

The following table shows rated duty cycles of XTP4000ACDC.

MODEL	Rated duty cycle	Description
XTP4000ACDC	60% (in TIG welding mode)	Can continuously provide the rated current of 400A for 6 minutes out of every 10 minute period, but during the other 4 minutes must idle and be allowed to cool.

Operation at the duty cycle higher than its rated value is allowed at the rated current or less. Allowable duty cycle can be calculated from the following formula. Never operate the TIG-315PACDC at more than the said allowable duty cycle. By doing so may shorten the service life of transformers, semiconductor devices, etc.

$$\text{Allowable duty cycle} = \left(\frac{\text{Rated current}}{\text{Operating current}} \right)^2 \times \text{Rated duty cycle}$$

(4) Operation of Main ON/OFF Switch

When the Main ON/OFF switch is turned off immediately after the completion of welding, the cooling fan stops and components inside the Welding Power Source are kept at high temperature, causing the reduced service life of such components. It is important that the Welding Power Source be switched off after 1 or 2 minutes but not immediately.



☆ In the event that the no-fuse breaker on the distribution panel has been automatically turned off during operation, resulting in power interruption, check the interruption current of the no-fuse breaker. If it is found the interruption current has exceeded the fuse capacity specified in Section 3.(1) "Preparation Prior to Installation" on page 10, any failure may occur with internal components. Burns may be caused by any incidental breakdown or burning of the Main ON/OFF switch due to short-circuit current. Absolutely do not turn on the Main ON/OFF switch. Contact any of our business office.

(5) Precaution on Inspection

Capacitors are electrically charged for a while after the Main ON/OFF switch or the distribution panel switch have been turned off. Before inspecting the inside of the Welding Power Source, leave it for about 5 min. after turning off power for discharging the capacitors, and then remove the top and side panels.

(6) Precautions after Maintenance and Inspection

In case when the top and side panels have been removed for the purpose of maintenance and inspection, be sure to place them back prior to resuming operation. Operating this IA-2000TP/IA-3000TP with such panels removed may cause burning of transformers, semiconductor devices, and the like.

(7) Precautions on Earth Leakage Breaker

In case a general-purpose earth leakage breaker is introduced into the input wiring, it may be turned off due to the high frequency switching noise induced at the time of turning on the Welding Power Source. In such case, be sure to use an earth leakage breaker for inverters.

(8) Precautions on Dripproof Measures

This Welding Power Source does not provides dripproof function. Accordingly, when it is exposed to rain or water spraying, water immersed inside it may cause it to fail. Be sure to check the inside for waterdrop and wipe off it.

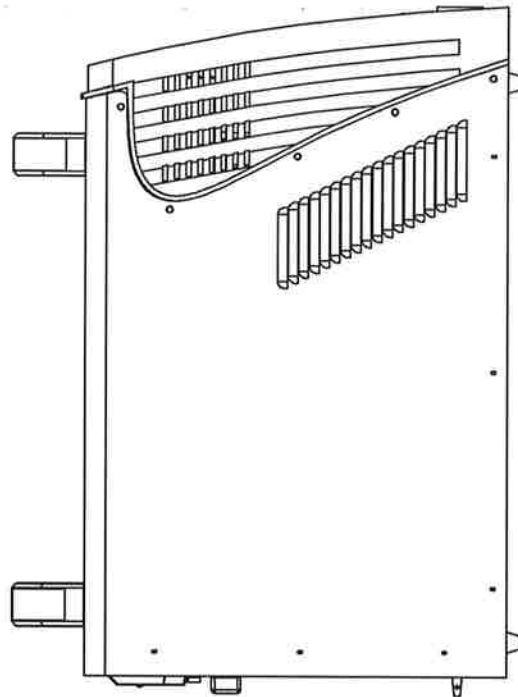
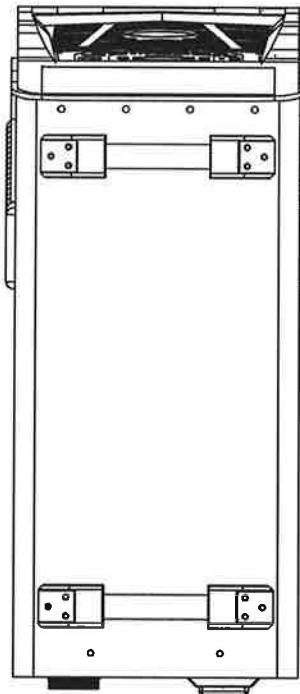
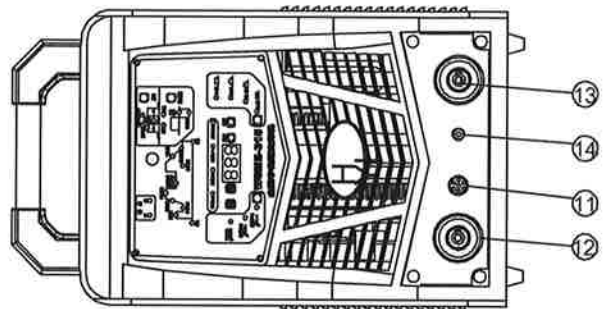
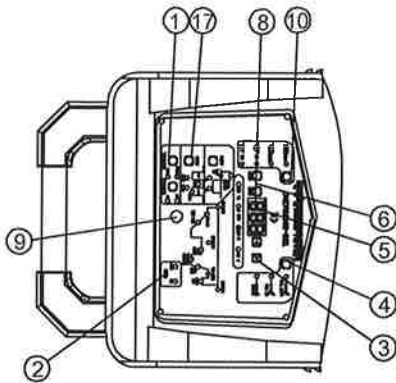
10. Basic Troubleshooting

Situation	Possible Cause	Remedy
Cooling fan does not operate. (Mains supply indicator lamp is not lit.)	<ul style="list-style-type: none"> •Fuse on distribution panel switch is faulty. •Poor connection of input cable 	Check cable connection and retighten it securely.
Cooling fan does not operate. (Mains supply indicator lamp is lit.)	<ul style="list-style-type: none"> •Defective control circuit •Cooling fan is faulty. 	Contact any of our business office.
Any error code is displayed on the Set value display panel.	<ul style="list-style-type: none"> •Refer to Section 9.(2) "Error Code in the Event of any Abnormality" on page 31. 	Refer to Section 9.(2) "Error Code in the Event of any Abnormality" on page 31.
No gas flow when the torch switch is depressed.	<ul style="list-style-type: none"> •Torch switch is faulty or torch switch cable is disconnected. •Breakdown or loose connection of gas hose 	Check with tester, and replace faulty switch or repair faulty cable. Check gas hose connection.
The welding arc is not obtained because high frequency spark is not achieved between torch and base metal.	<ul style="list-style-type: none"> •Poor contact with torch cable and/or work lead •Tungsten electrode is faulty. 	Retighten cable securely. In case of disconnection, repair or replace it. In case it is oxidized, polish it.
LIFT TIG welding not available.	<ul style="list-style-type: none"> •Tungsten electrode is faulty. 	If electrode tip has been rounded, polish it.
High frequency is not stopped even after striking the welding arc.	<ul style="list-style-type: none"> •Defective control circuit 	Contact any of our business office.
Output current not adjustable.	<ul style="list-style-type: none"> •Defective control circuit 	Contact any of our business office.
Tungsten electrode is significantly consumed.	<ul style="list-style-type: none"> •Welding current is too high in relation to electrode diameter. •No gas flow or insufficient gas flow rate •Electrode is in contact with base metal during or at the start of welding. •Torch is connected to the "+" terminal. 	Refer to Section 7 "Welding Parameters" on pages 28 and 29. Make sure that gas flow rate is proper. Operate properly. Connect torch to "-" terminal, and base metal to "+" terminal.
The welding arc is not stable.	<ul style="list-style-type: none"> •Welding current is too low in relation to electrode diameter. •Electrode is oxidized or contaminated. 	Refer to Section 7 "Welding Parameters" on pages 28 and 29. Polish electrode.
In STICK welding, no welding current is available even when stick electrode is in contact with base metal.	<ul style="list-style-type: none"> •Poor contact with torch cable and/or work lead •Defective control circuit 	Retighten cable securely. In case of disconnection, repair or replace it. Contact any our business office.
In STICK welding, the welding arc is not stable.	<ul style="list-style-type: none"> •Welding current is too low in relation to stick electrode diameter. 	Operate at proper welding current.

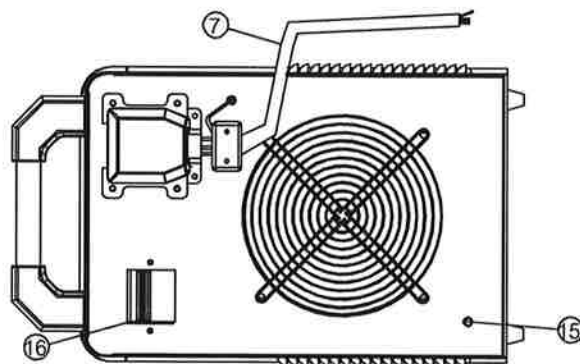
※ If problems still persist, please contact any of our business office.

11. Outline Drawing

[XTP4000ACDC]



No.	NAME	No.	NAME
1	PULSE MODE SELECT BUTTON	10	CRATER MODE SELECT BUTTON
2	VRD STATUS INDICATOR	11	TORCH SWITCH CONNECTOR
3	PARAMETER SELECT BUTTON	12	OUTPUT TERMINAL(+)
4	PROCESS SELECTOR BUTTON	13	OUTPUT TERMINAL(-)
5	PARAMETER SAVE BUTTON	14	GAS OUTPUT
6	PARAMETER LOAD BUTTON	15	GAS INPUT
7	PRIMARY POWER CABLE LED DISPLAY	16	SWITCH FOR POWER SOURCE
8	PARAMETER CONTROL KNOB	17	DC OR AC SELECT BUTTON



INVERTER PULSE TIG AC/DC WELDER

