

**THANKS FOR PURCHASING OUR PRODUCT**

**AC/DC MULTI-200P** **DC INVERTER**  
**AC/DC MULTI-220P** **AC TIG/DC TIG/DC MMA/CUT**  
**4 IN 1 MACHINE**

# **OPERATION INSTRUCTIONS**

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# **SAFETY PRECAUTIONS**

**Follow these precautions carefully. Improper use of any welder can result in injury or death.**

1. ONLY CONNECT WELDER TO A POWER SOURCE FOR WHICH IT WAS DESIGNED. The specification plate on the welder lists this information. When welding outdoors, only use an extension cord intended for such use.
2. ONLY OPERATE WELDER IN DRY LOCATIONS and on concrete floor. Keep area clean and uncluttered.
3. KEEP ALL COMBUSTIBLES AWAY FROM WORK SITE.
4. DO NOT WEAR CLOTHING THAT HAS BEEN CONTAMINATED with grease or oil.
5. KEEP CABLES DRY AND FREE FROM OIL AND GREASE and never coil around shoulders.
6. SECURE WORK WITH CLAMPS or other means; don't over reach when working.
7. NEVER STRIKE AN ARC ON A COMPRESSED GAS CYLINDER
8. DON'T ALLOW THE INSULATED PORTION OF THE ELECTRODE HOLDER TO TOUCH THE WELDING GROUND WHILE CURRENT IS FLOWING.
9. SHUT OFF POWER AND UNPLUG MACHINE WHEN REPAIRING OR ADJUSTING. Inspect before every use. Only use identical replacement parts.
10. FOLLOW ALL MANUFACTURER'S RULES on operating switches and making adjustments.
11. ALWAYS WEAR PROTECTIVE CLOTHING when welding. This includes: long sleeved shirt (leather sleeves), protective apron without pockets, long protective pants and boots. When handling hot materials, wear asbestos gloves.
12. ALWAYS WEAR A WELDER'S HELMET WITH PROTECTIVE EYE PIECE when welding. Arcs may cause blindness. Wear a protective cap underneath the helmet.
13. WHEN WELDING OVERHEAD, BEWARE OF HOT METAL DROPPINGS. Always protect the head, hand, feet and body.
14. KEEP A FIRE EXTINGUISHER CLOSE BY AT ALL TIMES.
15. DO NOT EXCEED THE DUTY CYCLE OF THE MACHINE. The rated cycle of a welding machine is the percentage of a ten minute period that the machine can operate safely at a given output setting.
16. KEEP ALL CHILDREN AWAY FROM WORK AREA. When storing equipment, make sure it is out of reach of children.
17. GUARD AGAINST ELECTRIC SHOCK. Do not work when tired. Do not let body come in contact with grounded surfaces.

## I. MAIN USAGE AND THE RANGE OF USAGE

AC/DC MULTI-220P Welder is a triple functional machine used as DC MMA, AC TIG, DC/PULSE TIG Welder. All ferrous metals, copper, aluminium, titanium and stainless steel material can be welded from all positions. The welding current is stable and the stepless is adjustable. Few spatter and low noise occurs during welding. The welder is compact, light in weight and easy to move. It is suitable for pressure vessel, building, shipping and petrochemical industries. It is the priority product to replace the NSA series welding machine.

## MAIN TECHNICAL SPECIFICATIONS

MODEL		AC/DC MULTI-220P	AC/DC MULTI-200P
INPUT	Voltage	AC220/230/ 240V 50Hz	
AC TIG	No-load Voltage	60 - 80V	
	Base current Adjusting Range	20~220A	20~200A
	AC balance	30%~70 %	
	AC Square Wave Frequency	20~100Hz	
	Rated Duty Cycle	60%	
DC	Pulse Current Adjusting Range	10~220A	5~200A
	Rated Duty Cycle	35%	
	Current Down-slope Time	0~10S	
	Base Current Adjusting Range	10~220A	5A~200A
TIG	Pulse Width Ratio	0.1~0.9	
	Pulse Frequency	0.5~25Hz	
	After Flow Time	1~25s	
	Arc starting Mode	high frequency arc striking	
DC MMA	No-load Voltage	60 - 80V	
	Base current Adjusting Range	10~180A	5~160A
	Rated Output Current	180A	160A
	Rated Duty Cycle	35%	
CUT	(Base) current Adjusting Range	15A~60A	15~50A
	Rated Duty Cycle	35%	
Efficiency		≥83%	
Mass		25kg	
Protection Class of enclosure		IP21S	
Outline Dimensions mm <sup>3</sup>		430x200x290	

## OPERATING CONDITIONS AND WORK SURROUNDING

### 1. Operating condition:

Voltage of power source: AC 220/230/240 V  $\pm$  10%。

Frequency: 50/60Hz

Reliable grounding protection

### 2. Work surrounding

- ① Relative humidity: not more than 90 % ( average monthly temperature not more than 20C);
- ② Ambient temperature: -10C - 40C;
- ③. The welding site should be free of harmful gases, chemicals, molds and flammable, explosive or corrosive materials;
- ④. Avoid operating in damp or wet conditions

## IV. OPERATING INSTRUCTION

### 1. Before welding, the operator should read the operation instructions.

2. Check the welder appearance for any damage before operation.

3. To ensure safe operation, the welder must be grounded correctly according to your local power supply system using a 4mm<sup>2</sup> lead to connect the welder to the ground.

4. Welding operation should be carried out in dry and well ventilated areas and conditions.

Surrounding objects should not be less than 0. 5m away from the welder.

5. Check the welder output connector for tightness.

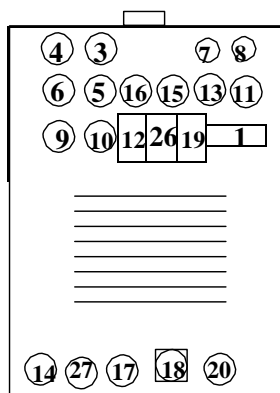
6. The welder cannot be moved and the cover cannot be opened while the power is on and welding operation is carried out.

7. The welder should be cared for, used and managed by trained personnel.

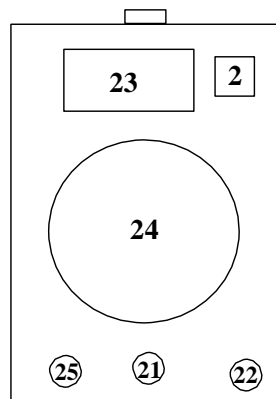
8. Current of the distribution board: not less than 40A

## SKETCH THE PANEL FUNCTION

1. FRONT PANEL



2. BACK PANEL



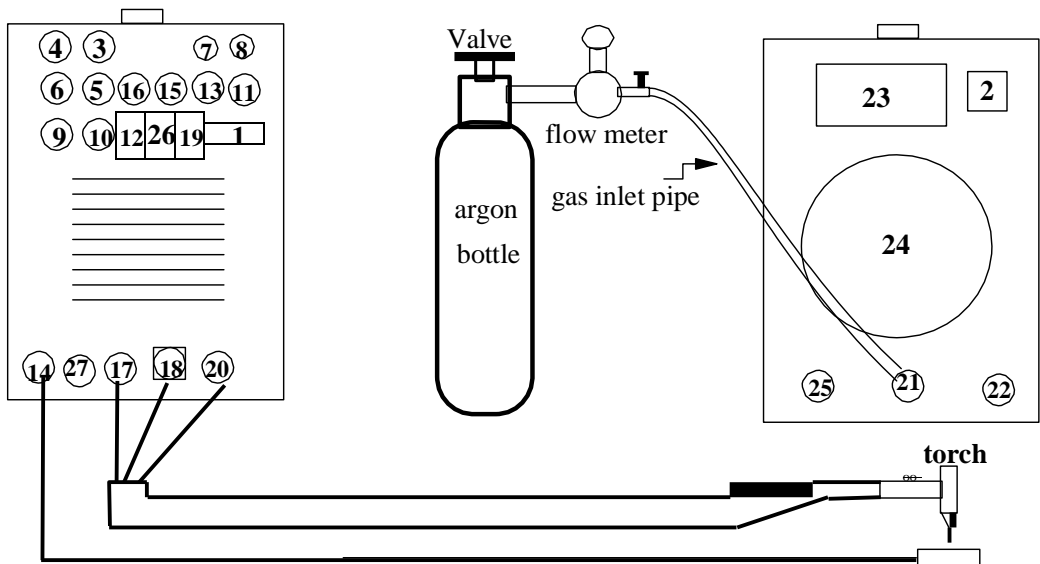
1. Indication of welding current 2. Power switch 3. Pulse current regulator 4. Base current regulator  
 5. Pulse width regulator 6. Pulse Freq. regulator 7. Indicating light of power 8. Warning indicating light  
 9. Current up-slope time regulator 10. Current down-slope time regulator 11. Post flow time regulator  
 12. MMA/TIG/ CUT switch 13. AC balance 14. output "+" 15. AC square wave Frequency 16. Arc force 17. Argon  
 out 18. Argon arc control (or remote control) 19. AC/DC TIG switch 20. Output "-" 21. Argon inlet 22. Power supply  
 23. Nameplate 24. Fan 25. Safety earthing column 26. 2 steps/ 4 steps switch 27. Pilot arc

## METHOD OF THE OPERATION

### 1. ARGON ARC WELDING (TIG)

a. FRONT OF WELDER

b. BACK OF WELDER



## 1.1 CLEAN BEFORE WELDING

Tungsten argon welding is very sensitive to surface contamination. Therefore ensure material is clean and free from all contaminants including grease, paint, lubricants and rust. Use an appropriate pre-cleaner if necessary.

## 1.2 DC ARGON ARC WELDING

- ① Put Switch "19" (AC/DC) onto the position "DC", connecting the gas inlet pipe to inlet "21" of the welding. Put switch "12" (MMA/TIG/CUT switch) onto the position "TIG".
- ② Connect gas inlet pipe of the welder torch to argon output of welder "17".
- ③ Put the control plug of the welding torch in the argon arc control socket "18".
- ④ Testing gas: Switch on the power "2", open the argon bottle valve, press the torch switch, select suitable argon flow.
- ⑤ Regulating the base current knob "4" (pulse current regulating to minimum, turning it anti clockwise to the end). Select welding current according to the thickness of the material to be welded. Select current down slope time and after flow time according to the current.

**Notice 1:** The current indicating meter on the front panel is used to display the preset output current level before welding and actual output level while welding: A lit display indicates that the input power is turned on.

**Notice 2:** When using the '**Adjustable foot control**' regulator, current will increase gradually when you step on the '**Adjustable foot control**'

- ⑥ Ensure Tungsten electrode end is 2-3mm away from the welding material. Press the torch switch, to strike an arc.

**Notice 3:** During welding, with the "12. 2T/4T" mode on "2T" mode, the torch trigger should be held at all times and must not be released. Otherwise the arc will extinguish.

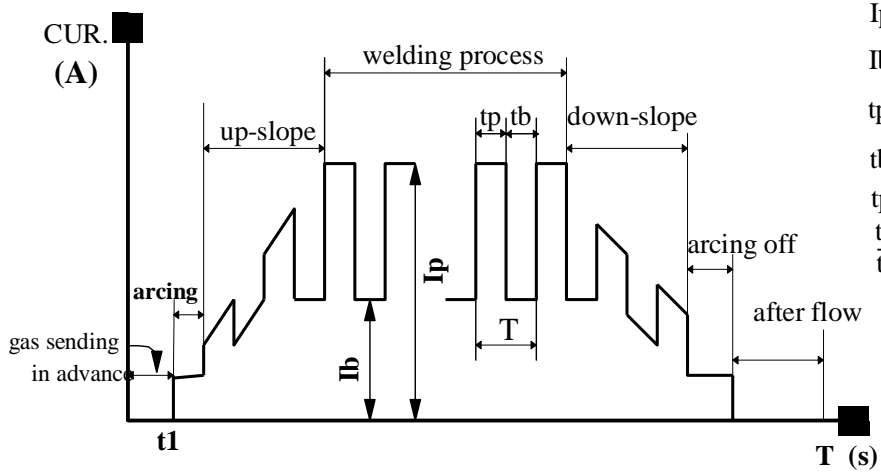
- ⑧ When the welding operation is finished, close the valve and turn off the power.

## 1.3 PULSE ARGON ARC WELDING

- ① Select peak current and base current:

- ① Current regulation: To carry out the pulse argon arc welding, the base current "4" should be lower than pulse current "3" (current regulation). Rotate knob clockwise, to increase current.
- ② Pulse frequency regulating: when the knob "6" is regulated clockwise, the frequency is high and pulse speed is high; conversely the speed is low. The frequency changes between 0.5-25Hz.
- ③ Regulation of pulse width ratio: when the knob "5" is regulated clockwise, the width ratio increases, conversely, it decreases. It can be selected between 0.1-0.9.
- ④ Regulation of up-slope time: when the knob "9" is regulated clockwise, the time increases. Conversely, it decreases. It can be selected between 0-10S.
- ⑤ Regulation of down-slope time: when the knob "10" is regulated clockwise, the time increases, conversely, it decreases. It can be selected between 0-10S.
- ⑥ Gas connection, testing, generating and post flow time use the same procedures as DC arc welding.

## 1.4 PULSE ARGON TUNGSTEN WELDING PROCESS (only for reference)



$I_p$ --pulse current

$I_b$ --base current

$t_p$ --width time of pulse current

$t_b$ --width time of base current

$t_p + t_b = T$

$\frac{t_p}{t_b} = D$  pulse width

### **①Features and application scope of the process**

The pulse type argon tungsten welding is different from the continuous (DC) argon welding. The welding current is pulsed. The wave form of the current is shown in the sketch above.  $I_p$  and  $I_b$  and their continuous time  $t_p$  and  $t_b$  can be regulated according to requirements of the process. The amplitude value of electric current changes periodically with certain frequency in case of the pulse current, molten base will be formed in the work piece and the molten bath will solidify. The welding seam is formed by reciprocal overlaps. Welding heat input can be controlled by regulating pulse frequency, pulse current amplitude, size of base current, continuous time of pulse current and base current and therefore the welding seam, size and quality of the zone influenced from heat can be controlled.

### **②Advantages and application scope of pulse argon gas tungsten arc welding**

- a. Precisely control the size of the bath inputting heat to the material to increase penetration resistance of molten seam and preservation of bath. It is easy to obtain even fusion deepness.
- b. Heating and cooling of each welding point is very fast. Therefore, the process is applicable for the material with great difference of heat conductivity and thickness.
- c. Pulse arc can obtain greater fusion deepness with lower heat input. Therefore under the same condition, the zone influenced from the welding heat reduces the possibility of distortion from welding. This is very important for sheet and ultra-thin sheet welding.
- d. Fast cooling of the bath metal and short duration time of high temperatures during welding can reduce cracks caused to the thermo-sensitive materials during welding.

### **③.Selection of welding parameters**

Except for pulse current, width time (width ratio) and pulse frequency, welding parameters of pulse argon gas tungsten arc welding are the same as general tungsten DC argon arc welding. Increasing pulse current means electric arc can obtain greater penetration ability. However, too much current can cause local melting of tungsten electrode. Generally, welding current required for DC tungsten argon arc welding uses greater current. The arc holding current and base current influences the cooling and crystallizing of the metal in the bath. The range is determined by the performance of the welding materials. When the sheet is being welded, smaller arc holding current (base current) is usually used in order to reduce the possibility of blowing holes through the sheet/material and reduce the possibility of sheet/material distortion. When pulse width ratio (holding time of pulse current and base current) is selected, both the heat input and features of pulse welding should be considered. Usually, it can be selected between 10% - 90%. Selection of pulse frequency (periodical change time of pulse current) mainly depends on the thickness of the sheet and welding speed. The customized settings of the operator should also be considered for the pulse width ratio.



## 1.5 AC ARGON ARC WELDING

1. Put switch "19" (AC/DC) onto the position "AC".
2. The method of the connection same as 1.1
3. Regulating "13" to select right "sp(AC balance)"

$$SP = \frac{t_p}{t_n} * 100\%$$

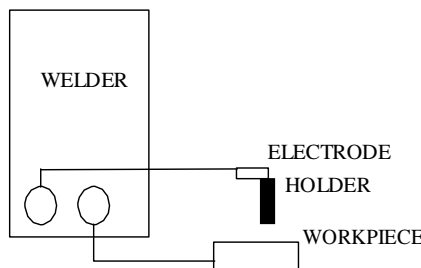
$t_p$ : the time of  $I_2$  at positive       $t_n$ : the time of  $I_n$  at Negative

4. Regulate "15" to select right AC square wave frequency.
5. The Method of the welding same as 1.1

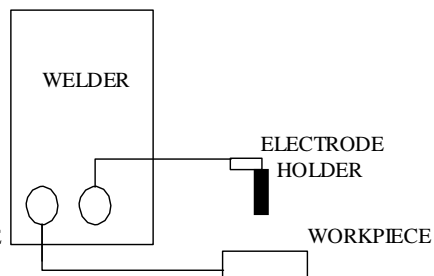
## 2. Hand welding with electrode

1. Connect input power for the welder, then switch on the power. The Data Display Meter ("7") light will switch on.
2. Put switch "12" (MMA/TIG/CUT switch) onto the position "MMA".
3. Regulate Current Knob "4" (base current regulator) to select right welding current (Pulse current regulator to minimum, turning it anticlockwise to the end) select empiric formula:  $I = 40d$ ,  $d$  is dia. of the electrode.
4. Notice positive and negative connections during welding.

A. NEGATIVE CONNECTION



B. POSITIVE CONNECTION

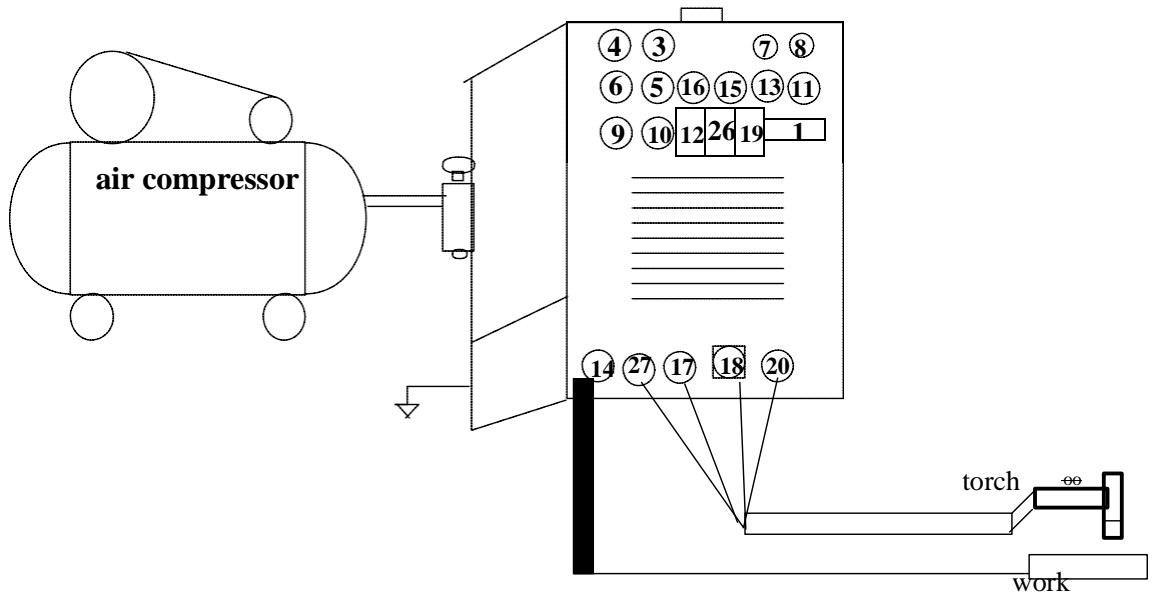


5. Pay attention to the rated welding current and the rated duty cycle of the welder. Overload is not allowed.
6. After the welding operation is finished let the welder cool down for a few minutes before cutting off the power switch.

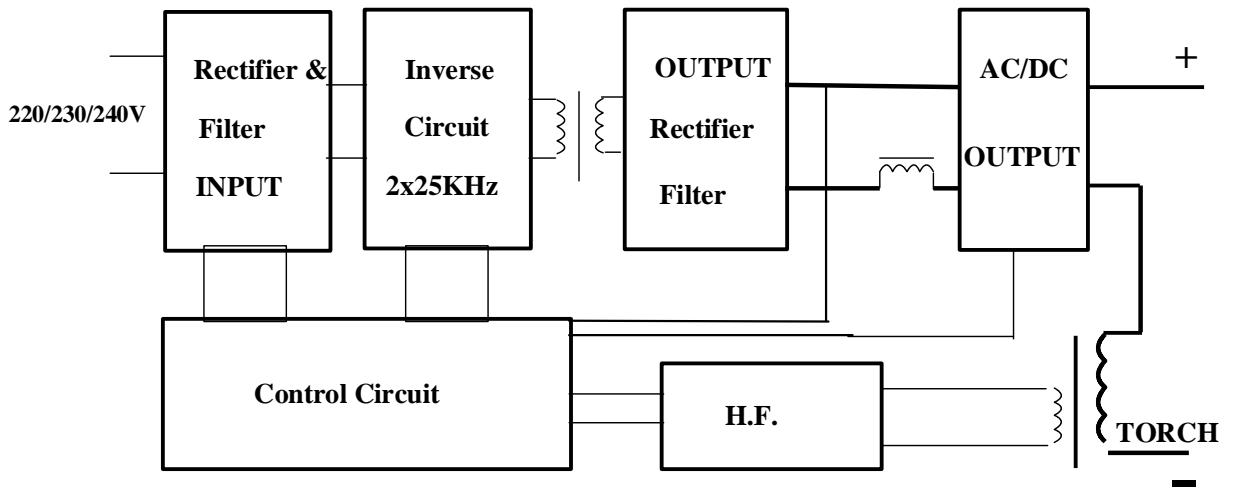
### **3. Cutting with compressed air**

#### **Put switch "12" (MMA/TIG/CUT switch) onto the position "CUT"**

- (1) Connect the machine correctly according to the diagram. Switch on the air compressor to its rated pressure.
- (2) Turn the power switch of the cutting machine on. The power indicator light will illuminate and the cooling fan will begin working.
- (3) Put the function switch in the position of "air testing". Then the air will expel from the cutting torch. Turning the function switch in the position of "cutting" and pressing the torch switch will also expel air from the torch.
- (4) Select a suitable cutting current and air pressure according to the thickness and material of the work piece and the appropriate cutting speed. Select the standard for the spray nozzle of the torch. The spray nozzle will not change color while cutting.
- (5) Cutting: Hold the cutting torch at the edge of the work piece and position the nozzle towards the work piece at 15 degrees. Let the nozzle touch the work piece, and press the torch switch. The air will now be expelled and a high frequency arc will be generated. The high frequency can be cut off automatically after the arc generation. After the torch has pierced through the work piece, straighten the torch vertically and follow your desired cut line. Once you have finished cutting, release the trigger to extinguish the arc.



## SYSTEMATIC BLOCK DIAGRAM



**This product is sold subject to the understanding that if any defects in manufacture or material shall appear within 12 months from date of consumer purchase/sale, the manufacturer will arrange for such defects to be rectified without charge on the sales invoice and warranty card (except for damage caused by neglect).**

### **General Troubles and Problem Solving:**

<b>Trouble</b>	<b>Causes</b>	<b>Problem Solving</b>
Power lamp not lit	1.No electricity input 2. Switch of welder fails.	1.Check incoming line 2.Replace the switch
Fan not rotating	1. Fan power line is off. 2. Enclosure blocks the fan due to distortion	1.Reconnect the line 2.Reform the enclosure
Warning lamp lights	1.Over heat (yellow lamp lights) 2.Over current (Green lamp lights)	1. Weld after cooling. 2. Increase input voltage
No output of welder	1.Over current protection 2. Welder fails	1. Over load using 2. Maintenance in manufacturer or service
Output current decreased	1. Input Voltage is low 2. Input line is too thin	1. Power line is thickened
Current cannot be regulated	1.Connecting line of the potentiometer is off 2.Potentiometer for current regulation fails	1.Reconnect the line 2.Replace potentiometer
High frequency arc cannot be generated	1.The switch fails 2.Interval of high frequency discharging is too big 3.Proximity of torch and work pieces too great	1.Replace torch switch 2.Regulate discharging interval to 0.8-1.0mm 3.Put torch tungsten electrode close to material
Arc of argon welding is broken or tungsten electrode is burnt	1.Argon gas flow is not regulated well 2.Tungsten electrode fails 3. Value of current does not match with dial. of tungsten electrode	1.Regulate well 2.Replace or sharpen 3.Select the electrode dial and current correctly
Welding torch overheat	1. Cannot use the water cooling when the current is more than 160A 2.The argon flow is the low current	1.Use water cooling 2.Increase the argon flow

## ACCESSORIES: SEE PACKING LIST PLEASE

### PACKING LIST



AC/DC MULTI200P 4 IN 1 MACHINE	1		
Ground clamp	1		
TIG welding torch	1		
Welding holder	1	optional accessory	
gas inlet pipe	1		
Air pressure Regulator	1		
Adjustable foot control	1	optional accessory	
Cutting torch	1		
Electrode	5		
Tip 1.0	5		
Ceramic shield	3		
Operation instructions	1		
Certificate of quality	1		

No.

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### Certificate of quality

**Name of product: ACTIG/DCTIG/DC MMA/CUT 4 IN 1  
MACHINE**

**Type of product: \_AC/DCMULTI200P**

**Packing No: \_\_\_\_\_**

**Test results of this welder fulfills \_\_\_\_\_**

**\_\_\_\_\_ technical requirements and its release**

**from the works is granted.**

**Inspector\_\_\_\_\_Date\_\_\_\_\_**

## ACCESSORIES: SEE PACKING LIST PLEASE

### PACKING LIST



AC/DC MULTI220P 4 IN 1 MACHINE	1		
Ground clamp	1		
TIG welding torch	1		
Welding holder	1	optional accessory	
gas inlet pipe	1		
Air pressure Regulator	1		
Adjustable foot control	1	optional accessory	
Cutting torch	1		
Electrode	5		
Tip 1.0	5		
Ceramic shield	3		
Operation instructions	1		
Certificate of quality	1		

No.

\_\_\_\_\_

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**Name of product:** ACTIG/DCTIG/DC MMA/CUT 4 IN 1  
**MACHINE**

**Type of product:** \_AC/DCMULTI220P

**Packing No:** \_\_\_\_\_

**Test results of this welder fulfills** \_\_\_\_\_

\_\_\_\_\_ **technical requirements and its release**

**from the works is granted.**

**Inspector**\_\_\_\_\_ **Date**\_\_\_\_\_