Smart TIG 315 AC/DC

EN	TECHNICAL INSTRUCTIONS MANUAL. ARC WELDING INVERTER EQUIPMENT.

EN	THIS EQUIPMENT MUST BE USED BY PROFESSIONALS. TO HELP YOU IN YOUR WORK CAREFULLY READ THIS MANUAL.

galagar® WELDING

Jaime Ferrán 19 50014 ZARAGOZA (Spain)
TLF.-34/976473410 FAX.-34/976472450

CE

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1. SAFETY

Warning! During the welding process, it may cause damage to you and others, please do well the protection. For the details, please refer to the safety protection guide to the operators that accord with the manufacturer accident prevention requirements.

Operate this equipment by trained professional only!

- Use welding labor protection supplies with approval of safety supervisory authority.
- Operators must be the special workers with valid work permits of “Metal Welding (Gas Cutting) Operation”.
- Do not maintain and repair welder with power.

Electric shock-may result in serious injury or even death!

- Install grounding device according to application standard.
- Do not touch live parts with naked skin, wet gloves or wet clothes.
- Be sure you are insulated from ground and workpiece.
- Confirm the safety of your working position.

Smoke-may be harmful to your health!

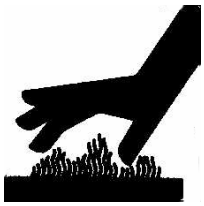
- Keep your head away from the smoke to avoid inhalation of waste gas in welding.
- Keep the working environment well ventilated with exhaust or ventilation equipment when welding.

Arc radiation-may hurt your eyes and burn your skin!

- Use proper welding mask and wear protective clothing to protect your eyes and body.
- Use proper mask or curtain to protect onlooker from being injured.

Improper use and operation may result in fire or explosion

- Welding spark may result in fire, so please make ensure there are no inflammables near the welding position, and pay attention to fire safety.
- Ensure there is fire extinguisher nearby, and make sure someone has been trained to operate the fire extinguisher.
- Do not weld closed container.
- Do not use this machine for pipe thawing.

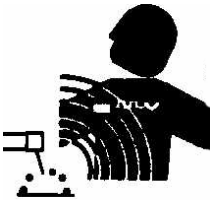


Hot workpiece can cause severe scald.

- Do not touch hot workpiece with bare hands.
- Cool the welding torch for a while after continuously working.

Excessive noise does great harm to people's hearing.

- Wear ear covers or other hearing protectors when welding.
- Give warning to onlooker that noise may be potentially hazardous to hearing.



Magnetic field can make cardiac pacemaker a bit wonky.

- People with cardiac pacemaker should stay away from the welding spot without first talking to a doctor.

Moving parts may injure your body.

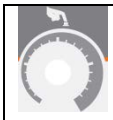
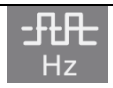
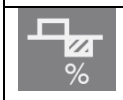
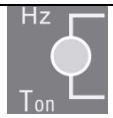
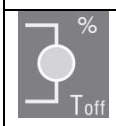
- Please keep away from moving parts (like fan).
- Each door, panel, cover, baffle plate, and protective device the like should be closed and located correctly.

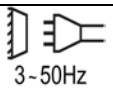
Seek professional support when trouble strikes.

- When trouble strikes in installation and operation, please inspect according to related contents in this manual.
- If you still cannot understand fully, or you still cannot solve the problem, please contact the dealer or the service center of JASIC to obtain professional support.

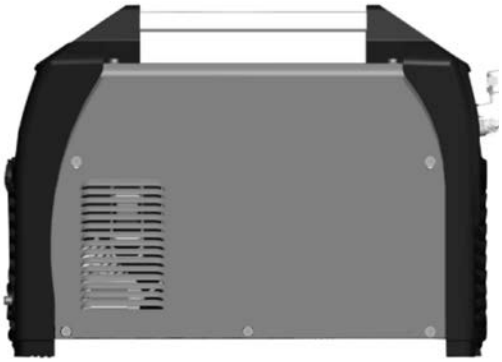
2. Description of Symbols

	**Reminder to be noted during operation**	ON	**Power switch in "on" position**
	**Object needing special instructions and tips**	OFF	**Power switch in "off" status position**

	**Knob can be operated**		**Grounding icon**
	**Arc strike mode**		**Spot welding time**
	**Tungsten needle diameter selection**		**Current unit**
	**Parameter setting warning or protection warning**		**Frequency unit**
	**Remote control mode or torch control mode**		**Percentage**
	**Argon welding mode**		**Time unit**
	**Manual welding mode**		**Voltage unit**
	**Welding gas related parameters**		**AC frequency**
	**Cleaning width**		**Pulse frequency, mixed argon welding pulse frequency or spot welding operation time**
	**Pulse duty cycle, hybrid argon welding pulse duty cycle or spot welding quenching time**		**Pulse mode**
	**VRD mode**		**Water tank control**
	**AC mode**		**Torch control mode**
	**Lights when a memory channel is selected**		**Lights when the parameter is saved or the channel has a stored parameter**

GAS **Lights when ventilated**	 **Symbol of three-phase AC power supply and rated frequency**
IP21S **Enclosure rating**	 **Do not dispose of electric tools together with domestic garbage**
 **Can be used in the environment which has high risk of electric shock**	 **Do not use outdoors**
 **Symbol of manual metal arc welding with covered electrodes**	 **Symbol of Tungsten inert-gas welding**
F **Insulation class**	I_2 **Output load**
U_1 **Rated AC input voltage**	U_0 **No-load voltage** **Open circuit voltage of secondary winding**
I_{1max} **Rated maximum input current**	I_{1eff} **Maximum effective input current**
X **Duty cycle** **The ratio of given duration time/the full-cycle time**	
U_2 **Load voltage** **Output voltage of rated load:U2= (20+0.04*I_2) V (For MMA function)** **Output voltage of rated load:U2= (10+0.04*I_2) V (For TIG function)**	
	**Three-phase static frequency converter-transformer rectifier**

3. Product Overview



This is a digital AC/DC inverter welder with complete functions, high performance and advanced technology. It is a multi-function welder with AC argon arc welding (square wave, triangular wave and sine wave optional), AC pulsed argon arc welding, DC argon arc welding, DC pulsed argon arc welding, AC-DC hybrid argon arc welding, coated electrode manual welding (DC, AC), and argon arc welding (DC, AC). It can be widely used in the fine welding operations of various types of metal materials. The unique electrical structure and air duct design inside the machine can accelerate the dissipating of the heat generated by the power devices, thus increasing the load continuation rate of the machine. Due to the unique air duct heat dissipation efficiency, the damage to the power device and the control circuit caused by the dust sucked by the fan can be effectively avoided, thus greatly improving the reliability of the machine.

The overall shape of the machine is streamlined and the front and rear panels use a large arc of transition to make the panels congruent naturally and seamless. The front and rear panels and handles of the main unit are sprayed with rubber oil①, which makes the texture of the machine soft, feel good and friendly.

Excellent welding performance, rich function integration, high efficiency, small size, light weight, low cost and many other features make it very convenient for both professional and non-professional welding staffs to put into use in both industrial applications and outdoor applications and meet the welding requirements of all walks of life.

Other information about the machine:

1、 Two functions: MMA, TIG.

2、 Cooling method: fan cooling.

3、 Handle provided for moving.

4、 Characteristics of welding machine: flat characteristic usually, or drop characteristic while set arc force.

5、 EMC is Class A according to CISPR .Ⅱ

①: Not all products are used, and machines of different customers may have differences

4. Function Overview

- **Multiple function design**
  - A variety of welding modes, torch control mode optional, argon arc welding supports pedal remote control and remote welding torch.
  - Output current displays in real time: Displays the output status of welder more conveniently.
  - Operating status displayed by LED light dynamically and the current operating status is displayed constantly.
  - Hot arc-starting of manual welding: Making arc striking of manual welding easier and more reliable.
  - VRD function: Ensures the personal safety of the operator and prevents electric shock due to high voltage when the machine is not working.
  - Anti-sticking function: Prevents the welding rod from sticking the workpiece during welding.
  - Adaptive plus thrust current: Significantly improves the welder's performance in extended length welding and achieves long-distance welding.
  - Advanced arc starting function: Argon arc welding supports contact arc strike and non-contact arc strike. Non-contact built-in high-voltage arc ignition circuit improves the success rate of high-frequency arc striking.
  - Intelligent fan temperature control: Increases the life of the fan.
  - Parameters are automatically saved when the power is off, and the state before shutting down is restored when the power is turned on again.
  - Parameter storage: Multi-channel parameter storage function can be called at any time. Up to 50 sets of data parameters can be stored.
  - Automatic recognition of multi-function welding torch.
  - With water tank interface, intelligent control of water tank.

5. Features

- **Advanced IGBT inverter technology**
  - The inverter frequency is 20 KHz, which significantly reduces the loss of copper and iron, improves the overall efficiency, and has a significant energy saving effect.
  - The main power device adopts IGBT with strong impact resistance, which is smaller and more reliable.
- **Leading control methods**
  - Advanced control solutions have significantly improved the performance of the welder and have met the welding process requirements to a greater extent.
  - New secondary inverter topology patent technology.
  - Using new control technology, the voltage spikes generated by the secondary inverter are smaller, the reliability is improved, the energy consumption is lower, and the volume is smaller.
  - Controlled by world's leading MCU intelligent digital technology, the core functions of the welder are realized by software. It is a digitally controlled welder. Its function and performance are greatly improved compared with the traditional welder.
  - New software control can be upgraded according to demand for easy maintenance.
- **Excellent welding performance**
  - It can be widely used for welding all kinds of acid and alkaline electrodes.
  - It has the characteristics of easy arc striking, small splash, stable current, and good molding.
  - AC argon welding can be widely used in welding with non-ferrous metals such as various aluminum alloys and magnesium alloys, featuring a variety of waveform options and wider application.
  - DC argon welding can be applied to the welding of various stainless steels and carbon steels.
- **Beautiful shape and structure**
  - Streamlined front and rear panel design makes the overall shape more beautiful.
  - High-strength engineering plastics are used on the front and rear panels to effectively ensure that the machine

can work efficiently under harsh conditions such as high impact and drop.

- Excellent insulation performance.
- Good “three proofings” design, good anti-static performance and corrosion resistance.

➢ **Perfect automatic protection**

- The machine has a perfect protection function, and there is a corresponding code hint when protection is enabled.
- The machine integrates under-voltage and over-voltage protection. When the input grid voltage is unstable, and the voltage is too high or too low, the welder protection disables output and prevents damage to the welder.
- Overheating protection: Due to high ambient temperature or overloaded use, the temperature of the internal components is too high, and the protection prevents damage to the welder due to high temperature.
- Overcurrent protection: When the welder exceeds the design rated output, the welder enables protection to prevent damage to the welder.

➢ **Good product consistency and stable performance**

- This machine adopts intelligent digital control, which is insensitive to changes of component parameters. The changes of component parameters will not affect the performance of the welder. It is insensitive to changes in the temperature and humidity of the environment. Therefore, the consistency and stability of the digital control welders are much better than those of the traditional welders.

➢ **Friendly human-machine interface**

- Using the internationally accepted graphical language interface, the main human-machine interface is simple, intuitive and easy to understand.
- The operation panel layout is convenient for various user operations.

➢ **High quality manual welding can be achieved**

- Excellent control algorithm significantly improves manual welding performance: easier arc striking, stable welding current, minimal splashing, non-stick, good weld formation, automatic adaptation to changes in the length or cross-section of the welding cables, excellent quality in size specifications.

➢ **Argon arc welding of high requirements can be achieved**

- The improved digital constant current regulation technology ensures the low noise and high stability of the arc in the full specification. In addition, the sophisticated and mature control algorithm provides a convenient and practical method for the user to freely control the current form. The machine offers four classical argon arc operation modes, including 2 steps, 4 steps, cycle and spot welding, which provide a good way for users to realize the special process requirements.

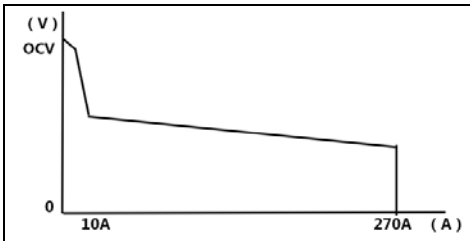
➢ **Support remote control**

- Provides torch control and pedal switch options, and users can choose as needed.

➢ **Perfect automatic recording**

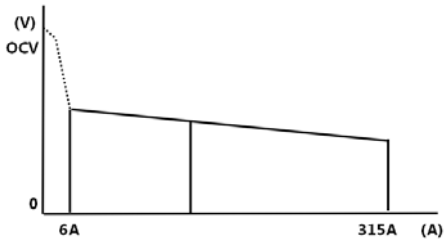
- The machine can count the data such as the cumulative number of start-ups, cumulative start-up time, cumulative welding time, cumulative argon arc welding time, cumulative manual welding time, cumulative number of alarms, cumulative number of overheating, cumulative number of undervoltage and cumulative number of overvoltage, store in FLASH memory for long-term and provide the basis for maintenance

6. Welder Output Volt-ampere Characteristic Curve

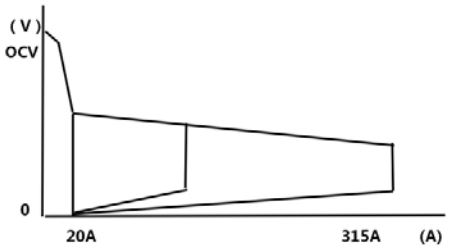


Manual welding process

This machine outputs constant current. The volt-ampere characteristic curve reflects the maximum output voltage and the maximum output current. Other welding parameters are within this curve range. The volt-ampere characteristic curves of various welding modes are shown in the figure.



Argon arc high-frequency arc striking process



Argon arc lifting arc striking process

7. Product Technical Parameters

Item name	Unit	Parameters
Supply voltage	VAC	AC400V±15%
Input frequency	Hz	50
Rated input current	A	19.5@TIG 21.0@MMA
Power capacity	KVA	9.0@TIG 10.0@MMA
Output current adjustment range (TIG)	A	10 ~ 315
Output current adjustment range (MMA)	A	10 ~ 270
Thrust current adjustment range	A	0 ~ 100
Hot arc current adjustment range	A	0 ~ 80
No-load voltage	V	70
VRD voltage	V	12.4

Rated operating voltage		V	22.6@TIG 30.8@MMA
AC output frequency		Hz	50 ~ 200
Cleaning width		%	20 ~ 60
AC-DC output frequency		Hz	1.0 ~ 20
AC-DC mixing duty cycle (DC)		%	5 ~ 95
Base current		%	6 ~ 315
Pulse frequency	DC	Hz	0.5 ~ 200
	AC	Hz	0.5 ~ 20
Pulse duty cycle		%	5 ~ 95
Front blowing time		S	0.5 ~ 10
Rear blowing time		S	0.5 ~ 15
Rise time		S	0 ~ 15
Decay time		S	0 ~ 15
Hot arc current time		S	0.01 ~ 1.5
Remote control			Yes
Arc strike mode			High frequency oscillation arc striking, contact arc striking
Efficiency (%)		%	80
Duty cycle (%)		%	TIG: 315@30% - MMA: 270@30%
Power factor			0.70
Insulation class			F
Enclosure rating			IP21S
Operating temperature		℃	-10 ~ 40
Dimensions		mm	566.0 x 223.5 x 405
Weight		Kg	25.5

Note:

Duty cycle(%):

The ratio of given duration time/the full-cycle time

Note:

Duty cycle(%):

The ratio of given duration time/the full-cycle time

This ratio shall be within 0~1, and can be indicated by percentage.

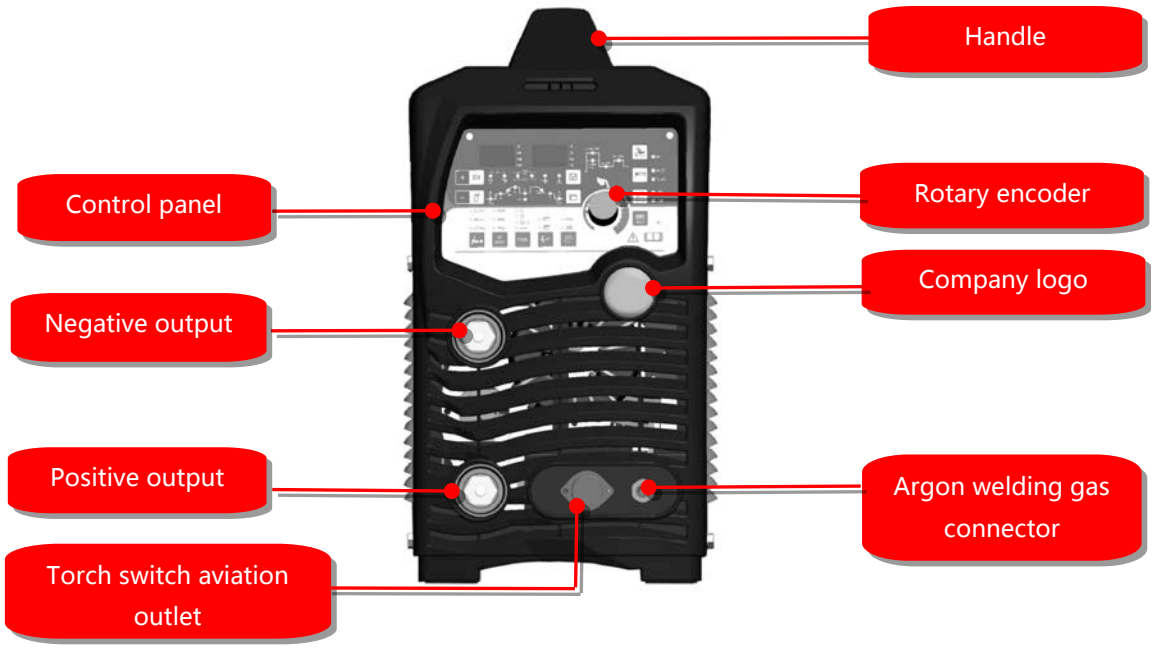
In this standard, the full-cycle time are 10minutes.

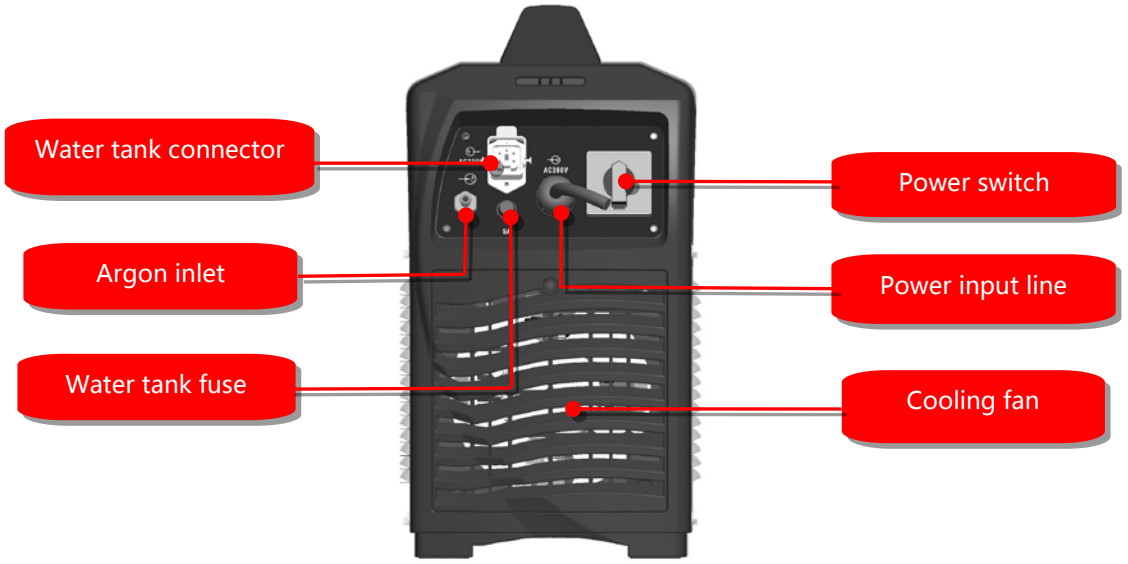
For example, if the duty cycle is 30%, the load-applying time shall be 3 minutes and the following.

gala gar WELDING CE			GALAGAR S.L. CIF B- 50/045285 50.014 ZARAGOZA - SPAIN			
TIG 315 AC/DC			No.:			
3~ f1/f2			EN 60974-1;EN 60974-10			
		10A/10.4V ~ 315A/22.6V(TIG) 10A/20.4V-270A/30.8V(MMA)				
		X%		30	60	100
S	U_0=73V	TIG	I_2 A	315	220	170
			U_2 V	22.6	18.8	16.8
	U_0=73V	MMA	I_2 A	270	185	145
			U_2 V	30.8	27.4	25.8
3~50Hz	U_1=400V	TIG	I_{1max}=17A		I_{1eff}=10A	
		MMA	I_{1max}=19A		I_{1eff}= 12A	
IP21S	F	⚠			25.5Kg	

8. Block Diagram

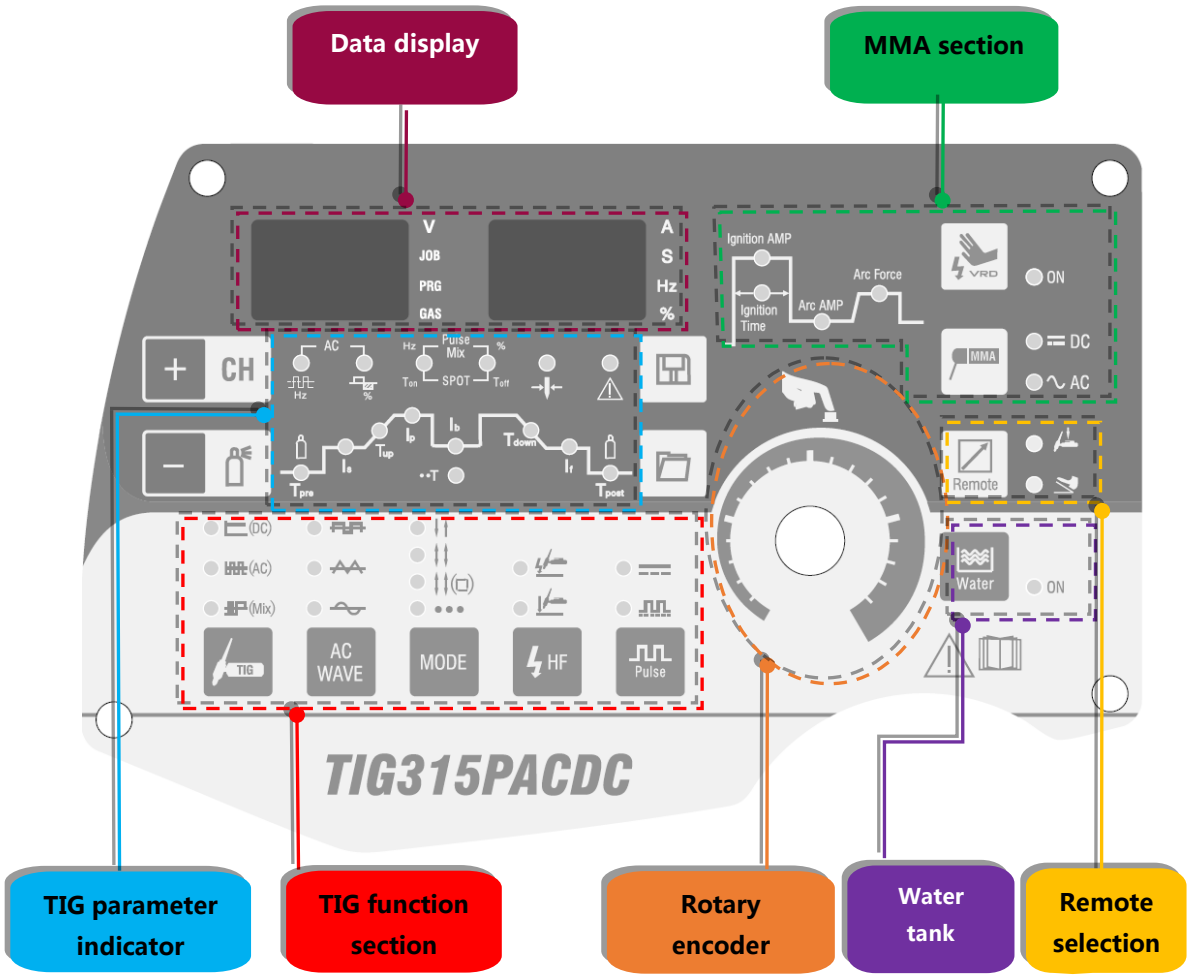
9. Product Appearance Overview





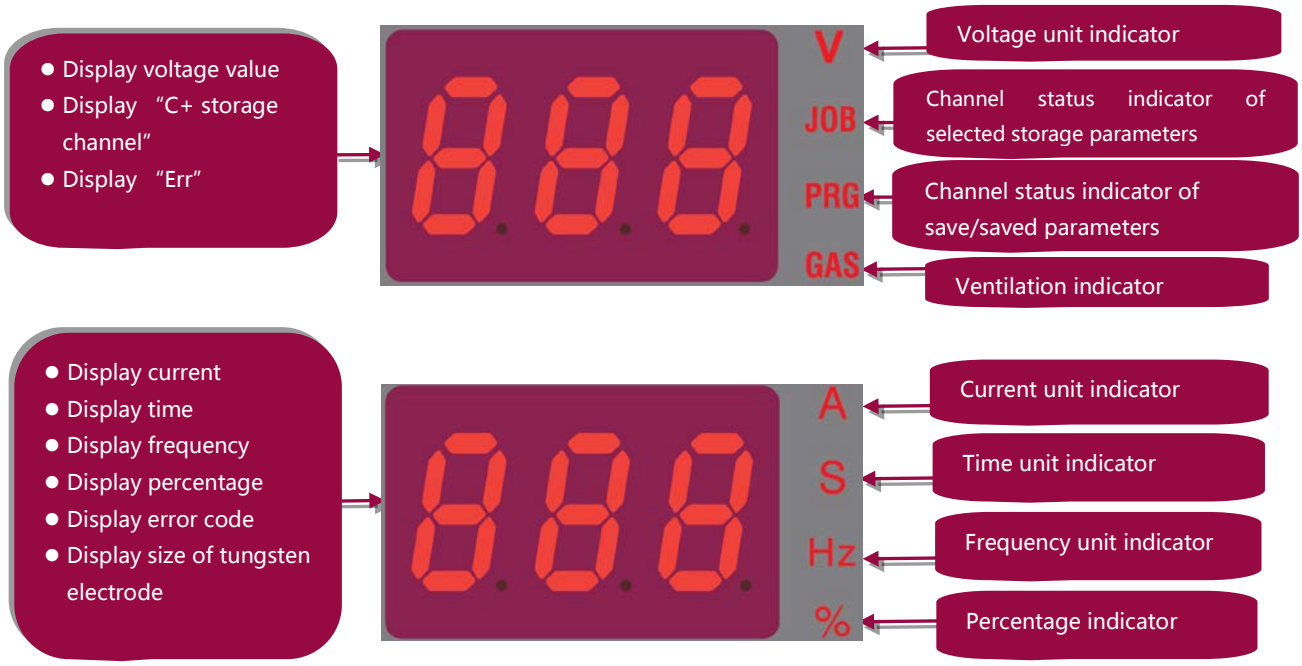
1. Connect the negative electrode output to the argon torch.
2. Connect positive output terminal to ground clamp.
3. Select functions and parameters on the control panel

10. About the Control Panel



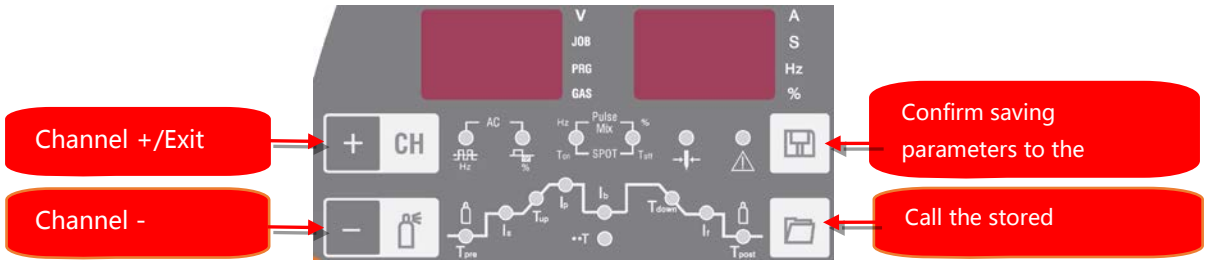
11. Control Panel Features

11.1 Header display



1. The "V" indicator lights up when the voltage is displayed
2. The "JOB" indicator lights up when the storage parameter channel is selected
3. The "PRG" indicator lights up when the parameter is saved to the channel or the channel stores the last stored data
4. The "GAS" indicator lights up when the solenoid valve gas switch is turned on
5. The "A" indicator lights up when there is current
6. The "S" indicator lights up when the time is displayed
7. The "Hz" indicator lights up when the frequency is displayed
8. The "%" indicator lights up when the percentage is displayed

11.2 Save and Call Parameter Settings



1. Press the Channel button + CH to enter the parameter storage channel mode.
2. In channel mode, select the corresponding channel by pressing the Channel button + CH and − turning pages up and down. 50 storage channels are available in total.
3. Set parameters as needed, save to the selected channel, and press Save button to save the parameters.
4. To exit the channel and return to the normal interface, press and hold the Channel button + CH for 2 seconds to exit the channel storage mode; press any button other than the channel mode to exit; or if you do not operate in the channel mode for more than 5 seconds, the channel mode will automatically

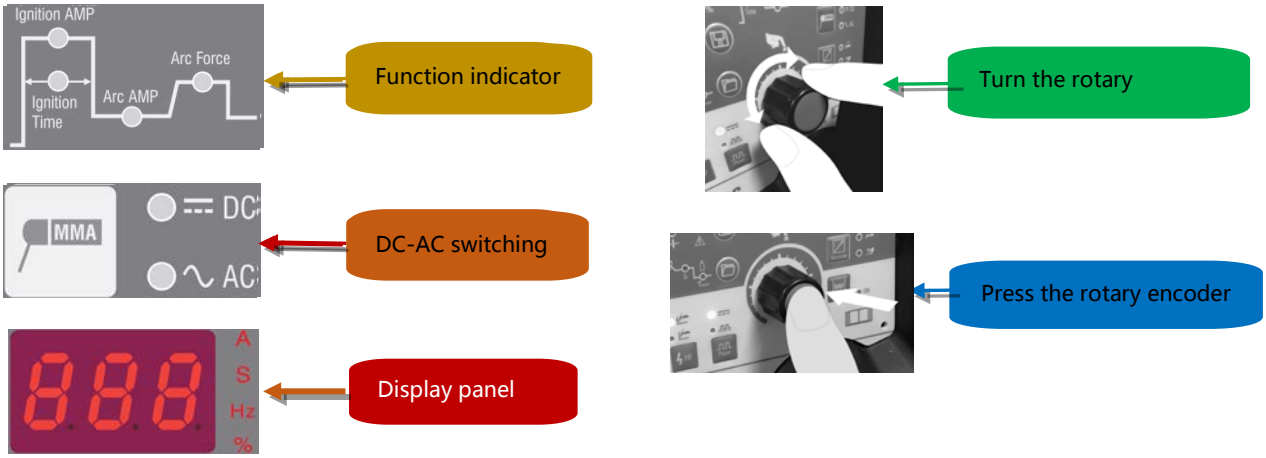
5. When calling a channel parameter, press the Channel button 

to enter the parameter storage channel mode, press the Channel button 

or 

to select the parameter channel to be called, and press the Call button 
to call the stored parameter. Press and hold the Call button 
to clear the current channel data.

11.3 MMA Mode and Parameter Settings



1. 

indicates the hot arc striking current for manual welding work.
2. 

indicates the time of hot arc striking.
3. 

indicates the welding current of manual welding work.
4. 

indicates the thrust current of manual welding work.
5. Press Manual welding 

to enter manual welding selection interface, and select desired DC or AC mode. 

indicator is on when DC mode is selected; 

indicator is on when AC mode is selected.
6. Rotate the rotary encoder 
clockwise or counterclockwise to select the desired function, and press the rotary encoder 
to set the required parameters. After setting, press the rotary encoder 
again to exit the parameter setting.
7. When a function is selected, the corresponding indicator lights; when a function is being edited, the corresponding indicator flashes.
8. When setting the parameters, rotate the rotary encoder 
clockwise to increase the parameter value, and rotate the rotary encoder 
counterclockwise to decreases the parameter value; the parameter size is displayed on the panel 

.

11.4 Safe VRD Mode

1. VRD can be enabled only in MMA mode. Press 

to turn on the VRD function, and the indicator 

lights up.
2. When the input is rated, the no-load output voltage is 12.5V when VRD is turned on and 75V when it is not turned on. The output voltage is displayed on the panel 

.
3. If the input voltage is different, the voltage displayed on the panel will be different, but approximately equal to the rated output voltage.

11.5 Classification of TIG Modes

1. Press the TIG button 

to enter the TIG welding selection interface, switch among DC, AC and MIX mode, and select the mode as needs.
2. When the DC mode is selected, the indicator 

lights up,DC-TIG is applied to carbon steel welding ,copper welding and stainless steel welding.
3. when the AC mode is selected, the indicator 

lights up，AC TIG is applied to welding aluminum, magnesium and their alloys.
4. when the Mix mode is selected, the indicator 

lights up，under Mix TIG mode, AC and DC output alternately, which enhances thermal input for melting base metal, deepens molten pool and reduces tungsten sparkwear. You can achieve a better welding performance if you fill wire during AC output. (It is easier to control time for filling wire when frequency is 1Hz to 2Hz.)

11.6 Classification of AC Waveforms

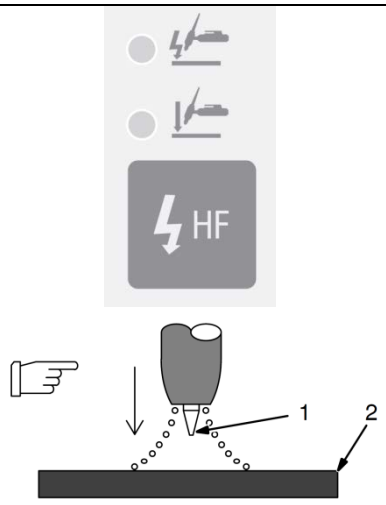
1. Press the Waveform selection button 

to switch among square wave, triangle wave and sine wave, and select the waveform as needed.
2. When the square wave is selected, the indicator 
lights up，standard square wave is featured with quick polarity switch, high arc stability, good dynamic response and strong ability to clean oxidation film. It is suitable for welding aluminum and its alloys.
3. when the triangle wave is selected, the indicator 
lights up,triangle wave can speed up shaping weld-joint and decrease thermal deformation by reducing thermal input. It is suitable for welding thin plates.
4. when the sine wave is selected, the indicator 
lights up,sine wave has softer arc and lower noise.

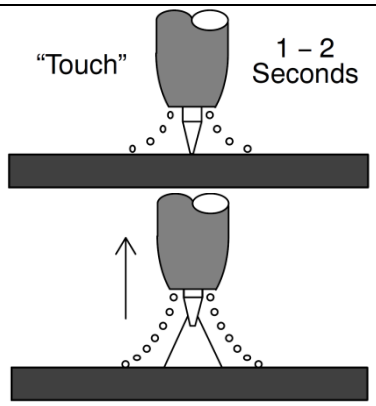
11.7 Classification of Welding Torch Control Modes

1. Press the Mode control button MODE to switch among 2T, 4T, cycle, and spot welding, and select the mode as needed.
2. When 2T is selected, the indicator lights up; when 4T is selected, the indicator lights up; when cycle is selected, the indicator lights up; when spot welding is selected, the indicator lights up.
3. In 2T mode, when the torch switch is pressed down, it will pre-feed gas and the arc striking current rises for preset current time to preset current; when the torch switchis released, the preset current drops to the arc stopping current and then quenches.
4. In 4T mode, when the torch switch is pressed down, it will pre-feed gas and stop at arc striking current; when the torch switch is released, the arc striking current rises to the preset current; when the torch switch is pressed down, the preset current drops to the arc stopping current; when the torch switch is released, the arc stopping current drops until the arc quenches.
5. In cycle mode, when the torch switch is pressed down for the first time, it will pre-feed gas and stop at arc striking current. When the torch switch is released, the arc striking current will rise to the preset current. When the torch switch is pressed down, the preset current will drop to the arc stopping current; when the torch switchis released, the arc stopping current will rise to the preset current. Then, the mode switches among preset current → arc stopping current → rise time → preset current when the torch is pressed down and released. If the torch switch is pressed consecutively within 500 milliseconds, the welder turns off output and exits the cycle mode.
6. In spot welding mode, when the torch switch is pressed down, it will pre-feed gas and reach the preset current. In lift arc striking mode , spot welding closes the output after set running time. In high frequency arc striking mode , spot welding reaches set running time and returns to running state after set output time closing. The cycle retains as long as the torch switch isn't released.

11.8 Arc Striking Mode



1. Two arc striking modes are available: high frequency oscillation arc striking and contact arc striking.
2. Press the arc strike control button HF to switch between high frequency oscillation arc striking and contact arc striking.
3. When the indicator lights up, it indicates the high-frequency oscillation arc striking mode. When the indicator lights up, it indicates the contact arc striking mode.
4. In high-frequency oscillation arc striking mode, keep the distance between the tungsten electrode and the workpiece is within 1cm and press the torch switch to strike the arc.
5. In contact arc striking mode, two methods are available: one is to press the torch switch first, then tungsten electrode contacts with the workpiece 1-2 seconds and lifts the tungsten electrode to strike the arc. The other is to contact the tungsten electrode and the workpiece, and then press the torch switch to contact 1-2 seconds, and lift the tungsten electrode to strike the arc.
6. "1" in the figure refers to the tungsten electrode and "2" refers to the workpiece.



Contact arc striking

11.9 Choice of Pulse

1. Press the pulse selection button Pulse to switch between pulse and no-pulse.

There is no pulse when the indicator lights up. There is pulse when the indicator lights up.Generally, low frequency 0.5-10Hz pulse, with its alternant heating and cooling function, decreases thermal deformation by lowering average current. Fish-scale welding bead will be obtained through combining low frequency pulse with proper welding speed. Meanwhile, low frequency pulse is suitable for wire-feeding device and optimizes shaping weld-joint. Pulse improves microstructure of welding bead by vibrating and stirring molten pool. High frequency pulse enhances the stability, centrality and stiffness of arc, which can deepen molten pool and speed up welding.

11.10 Remote Control Mode

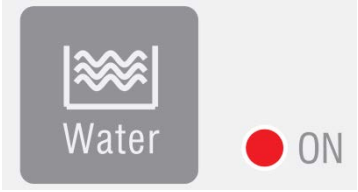
1. When torch indicator lights, it means machine gets into torch control mode. Using analog torch, can only adjust the output current. Using digital torch, can adjust multiple parameters and output current. Machine can detect analog or digital torch you use automatically.
2. When pedal indicator lights, it means machine gets into foot-pedal control mode. Using foot pedal can control arc striking and adjust output current.

NOTES:

Please choose remote torch control mode when using torch.

And choose pedal control mode when using foot pedal.

11.11 Water Tank Control



1. Press the water tank control button Water to turn on/off the cooling mode.
2. When the indicator ON lights up, water cooling mode is activated. Water start cycling when there is current output during the process of welding. Without current output, water circulation will stop 5 minutes later.
3. It is recommended to using water cooling mode and water cooling torch when output current is more than 200A. Otherwise, torch can easily be damaged.

11.12 Selection of Tungsten Electrode Size



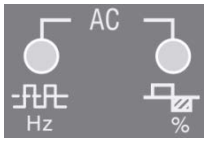
1. Rotate the rotary encoder  clockwise or counterclockwise and the indicator  lights up. Press the rotary encoder  and the indicator flashes. Set the actual size of the tungsten electrode, and press the rotary encoder  again after setting the parameters to exit.
2. When setting parameters, turn the rotary encoder clockwise  to increase the parameter value, turn the rotary encoder  counterclockwise to decrease the parameter value; the parameter size is displayed on the panel  .
3. When the tungsten electrode size does not match the output current, the indicator  lights up.
4. Correspondence between the size of the tungsten electrode and the output current. (Note: DC argon welding does not have this feature)

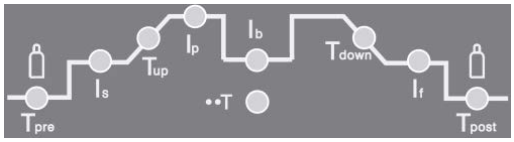
Tungsten electrode size (mm)	Recommended current range (A)	Tungsten electrode size (mm)	Recommended current range (A)
0.5	6--15	2.4	141--190
1.0	16--55	3.2	191--240
1.6	56--90	4.0	241--15
2.0	91--140		

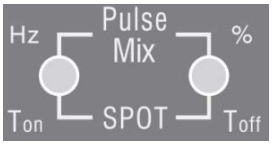
11.13 Air Intake Detection

1. Press the panel  and the GAS indicator  lights up.
2. When the indicator lights up, there is gas output from the pipe. If there is no gas output, check the gas supply equipment.
3. Press  again to exit the intake detection.
4. If you do not press Exit  , the gas will automatically shut off if the torch switch has no action or under no-load for 30 seconds.

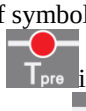
11.14 TIG Parameter Settings







1. Meaning of symbols

Pre-feed time 

indicates the time for pre-feeding of shielding gas.

Arc striking current 

indicates the current at arc striking.

Up time 

indicates the time from arc striking current to peak current.

Peak current 

indicates the welding current during operation.

Base current indicates the base current of the pulse.

Down time 

indicates the time from peak current to arc striking current.

Arc stopping current 

indicates the current at the time of arc stopping.

Gas delay time 

indicates the time of delayed gas shutoff.

AC frequency 

indicates the frequency of AC work.

Clearance width 

indicates the ratio of time when tungsten electrode is negative to AC cycle.

Pulse frequency 

indicates the frequency of pulse operation or the running time during spot welding.

Pulse duty cycle 

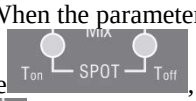
indicates the ratio of the peak current time to the pulse period or the time when the spot weld quenches.

2. Rotate the rotary encoder 
clockwise or counterclockwise to select the parameter to be adjusted. Then press the rotary encoder 
to set the required parameters. Press the rotary encoder 
again to exit the parameter setting. If the encoder is not operated for 5 seconds, it will automatically return to the “peak current” parameter position and parameter selection state.

3. When a parameter is selected, the corresponding indicator lights up; when a parameter is being adjusted, the corresponding indicator flashes.

4. When setting the parameters, rotate the rotary encoder 
clockwise to increase the parameter value, and rotate the rotary encoder 
counterclockwise to decreases the parameter value; the parameter size is displayed on the

panel  .

5. When the parameters are set in spot welding mode, turn the rotary encoder  to select the spot welding time 

, and the indicator 

lights up. Press the rotary encoder  to set parameter, select 

Ton to set the on time, and select 

Toff to set the off time.

Note:
If the AC peak Ip is set to 6~200A when setting the AC frequency, the AC frequency range is 50~200Hz; if the peak exceeds 200A, the AC frequency becomes 50~100Hz. The frequency is set to 100Hz~200Hz when Ip is within 200A and will become 100Hz when Ip exceeds 200A. However, the frequency will remain unchanged if it is 50~100Hz when Ip exceeds 200A.

12. Welding Function

·ning! Select welding function complies with demands. Select the method according to the ıological requirements of workpiece during the welding, if selects the method improperly, unstable electric arc, large splash and sticky welding rod may occur.

12.1 Function Parameter Table

Rotate the rotary encoder  , and select different welding parameters to adjust according to the actual welding needs. Parameters can be selected and adjusted without affecting welding regardless of no-load and welding. The mode is switched in scroll mode, as shown below:

Welding mode	Torch switch mode	Manual arc welding current	Hot arc striking current	Thrust current	Hot arc striking time
MMA DC	NO	●	●	●	●
MMA AC	□O	●	●	×	●

Welding mode	Torch switch mode	Advance gas feeding	Arc striking current	Up time	Peak current	Base current	Down time	Arc stopping current	Gas hysteresis	Spot welding time	AC frequency	Cleaning width	Pulse frequency	Pulse duty cycle	Tungsten electrode selection
DC TIG	2T	●	●	●	●	×	●	●	●	×	×	×	×	×	×
	4T	●	●	●	●	×	●	●	●	×	×	×	×	×	×
	Cycle	●	●	●	●	×	●	●	●	×	×	×	×	×	×
	Spot welding	●	×	×	●	×	×	×	●	●	×	×	×	×	×
DC Pulse TI□	2T	●	●	●	●	●	●	●	●	×	×	×	●	●	×
	4T	●	●	●	●	●	●	●	●	×	×	×	●	●	×
	Cycle	●	●	●	●	●	●	●	●	×	×	×	●	●	×
	Spot welding	×	×	×	×	×	×	×	×	×	×	×	×	×	×
AC TIG	2T	●	●	●	●	×	●	●	●	×	●	●	×	×	●
	4T	●	●	●	●	×	●	●	●	×	●	●	×	×	●
	Cycle	●	●	●	●	×	●	●	●	×	●	●	×	×	●
	Spot welding	●	×	×	●	×	×	×	●	●	●	●	×	×	●
AC Pulse TIG	2T	●	●	●	●	●	●	●	●	×	●	●	●	●	●
	4T	●	●	●	●	●	●	●	●	×	●	●	●	●	●
	Cycle	●	●	●	●	●	●	●	●	×	●	●	●	●	●
	Spot welding	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Mix TIG	2T	●	●	●	●	×	●	●	●	×	●	●	●	●	●
	□T	●	●	●	●	×	●	●	●	×	●	●	●	●	●
	Cycle	●	●	●	●	×	●	●	●	×	●	●	●	●	●
	Spot welding	×	×	×	×	×	×	×	×	×	×	×	×	×	×

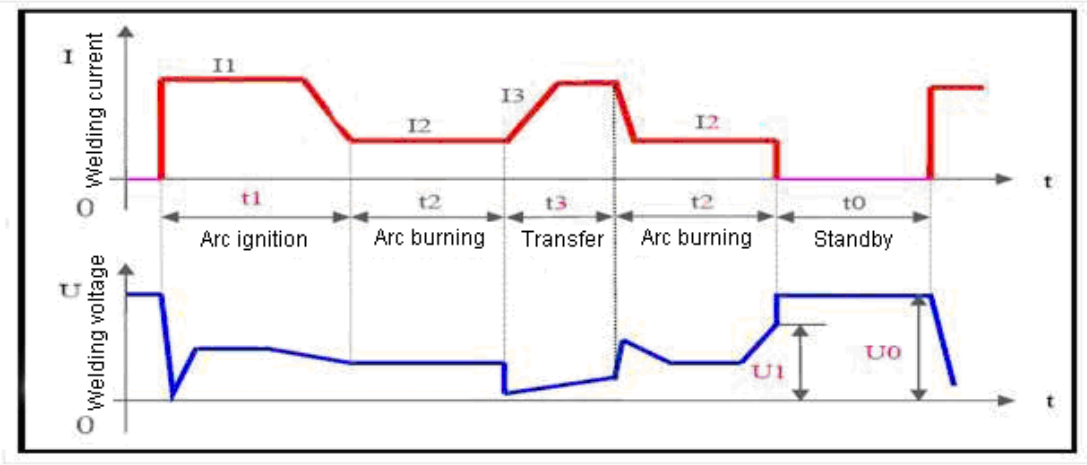
Note:
1. "●" indicates that the parameter is valid, and "X" indicates that the parameter is invalid
2. Press and hold the knob for 2 seconds to enter the linkage mode. If the indicator is not at the peak current and knob rotation is stopped, it will automatically return to the peak current position after 10 seconds.
3. The tungsten electrode selection function aims to provide the welders with a suitable welding parameter, such as arc

striking current and welding current range during welding. If the tungsten electrode used by the welder does not match the tungsten electrode parameter on the panel, the "  " indicator on the panel will turn to yellow and may affect the welding performance. The welding performance is best only When the proper tungsten electrode parameter and welding current are selected and the "  " is off.

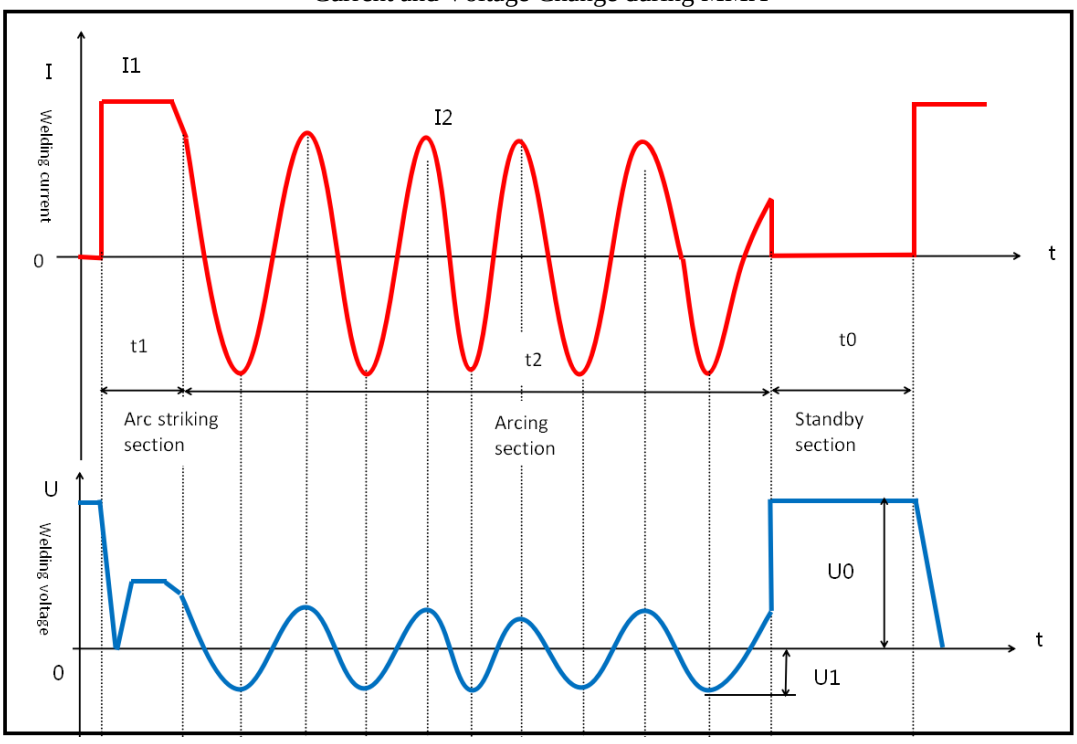
4. In the welding mode switching process, if some debugging parameters are the same, the parameters will not change when the mode is switched, and some parameters will be changed due to the conditional restriction parameters of different modes.

5. Spot welding function is unavailable for pulse and hybrid mode.

12.2 MMA



Current and Voltage Change during MMA



Current and Voltage Changes in AC Manual Welding Process

Note:t0 - standby section, no welding current, output no-load voltage.

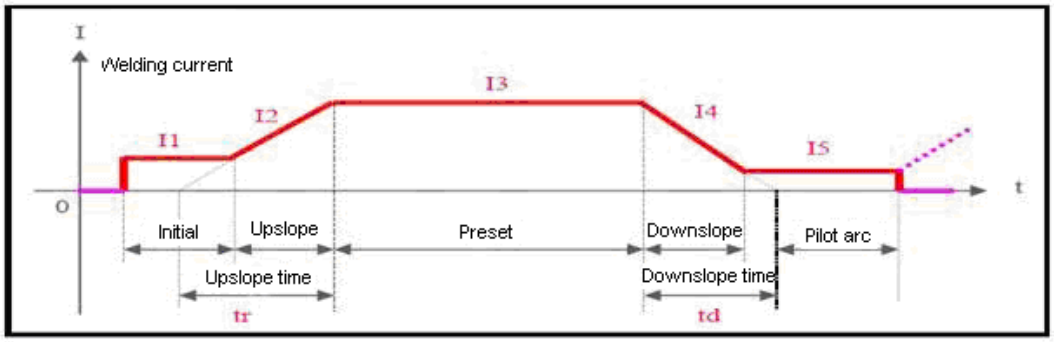
t1 - Arc striking section, the length adjusted according to hot arc striking time.

t2 - Arcing section
t3 - Short-circuit transition section
I1 - Arc strike current
I2 - Operating current
I3 - Thrust current
U1 - Operating voltage
U0 - No-load voltage

- There is no thrust current in MMA AC mode.
- MMA AC mode outputs 50Hz sine wave.
- Current I2: The current of the arcing section during welding, i set by the user according to process requirements.
- Thrust: Thrust refers to the slope of the current rise during a short circuit, and it is set to the current increased every millisecond on this machine. After a short circuit, the current rises from the set current with this slope. For example, when the current is set to 100A and the thrust is 10, the current value after a short circuit of 5ms is: 100+5*10=150A. If is still in a short-circuit state after rising to the allowed maximum value of 270A, the current will not keep rising. If the short circuit state lasts longer than 0.8 second, the welder enters adhesive strip process: waiting for the rod to disconnect at a small current. Thrust value should be determined according to rod diameter, set current and process requirements. Larger thrust results in quicker transition of the droplets and less stickiness, but too much thrust will increase the spatter; small thrust will result in small spatter and good weld formation, but sometimes it will cause the arc to become soft or cause sticking. In particular, the thrust should be increased when welding thick rods at small current. The thrust is generally 0~40.
- Arc striking current: It is beneficial to arc striking and reduces the tendency of welding rod and weldment to stick. The size of the hot arc striking current is generally determined according to rod type, the specifications and welding current. Rods with better arc striking performance and small diameter generally need smaller hot arc striking current; large welding current doesn't have high requirement on the hot arc striking current. The hot arc striking time is related to the arc striking current. If the hot arc striking current is large, the arc striking time can be shortened.
- During DC welding, the heat of the welding arc is different on the positive and negative electrodes. Therefore, a DC power supply must be distinguished between positive connection and reverse connection. The so-called positive connection means that the welding rod is connected to the negative electrode of the power supply, and the weldment is connected to the positive electrode. At this time, the weldment acquires more heat, features high temperature, deep molten pool and easy penetration, and it is suitable for welding thick pieces; the so-called reverse connection means that the welding rod is connected to the positive electrode of the power supply and the weldment is connected to the negative electrode. At this time, the weldment acquires less heat, features low temperature, shallow molten pool and difficult penetration, and it is suitable for welding thin pieces.
- If AC welding equipment is used for welding, the polarities of the arcs will change alternately and instantaneously. Therefore, the two electrodes has same heating and basically same temperatures, and there is no problem in positive connection and reverse connection.
- **Selection of welding rods**

No.	Weldment thickness (mm)	Rod diameter (mm)	Rod diameter (mm)	Welding current (A)
1			1.6	25~40
2	≤4	2.0~3.2	2.0	40~65
			2.5	50~80
			3.2	100~130
3	4~12	3.2~4.0	3.2	100~130
			4.0	160~210
3	> 12	≥4	5.0	200~270
			6.0	220~300

12.3 DC Argon Arc Welding



DC TIG Current Change Waveform

Note: I1- Arc striking current

I2 - Current corresponding to up time

I3 - Set current

I4 - Current corresponding to down time

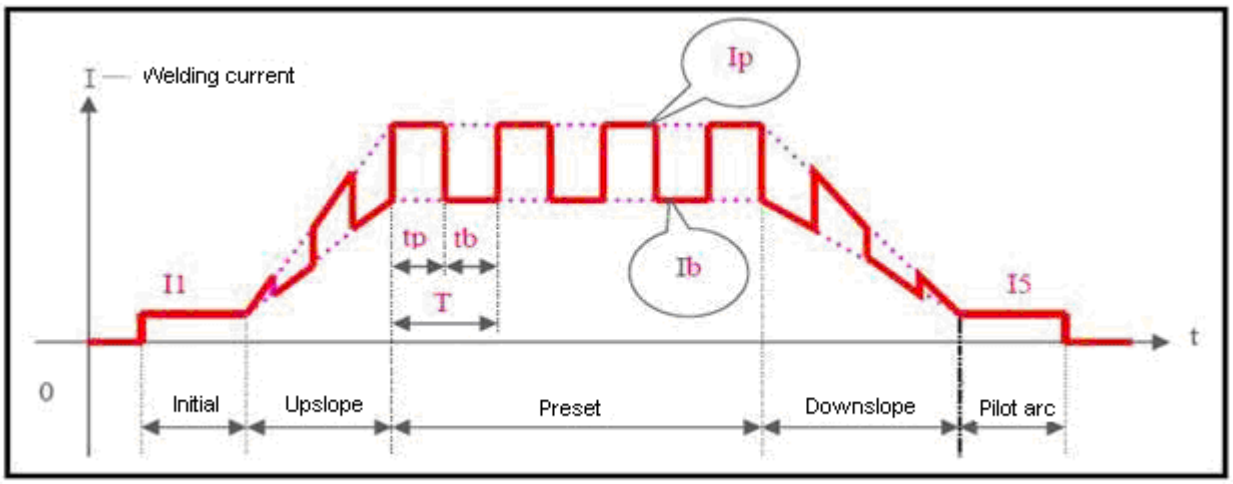
I5 - Arc stopping current

Tr - Upslope time

Td - Downslope time

- Arc striking current I1: The initial current is the current after arcing by pressing the torch switch. It should be determined according to the process requirements. Arcing is easy if the initial current is large, but it should not be too large when welding thin plates, or else it is easy to burn through the workpiece. After arcing in certain mode of operation, the current first stays at the initial current and does not go upslope to achieve the purpose of preheating the workpiece or lighting.
- Set current I3: This parameter is set by the user according to process requirements.
- Arc stopping current I5: In some operating modes, the current maintains the arc continuously after a downslope instead of quenching. The operating current in this state is called arc stopping current, which avoids welding defects or large craters caused by cutting the output immediately. The current should be determined according to the process requirements.
- Pre-feed time: Pre-feed time refers to the time from the torch switch is pressed to deliver argon gas to the non-contact arc striking. Generally, it should be greater than 0.5s, in order to ensure that the argon has been delivered to the welding torch at the normal flow rate when the arc is struck. In particular, the time for advance gas feeding should be increased when the air pipe is long.
- Shut-off delay time: Gas hysteresis time refers to the time from welding current cut-off to gas valve shut-off in the welder. Too long time will cause argon to be wasted and too short time will cause the weld to oxidize due to premature gas stoppage. The time should be longer for AC argon arc welding and special material welding.
- Upslope time tr: Up time refers to the time when the current rises from the arc striking current to the set current. It can be determined according to the use and process requirements.
- Downslope time td: Down time refers to the time when the current drops from the set current to the arc stopping current. It can be determined according to the use and process requirements.

12.4 DC Pulsed Argon Arc Welding



DC Pulse TIG Current Change Waveform

Note: I1 - Arc striking current

Ip - Set peak current

Ib - Set base current

I5 - Arc stopping current

Tp - Peak width

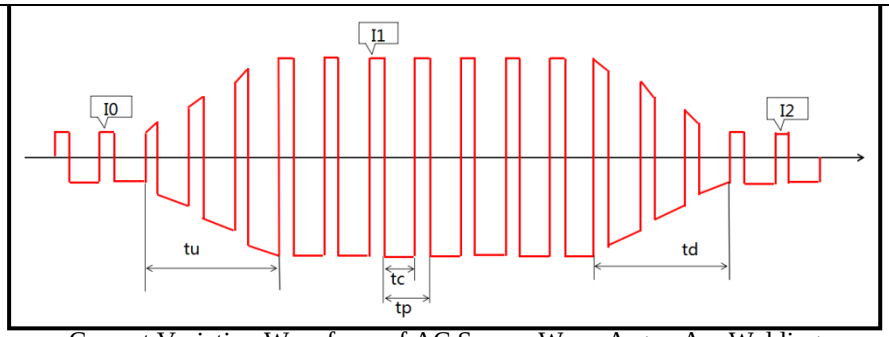
Tb - Base width

T - Pulse period

Pulsed argon-arc welding contains all the parameters of DC argon arc welding and only the parameters of the setting segment are different. In addition, there are four unique adjustable parameters, which are described below in combination with the figure.

- Peak current (Ip): Adjusted according to process requirements.
- Base current (Ib): Adjusted according to process requirements.
- Pulse frequency (1/T): T=Tp+Tb, adjusted according to process requirements.
- Duty cycle (100%*tp/T): The duty cycle is the percentage of the peak current duration in the pulse period, and is adjusted according to the process requirements.

12.5 AC Argon Arc Welding



Current Variation Waveform of AC Square Wave Argon Arc Welding

Note: I0 - Initial current.

I1 - Welding current.

I2 - Arc stopping current.

tu - Upslope time.

td - Downslope time.

tp - AC cycle.

tc - Current clearing time.

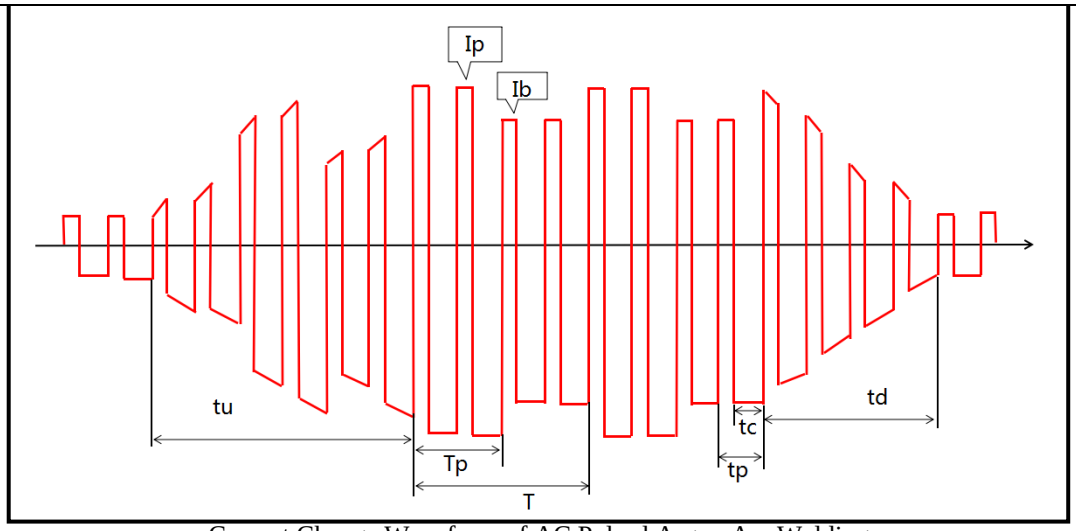
AC argon arc welding has square waves, triangle waves and sine waves. They are only different in output waveforms. AC argon arc welding is the same as DC argon arc welding in pre-feed and gas shutoff hysteresis time. Other parameters are illustrated separately in this figure:

● Initial current I0, welding current I1 and arc stopping current I2: The setting of these three parameters is approximately equal to the absolute average of the actual welding current and can be adjusted according to the process requirements.

● AC frequency (1/tp): Adjusted according to process requirements.

● Clearing width (100%*tc/tp): Generally, the current of positive tungsten electrode during AC welding is called cleaning current. Its main function is to crush the dense oxide layer of the workpiece. The cleaning strength indicates the proportion of cleaning current. This parameter is generally 10~40%. When the value is small, the arc is concentrated, the penetration is large, and the melting width is small. When the value is large, it is opposite.

12.6 AC Pulsed Argon Arc Welding



Current Change Waveform of AC Pulsed Argon Arc Welding

Note: tc- Current clearing time.

tp - AC cycle

Tp - Pulse peak time

T - Pulse cycle

tu - Upslope time

td - Downslope time

Ip - Peak current

Ib - Base current

● AC frequency (1/tp): Adjusted according to process requirements.

● Pulse frequency (1/T): Adjusted according to process requirements.

● Duty cycle (100%*Tp/T): Adjusted according to process requirements.

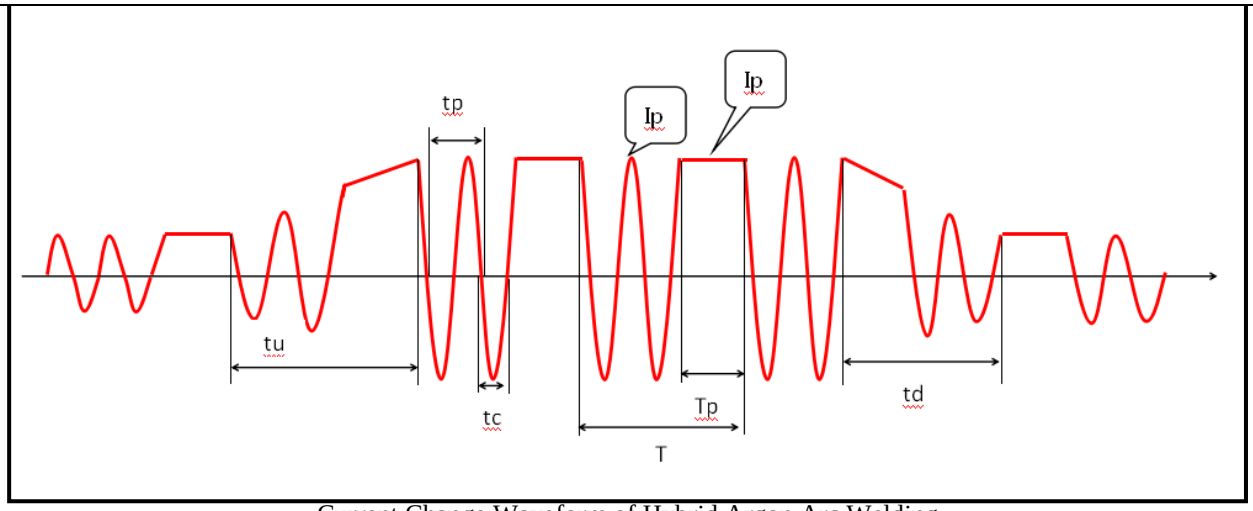
● Clearing width (100%*tc/tp): Adjusted according to process requirements.

● AC pulsed argon arc welding has square waves, triangle waves and sine waves. They are only different in output waveform. The AC pulsed argon arc welding is basically the same as the AC square wave argon arc welding. The difference is that the welding current is controlled by a low frequency pulse, so that the welding current changes with the pulses to form the peak and base current, and the set peak and base currents are also the peak (average) and base (average) of the low frequency pulse.

● In AC pulse mode, the range of pulse frequency is affected by AC frequency and frequency division factor. The minimum frequency division factor is 10, and the maximum is 2 times the AC frequency. The pulse frequency range is 0.5 Hz to AC frequency/10 Hz. You can choose any frequency in the range. When the AC frequency changes, the AC frequency/actual frequency of current pulse is equal to the frequency division factor and updated. When the frequency division factor is determined, the current AC frequency/frequency division factor is equal to the actual frequency of the

current pulse and stored so as to maintain the pulse frequency unchanged. Once the AC frequency and the pulse frequency are set, the frequency division factor is determined, that is, the AC frequency divided by the pulse frequency. For example: When the AC frequency is set to 100Hz, the pulse frequency range is 0.5~10Hz. When the AC frequency is set to 100Hz and the pulse frequency is 5Hz, the current frequency division factor is 100/5 = 20. When the AC frequency changes to 70Hz, the frequency division factor is 70/5 = 14, that is, the frequency division factor is variable, and the pulse frequency is unchanged. **In other words, the AC frequency affects the pulse frequency range. When the pulse frequency is determined, the change of the AC frequency no longer affects the pulse frequency.**

12.7 Hybrid Argon Arc Welding



Current Change Waveform of Hybrid Argon Arc Welding

Note: tc - Current clearing time.
tp - AC cycle.
Tp - DC operating time.
T - Hybrid cycle.
tu - Upslope time.
td - Downslope time.
Ip - Peak setting current.

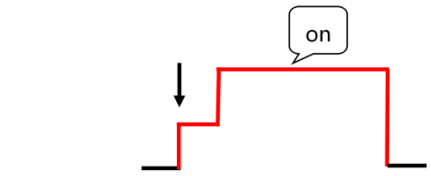
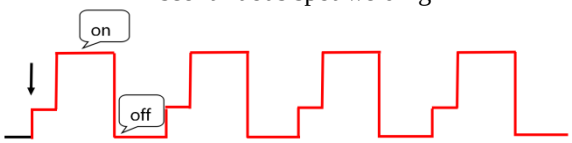
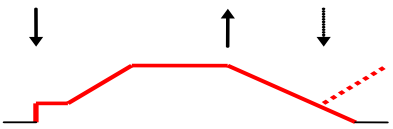
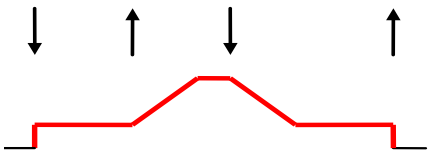
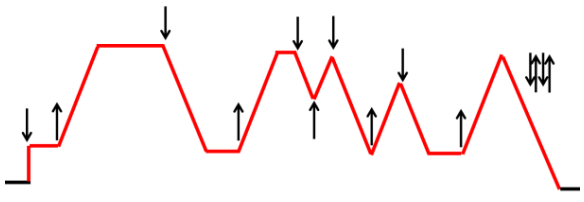
- AC frequency (1/tp): Adjusted according to process requirements.
- Hybrid cycle frequency (1/T): Adjusted according to process requirements.
- Duty cycle (100%*Tp/T): Adjusted according to process requirements.
- Clearing width (100%*tc/tp): Adjusted according to process requirements.
- Hybrid argon arc welding includes the combination of square wave and DC, triangle wave and DC, and sine wave and DC. They are only different in output waveform.
- In hybrid argon arc welding mode, the range of hybrid argon arc welding frequency is affected by the AC frequency and the frequency division factor. The minimum frequency division factor is 10 and the maximum is the AC frequency. Then the frequency range of hybrid argon arc welding is 1 Hz to AC frequency/10 Hz. You can choose any frequency in the range. When AC frequency changes, the AC frequency/the actual frequency of current hybrid argon arc welding is equal to the frequency division factor and updated. When the frequency division factor is determined, the current AC frequency/frequency division factor is equal to the actual frequency of the current hybrid argon arc welding and stored so as to maintain the hybrid argon arc welding frequency unchanged. Once the AC frequency and the hybrid argon arc welding frequency are set, the frequency division factor is determined, that is, the AC frequency divided by the hybrid argon arc welding frequency. For example: when the AC frequency is set to 100Hz, the hybrid argon arc welding frequency range is 1~10Hz. When the AC frequency is set to 100Hz and the hybrid argon arc welding frequency is 5Hz, the current frequency division factor is 100/5 = 20; when the AC frequency changes to 70Hz, the frequency division factor is 70/5 =14, that is, the frequency division factor is variable, and the hybrid argon arc welding frequency is unchanged. **In other words, the AC frequency affects the frequency range of the hybrid argon arc welding. When the hybrid argon arc welding frequency is determined, the change of the AC frequency does not affect the hybrid argon arc welding frequency.**

12.8 Description of Argon Arc Welding Mode

Argon arc operation mode is a special type of convention, which specifies the methods for controlling the welding current variation through different operations of the torch switch in the argon arc (DC, pulse, AC argon arc, hybrid argon arc) welding process. The introduction of the argon arc operation mode has strengthened the application of the torch switch remote control function, so that users can obtain a very practical welder remote controller without increasing the investment.

The argon arc mode should be determined according to the process requirements and the user's operating habits. The icons in the table are described as follows:

Diagram of commonly used torch switch operations			
↓	Press the torch switch	↑	Release the torch switch

Mode No.	Conventional operations	Torch switch operation and typical DC argon arc current curve
1	Discontinuous spot welding: 1. Discontinuous mode under lift arc striking 2. Press the torch switch to strike arc to the set value 3. Arc quenches after set time of spot welding Continuous spot welding 1. Continuous mode under high frequency arc striking 2. Press and hold the torch switch, strike arc to the set value, and the arc quenches after the set working time. After the set quenching time, the arc is automatically struck to the set value, and the cycle sustains as long as the torch switch is not released.	 Discontinuous spot welding  Continuous spot welding
2	Standard two-step method: 1. After pressing the torch switch, arc strikes to set peak value. 2. When the torch switch is released, the arc quenches 3. If the torch switch is pressed again before arc quenching, it goes upslope to the peak.	
3	Standard four-step method: 1. Arc strikes to the initial value when the torch switch is pressed down 2. Arc rises to the peak when the torch switch is released 3. Arc drops until stopping when the torch switch is pressed down 4. Arc quenches when the torch switch is released	
4	Cycle mode: 1. Arc strikes to the initial value when the torch switch is pressed down 2. Arc rises to the peak when the torch switch is released 3. Arc drops until stopping when the torch switch is pressed down 4. Arc rises to the peak when the torch switch is released 5. Cycle 3-4 repeats.	

	6. Corresponding actions will appear when the torch is released or pressed at the moment of rising or dropping. 7. Press, release, press and release the torch continuously within 500 milliseconds to exit the cycle mode.	

- Regardless of high-frequency arc striking or scratch arc striking and regardless of the operation method, it will always reach the initial current first after successful arc striking and then enter the operation mode control.
- Some operation modes exit when the torch switch pressed down. The operator should release the torch switch after exiting welding, and then press the torch switch again to enter the next welding.
- The current curves for all operating modes are assumed to be plotted in the DC argon arc welding mode. When working in pulsed argon arc mode, the current curve is in pulse shape. When working in AC argon arc mode, the current curve is in variable polarity pulse shape.
- Traditionally, the most widely used argon arc operation modes are 2 steps and 4 steps, which correspond to the operation modes 2 and 3 of this machine. The default of this machine is 2 steps.

13. Installation and Operation

ning! This equipment is IP21S and should be protected from rain!

se strictly follow the following steps to install and commission!

13.1 Installation method

rning! All the connections should be conducted after making sure that power supply is cut off.

rect sequence is to connect the bond and grounding line to the welding machine, make sure that connection is reliable and not loose, and then connect to power supply finally.

1) Connect to the appropriate voltage level according to the input voltage of the welder. Do not mismatch the voltage level.
2) The input power cable should be in good contact with the corresponding power terminal or socket to prevent poor contact.
3) Use a multimeter to measure if the input voltage is within the fluctuation range.
4) Insert the cable plug with welding tongs into the positive socket under the front panel of the welder and tighten it clockwise.
5) Insert the cable plug with ground clamp into the negative socket under the front panel of the welder and tighten it clockwise.
6) Ground the power supply properly.

The operator can also choose the DC connection method according to the condition of the parent metal and the welding rods. In general, DC reverse connection method is recommended for basic welding rod (that is, the welding rod is connected to the positive electrode); no special provision is made for acid welding rods.

13.2 Electric connection

Warning! Electric shock may result in personal death; high voltage direct current still exist on equipment even after power-off, please do not contact the current-carrying part on equipment.

Warning! The electric connection of equipment must be performed by qualified electrician with qualification certificate.

Warning!

Do not connect the power cord (blue /brown/black)to ground terminal.

Do not connect the ground wire(yellow/green) to power cord.

Warning!

Improper power supply voltage may damage equipment.

1) This welding machine is equipped with power source voltage compensation system, so it still can work on normally when the power source voltage varies within ±15% range of rated voltage.
2) Connect the power cord to the corresponding voltage class of distribution box according to input voltage class of welding machine, don't connect the voltage by mistake. Meanwhile, make sure that tolerance of supply voltage is within the allowable range. Voltage of the product is 400V~, 50Hz three-phase.
3) When long cable is necessary to be used, the larger section cable is advised to be used to decrease voltage drop；when the connecting cable is overlong, it may impose great affect on arc starting performance of welding machine and other performance of system, so we advice you use the recommended cable length.

4）It is suggested that power cord should be H07RN-F 4X2.5mm2, welding cable (approved according to EN 60245-6) should be H01N2-D 1X35mm2 and external fuse should be 30A. The recommended TIG welding torch is 30% 315A (approved according to EN 60974-7). The recommended electrode holder is 30% 270A (approved according to EN 60974-11).

13.3 Operation method

Warning!

Install the leakage protection device when using the equipment!

Non-operator (bystander) must be far away from the operation site for 5m,the operation site should be Protected by enclosure.

3. it can't be use as cardiac pacing,air pipe welding,and etc.

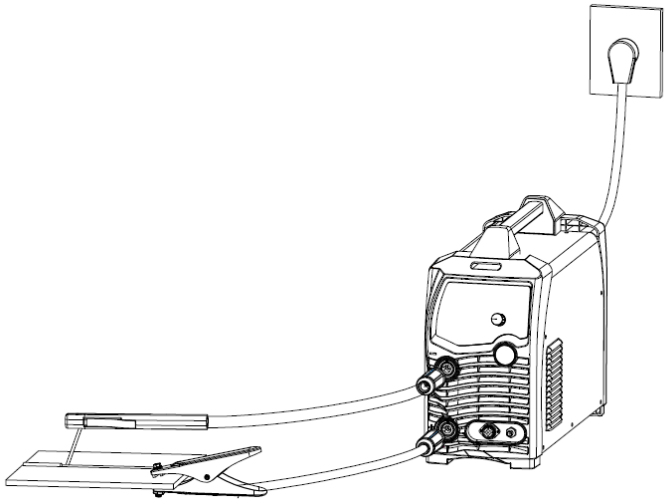
1) When the installation is correct, turn the power switch to "ON" position. At this time, the panel indicator lights, the fan inside the machine starts to rotate (fan is controlled by temperature and may stop), and the welder starts to work normally.

2) Before manual welding, pay attention to the polarity of the wiring. Generally, there are two wiring methods for DC welder: positive connection and reverse connection.

Positive connection method: connect the welding tongs to the negative electrode and the workpiece to the positive electrode;

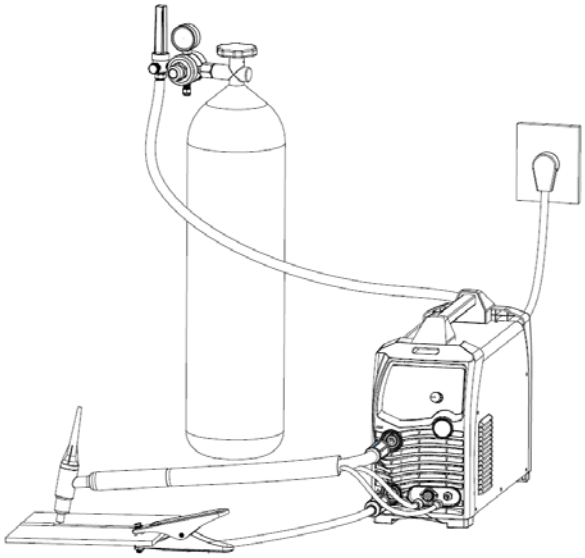
Reverse connection method: connect the workpiece to the negative electrode and the welding tongs to the positive electrode.

When welding, it is selected according to the process requirements of workpiece. Improper selection may result in instable arc, splashing and sticking. In this case, swap the quick plug to change the polarity.



Manual welding diagram

3) Before argon arc welding, clamp the ground wire to the positive electrode of the welder, clamp the welding torch joint to the negative electrode of the welder. Otherwise, welding can't be performed. Connect the welding torch control line is to the control interface. Select the appropriate welding mode according to the workpiece material, and check if the selected tungsten electrode matches the tungsten electrode parameters on the panel and if the current parameters match; in AC welding mode, improper clearing width parameters may lead to welding failure.

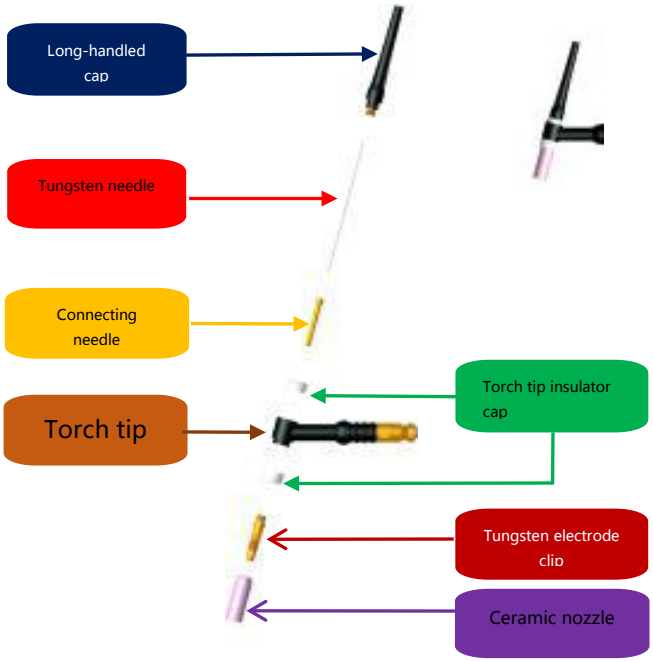


High-frequency Arc Striking or Lift Arc Striking TIG Welding Diagram

4) If the workpiece is far away from the welder and the secondary wire (welding rod holder wire and ground wire) used is relatively long, the cross-sectional area of the wire should be larger to reduce the voltage drop of the cable.

5) During manual welding, select the appropriate welding rod according to the current, clamp the rod, strike arc through short circuit and start welding. During argon arc welding, select the appropriate tungsten electrode according to the current, use lift arc striking or high-frequency arc striking and then start welding.

13.4 Argon arc welding torch



Assemble the torch as illustrated

Standard welding torch parameters

Torch type: Water cooling WP-18 (5M)
Maximum current: 350A
Rated current: 315A
Cooling method: Water cooling
Gas fitting: M10×1.0
Rated load duration: 40%

Accessories

14. Precautions

14.1 Working Environment and place

Warning!

sh down may cause equipment damage or personal injury. Refer to transporting and placing nods marked on the external packing of equipment, handle the equipment with trolley or similar handling equipment which has adequate carrying capacity.

The welding machine must be used in recommended environment. The insulation must be done in advance if the following or similar instance exist:

1) When the operator's action is limited by environment (such as: only can work on bended knees, on foot or lay), it must avoid directly contacting the current-carrying part on equipment with body.
2) Don't use the machine in the event the operating environmental space is very narrow and small which make the operator unable to step aside the current-carrying conductor.
3) Don't use the machine in humid environment, where the operators easy to sweat which make them in great electric shock risks.
4) Don't conduct the welding in the sun or rain or snow; don't make water or rainwater seep into the welding

machine.

5) Don't conduct the welding in the dust area or under the environment of corrosive gas.
6) Don't conduct the gas shielded welding work under the environment of stronger air flow.

Ensure the welding machine is placed according to the following instructions:

- range of the temperature of the ambient air: during operation: –10 °C to +40 °C; after transport and storage at: –25 °C to +50 °C.
- relative humidity of the air: up to 50 % at 40 °C; up to 90 % at 20 °C.
- ambient air, free from abnormal amounts of dust, acids, corrosive gases or substances,etc. other than those generated by the welding process.
- Inclination between placement of welding machine and horizontal plane is ≤10°, avoid toppling over, the welding power source shall not be placed on tilted plane.
- Without oil sludge, water vapor and corrosive gas.
- No vibration and strike .
- In rainproof and shade place .
- More than 300mm to wall to ensure smooth cooling air-flow and excellent ventilation .

14.2 Safety Tips

rning!

er-current/over-voltage/over-heating protection circuit is installed in this machine. When the network voltage, output current or inner temperature exceeds the setting standard, the machine will stop working automatically. However, excessive operation (over voltage) will lead to welder damage.

Therefore, please note:

1) Ventilation

This is an industrial welding machine and can create large current that requires strict cooling devices instead of natural ventilation. Therefore the built-in two fans are very important to ensure effective cooling and stable working performance. The operator should make sure that the louvers be uncovered and unblocked. The minimum distance between the machine and nearby objects should be 30cm. Good ventilation is of critical importance to the normal performance and lifespan of the machine.

2) Over-load is forbidden

The welder is operated according to allowable duty circle (refer to the corresponding duty cycle). Make sure that the welding current should not exceed the max load current. Overload could obviously shorten the machine's lifespan, or even damage the machine.

3) Over-voltage is forbidden.,

Please refer to "Technical Parameters" for the power supply voltage range. This machine is of automatic voltage compensation to ensure the welding current is within the given range. In case that the input voltage exceeds the stipulated value, it would possibly damage the components of the machine. The operator should take according measures to this case.

4) Reliable ground connection. T**here is an ground screw(with ground remark) in the rear part of each machine.** Connect it with an earth cable (section≥6mm^2) to avoid the static and electric shock.

A sudden halt may occur with the front panel's red indicator lighting up while the machine is of over-load status. Under this circumstance, it is unnecessary to restart the machine for it's resulted from over-heating and the triggered the

temperature control switch. Keep the built-in fans working to lower the machine's temperature. Welding can be resumed when temperature falls into the standard range and the red indicator is off.

15. Basic knowledge of MMA

ırning! During welding, it is forbidden to pull off any plug or cable in use, it will lead to life-threatening danger and severe damage of the machine.

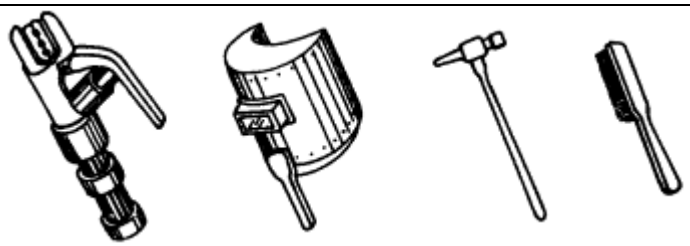
15.1 MMA

Manual metal arc welding (MMA) is an arc welding by manually operating electrode. MMA requires simple equipment and is a convenient, flexible and adaptive welding processing type.MMA is applied to various metal materials with thickness more than 2mm. It's suitable for various material structures, particularly to workpiece with complex structure and shape, short weld joint or bending shape, as well as weld joints in various spatial locations.

15.2 Welding Process of MMA

Connect the two output terminals of the welder to the workpiece and electrode holder respectively, and then clamp the electrode by the electrode holder. When welding, arc is ignited between the electrode and the workpiece, and the end of the electrode and part of the workpiece is fused to form a weld crater under the high-temperature arc. The weld crater is quickly cooled and condensed to form weld joint which can firmly integrally connect two separate pieces of workpiece. The coating of the electrode is fused to produce slag to cover the weld crater. The cooled slag can form slag crust to protect the weld joint. The slag crust is removed at last, and the joint welding is finished.

15.3 Tools for MMA



a) electrode holder b) welding mask c) slag hammer d) wire brush

Common tools for MMA include electrode holder, welding mask, slag hammer, wire brush, welding cable and labor protection supplies.

a) Electrode holder: a tool for clamping electrode and conducting current, mainly including 300A type and 500A type.

b) Welding mask: a shielding tool for protecting eyes and face from injuring due to arc and spatter, including handholding type and helmet type. Colored chemical glass is installed on the viewing window of the mask to filter ultraviolet ray and infrared ray. Arc burning condition and weld crater condition can be observed from the viewing window during welding. Thus, welding can be carried out by operators conveniently.

c) Slag hammer (peen hammer): for the use of removing slag crust on the surface of weld joint.

d) Wire brush: for the use of removing dirt and rust at the joints of the workpiece before welding, as well as cleaning the surface of weld joint and the spatter after welding.

e) Welding cable: generally cables formed from many fine copper wires. Both YHH type arc welding rubber sleeve

cable and THHR type arc welding rubber sleeve extra-flexible cable can be used. Electrode holder and welding machine are connected via a cable, and this cable is named as welding cable (live wire). Welding machine and workpiece are connected via another cable (earth wire). The electrode holder is covered with insulating material performing insulation and heat insulating.

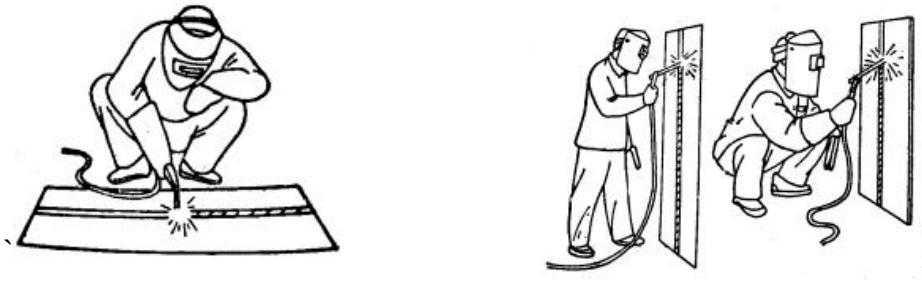
15.4 Basic Operation of MMA

1) Welding joint cleaning

Rust and greasy dirt at the joint should be removed completely before welding in order to implement arc igniting and arc stabilizing conveniently as well as ensure the quality of weld joint. Wire brush can be used for condition with low requirement on dust removal; grinding wheel can be used for condition with high requirement on dust removal.

2) Posture in operating

Take flat welding of butt joint and T-shaped joint from left to right as an example. (See Fig. 13.2) The operator should stand at the right side of the working direction of weld joint with mask in the left hand and electrode holder in the right hand. The left elbow of the operator should be put on his left knee to prevent his upper body from following downwards, and his arm should be separated from the costal part so as to stretch out freely.

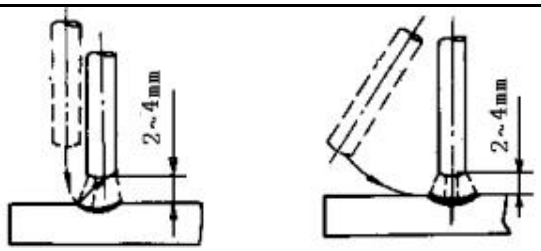


a) flat welding

b) vertical welding

3) Arc igniting

Arc igniting is the process for producing stable arc between electrode and workpiece in order to heat them to implement welding. Common arc ignition mode includes scraping mode and striking mode. (See Fig.13.3) During welding, touch the surface of the workpiece with the end of the electrode by scraping or light striking to form short circuit, and then quickly lift the electrode 2~4mm away to ignite arc. If arc ignition fails, it is probably because there is coating at the end of the electrode, which affects the electric conduction. In this case, the operator can strongly knock the electrode to remove the insulation material until the metal surface of the core wire can be seen.



a) striking mode b) scraping mode

4) Tack weld

For fixing the relative positions of the two pieces of weldment and welding conveniently, 30~40mm short weld joints are welded every certain distance in order to fix the relative positions of the workpiece during welding assembly. This process is named as tack weld.

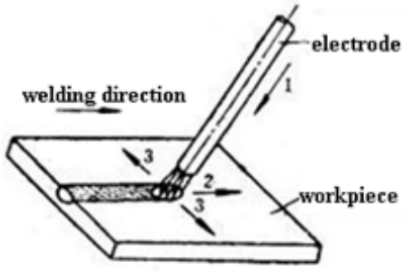
5) Electrode manipulation

The electrode manipulation actually is a resultant movement in which the electrode simultaneously moves in three basic directions: the electrode gradually moves along the welding direction; the electrode gradually moves toward the weld crater; and the electrode transversely swings. (See Fig.13.4) Electrode should be correctly manipulated in three movement directions after arc is ignited. In butt welding and flat welding, the most important is to control the following three aspects: welding angle, arc length and welding speed.

(1)welding angle: the electrode should be inclined in 70～80º forwards. (See Fig.13.5)

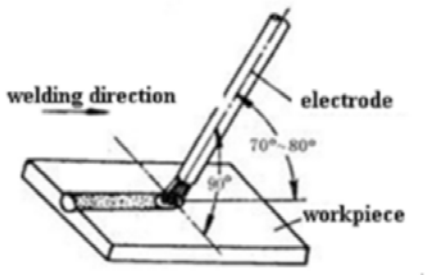
(2)Arc length: the proper arc length is equal to the diameter of electrode in general.

(3)Welding speed: proper welding speed should make the crater width of the weld bead about twice the diameter of the electrode, and the surface of the weld bead should be flat with fine ripples. If the welding speed is too high, and the weld bead is narrow and high, the ripples are rough, and the fusion is not well implemented. If the welding speed is too low, the crater width is excessive, and the workpiece is easy to be burned through. Besides, current should be proper, electrode should be aligned, arc should be low, and welding speed should not be too high and should be kept uniform during the whole welding process.



1. Feed down
2. Move along the welding direction
3. Lateral swing

Three basic movement directions of electrode

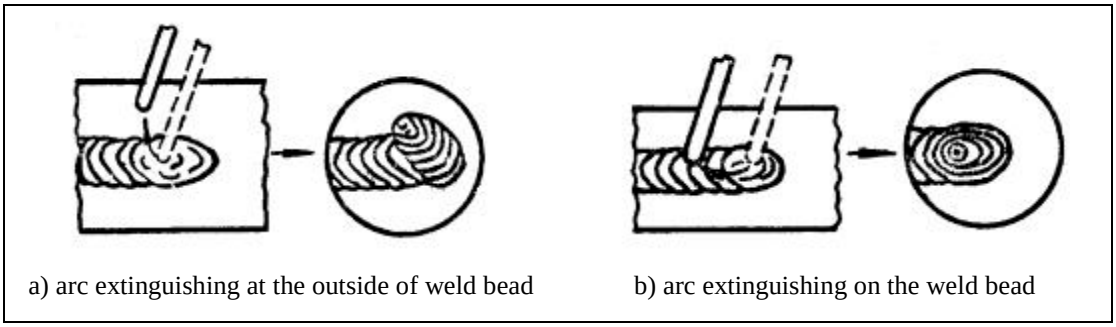


Angles of electrode in flat welding

6.Arc extinguishing

Arc extinguishing is unavoidable during welding. Poor arc extinguishing may bring shallow weld crater and poor density and strength of weld metal by which cracks, air holes, slag inclusion and shortage the like are easy to be

produced. Gradually pull the end of the electrode to the groove and raise the arc when extinguishing arc, in order to narrow the weld crater and reduce the metal and heat. Thus, defects such as cracks and air holes can be avoided. Pile up the weld metal of the crater to make the weld crater sufficiently transferred. Then, remove the excessive part after welding. The operation modes of arc extinguishing are shown in the figure.



a) arc extinguishing at the outside of weld bead b) arc extinguishing on the weld bead

7. Weldment cleaning

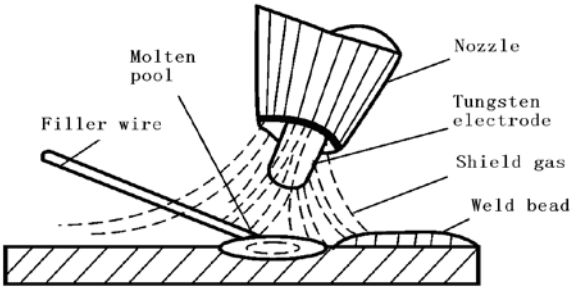
Clean welding slag and spatter with wire brush and tools the like after welding.

16. Basics of Argon Arc Welding

'ning! During welding, it is forbidden to pull off any plug or cable in use, t will lead to life-threatening danger and severe damage of the machine.

16.1 General description of argon arc welding

Argon arc welding is a kind of gas shielded arc welding using argon as shield gas, and the process of argon arc welding is shown in Fig. 13.7. Tightly close protective layer is formed in the arc zone by the argon gas flow output from the torch nozzle. Thus, the metal molten pool can be protected and separated from the air. Meanwhile, the filler wire and base metal is molten by the heat generated from arc. After the liquid molten pool cools down, weld bead is formed.



Since argon is a kind of inert gas and it does not react with metals, the alloying elements in the weld metal will not be burned out and the metal molten pool can be fully protected from oxidation. Besides, because argon is insoluble in liquid metal at high temperature, air holes can be avoided in weld bead. Therefore, the protective effect of argon is effective and reliable, and better welding quality can be obtained.

16.2 Characteristics of argon arc welding

Compared with other arc welding methods, argon arc welding has the following features.

1) Argon has excellent protective performance, so corresponding flux is not needed when welding. It is basically a simple process of metal melting and crystallization, and pure weld bead of high quality can be obtained.
2) Due to the compression and cooling effect of argon flow, the heat of arc is concentrated with high temperature.

Therefore, the heat affected zone is very narrow, and there is little welding deformation stress and crack tendency. Thus, argon arc welding is suitable for thin plate welding especially.

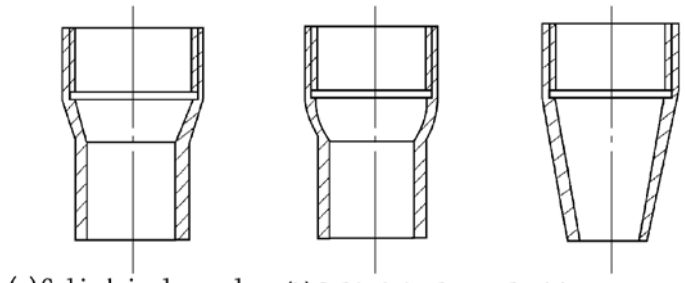
3) Argon arc welding is a kind of open flame welding and is easy to operate and observe, so the mechanization and automation of welding process can be achieved easily. Besides, welding at various spatial locations can be carried out under certain conditions.
4) Argon arc welding can be applied to welding a wide range of welding materials. Almost all metal materials can be welded by argon arc welding, and it is especially suitable for welding chemically active metals and alloys. Generally, it is used in the welding of aluminum, titanium, copper, low alloy steel, stainless steel and refractory steel, etc.

With the increasing of product structure of non-ferrous metals, high alloy steel and rare metals, common gas welding methods and arc welding methods are difficult to obtain the required welding quality. However, argon arc welding are being more and more widely used due to its remarkable characteristics above.

16.3 Gas tungsten arc welding (GTAW)

The function of welding torch for GTAW is to clamp the electrode, conduct current and carry argon flow. For manual welding, ON/OFF button is mounted on the handle of the welding torch. Generally, welding torches can be divided into three categories, large-type, medium-type and small-type. For small-type welding torch, the maximum welding current is 100A. And the welding current can reach up to 400~600A for large-type welding torch with water cooling. The torch body is pressed from nylon, so it is light, small-sized, insulated and heat-resistant.

The torch nozzle plays an important part in the protective performance of argon. The common nozzle shapes are shown in Fig. 13.1. Cylindrical nozzle with cone-shaped or spherical end has the best protective effect, since the argon flow speed is uniform, and laminar flow is easy to hold. The protective effect of coniform nozzle is worse, because the argon flow speeds up. However, this kind of nozzle is easy to operate and the visibility of the molten pool is good, so it is also commonly use in welding.



16.4 GTAW process

1. Preweld cleaning

Clean the electrode and the zone near the weld joint of the workpiece, and remove impurities such as oil pollution and the oxidized film on the surface of the metal before carrying out argon arc welding to ensure good quality of weld bead. The methods for preweld cleaning are: mechanical cleaning, chemical cleaning and chemical & mechanical cleaning.

A. Mechanical cleaning: This method is simple with good effect, and it is suitable for large-sized workpiece. Generally,

remove the oxidized film by grinding with a small-diameter stainless steel wire brush or by shoveling with a scraper to make the welding position appearing with metal luster, and then clean the weld joint zone with organic solvent for eliminating oil pollution.

B. Chemical cleaning: Chemical cleaning is commonly used for cleaning the filling electrode and small-sized workpiece. Compared with mechanical cleaning, this method has such characteristics as high cleaning efficiency, uniform and stable quality and long duration of clean state. The chemical solutions and processes used in chemical cleaning should be chosen according to the welding materials and welding requirements.

C. Chemical & mechanical cleaning: Use chemical cleaning method when cleaning firstly, and clean the welding position with mechanical cleaning method before welding. This combined cleaning method is suitable for the high quality welding.

2. Protective effect of gas

Argon is ideal protective gas. The boiling point of argon is -186℃, which is between that of helium and oxygen. Argon is a byproduct when the oxygen installation gets oxygen by fractionating the liquid air. Bottled argon is used for welding in our country. The filling pressure is 15MPa under room temperature, and the cylinder is painted gray and marked with "Ar". The chemical composition requirements of pure argon are: Ar≥99.99%; He≤0.01%; O_2≤0.0015%; H_2≤0.0005%; C≤0.001%; H_2O≤30mg/m^3.

Welding arc can be better protected and the consumption of shield gas can be reduced in flat position welding. As inert gas, argon does not react with metal chemically even under high temperature. Thus, the alloying elements will not be oxidized or burned out, and problems caused accordingly will be avoided. Meanwhile, argon is insoluble in liquid metal, so air holes can be avoided. Argon is a kind of monatomic gas, existing in atomic state, without molecular decomposition and atomic endotherm under high temperature. Besides, the specific heat capacity and heat conductivity is low, so the arc heat is not easy to lose. Accordingly, the welding arc can burn stably and heat can be concentrated, which is advantageous to welding.

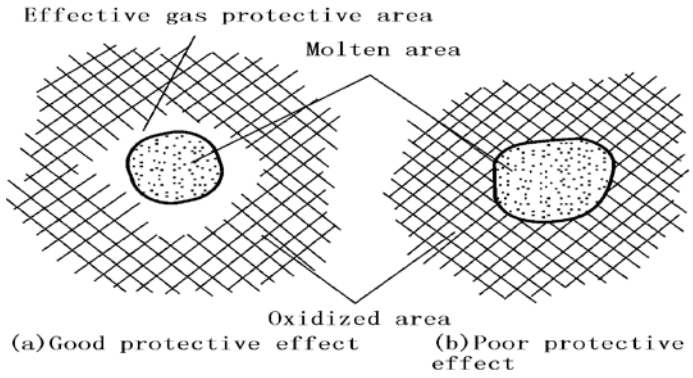
The disadvantage of argon is that its ionization potential is high. When the arc space is fully filled with argon, arc is hard to ignite. However, arc will become stable once it is successfully ignited.

The gas protective effect of argon can be affected by various process factors during welding. Therefore, special attention should be paid to the effective protection of argon in GTAW to avoid interference and damage. Otherwise, satisfactory welding quality is hard to obtain.

Welding process factors such as gas flow, shape and diameter of nozzle, distance between nozzle and workpiece, welding speed and weld joint form may affect the gas protective effect, so all these should be fully considered and chosen correctly.

The gas protective effect can be judged by welding spot testing method through measuring the size of the effective gas protective area. For example, keep all welding process factors fixed when carrying out spot welding on aluminum plate with AC manual TIG, maintain the torch in the fixed position after arc is ignited, and cut off the power after the 5~10s, there will be a molten welding spot left on the aluminum plate. Due to the cathode cleaning action against the area

around the welding spot, the oxidized film on the surface of the aluminum plate is eliminated, and a gray area with metallic luster appears. As shown in Fig. 13.9, this area is called effective argon protective area. The greater the diameter of the effective gas protective area, the better is the gas protective effect.



In addition, the gas protective effect can be judged by directly observing the color of the weld bead surface. Take stainless steel welding for example. If the weld bead surface appears silvery white or golden, it indicates that the gas protective effect is good. However, if the weld bead surface appears gray or black, it indicates that the gas protective effect is poor.

16.5 Welding process parameters

The gas protective effect, welding stability and weld bead quality of GTAW has direct relationship with the welding process parameters. Therefore, select appropriate welding process parameters to ensure high quality weld joint.

The welding process parameters for GTAW include type and polarity of current, diameter of tungsten electrode, welding current, argon gas flow, welding speed and process factors, etc.

A. The type and polarity of current for GTAW should be chosen according to the workpiece material and also the operation mode.

B. Select tungsten electrode with proper diameter mainly according to the thickness of workpiece. Besides, when the thickness of workpiece is the same, tungsten electrodes with different diameters should be chosen due to the different current types and polarities and different allowable current ranges for the tungsten electrode. Improper tungsten diameter will lead to unstable arc, serious burn and tungsten in weld bead.

C. Select proper welding current after the tungsten diameter is determined. Overly high or overly low welding current will cause poor weld bead or welding defects. For the allowable current ranges for thorium-tungsten/cerium tungsten electrodes with different diameters, please refer to the table below

Allowable current ranges for tungsten electrodes with different diameters

Tungsten dia. (mm)	DCEN (A)	DCEP (A)	AC (A)
1.0	15~80	—	20~60

1.6	70~150	10~20	60~120
2.4	150~250	15~30	100~180
3.2	250~400	25~40	160~250
4.0	400~500	40~55	200~320

D. The argon gas flow is selected mainly according to the tungsten diameter and nozzle diameter. For a nozzle with a certain aperture, the argon gas flow should be appropriate. If the gas flow is too high, the gas flow speed will increase. Thus, it is difficult to maintain stable laminar flow, and the welding zone can not be well protected. Meanwhile, more arc heat will be taken away, which will affect the arc stability. If the gas flow is too low, the gas protective effect will be affected due to the interference of the environmental airflow. Generally, the argon gas flow should be within 3~20L/min.

E. Under the condition of fixed tungsten diameter, welding current and argon gas flow, overly high welding speed will make the protective gas flow deviate from the tungsten electrode and molten pool, and the gas protective effect will be affected accordingly. Besides, the welding speed affects the weld bead shape significantly. Therefore, it is very important to select appropriate welding speed.

F. Process factors mainly refer to the shape and diameter of nozzle, the distance between nozzle and workpiece, stick-out and the diameter of filling wire, etc. Although the change of these factors is not big, it takes more or less influence on the welding process and gas protective effect. Therefore, all factors should be selected according to specific welding requirements.

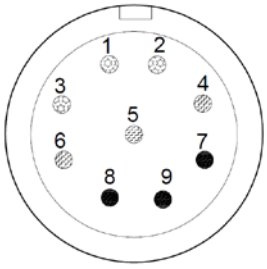
Generally, the nozzle diameter should be within 5~20mm, the distance between the nozzle and workpiece should not be greater than 15mm, the stick-out should be 3~4mm, and the filling wire diameter should be selected according to the thickness of workpiece.

16.6 General requirements for argon arc welding

1) The control of gas: Pre-flow and post-flow are required in argon arc welding. Argon is a kind of inert gas that can be broken down easily. Fill the space between workpiece and tungsten electrode with argon firstly, and then arc can be easier to ignite. Keep the gas flow after welding ends, and the workpiece will not cool down too quickly. Thus, the oxidization of workpiece can be avoided, and good welding effect can be ensured.
2) The manual switch control of current: When the manual switch is switched on, the current supply should be delayed for the pre-flow time. After the manual switch is switched off and welding ends, the current supply should be cut off first and the gas flow maintains according to the post-flow time.
3) The generation and control of high voltage: The argon arc welding machine adopts high voltage arc ignition mode. It is required that there should be high voltage when igniting arc and there should be no high voltage after arc is successfully ignited.
4) Protection from interference: The high voltage for arc ignition in argon arc welding is accompanied with high frequency, which produces serious interference to the machine circuit. Thus, good anti-interference ability is required for the circuit.

17. Accessories Instructions

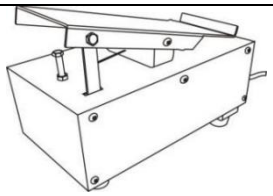
17.1 Torch switch aviation socket



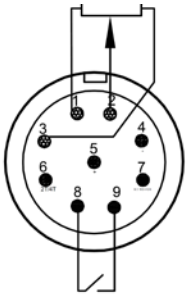
1. Pin1, Pin2 and Pin3 simulate torch current regulation.
2. Pin4, Pin5 and Pin6 are digital torch, Pin4 -, Pin5 +, Pin6 2T/4T.
3. Pin7 digital/analog torch identification side, high-level is digital torch, low-level is analog torch.
4. Pin8 and Pin9 are torch switches.
5. Torch switch aviation socket can be connected to digital torch, analog torch and pedal switch.
6. Pin2 is the common terminal of the potentiometer. It uses the torch control wheel 0 as the starting position. When the current is the minimum, the resistance of Pin1 and Pin2 is 10KΩ, and the resistance of Pin2 and Pin3 is 0Ω. When the wheel rotates to the maximum and the current is the maximum,

	the resistance of Pin1 and Pin2 is 0Ω, and the resistance of Pin2 and Pin3 is 10KΩ.

17.2 Use of pedal switch



Pedal switch



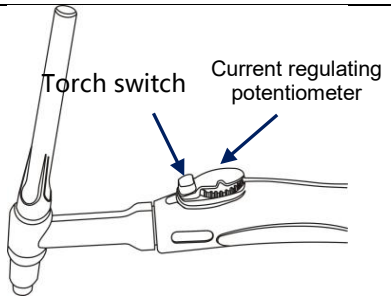
Torch switch aviation socket

1. Pedal remote control consists of a jog switch and a slide potentiometer, as shown in the figure.
2. Connect the pedal remote control to Pin1, Pin2, Pin3, Pin8 and Pin9 of the torch switch aviation socket on the front panel of the welder through a special cable.
3. Under no load, press 

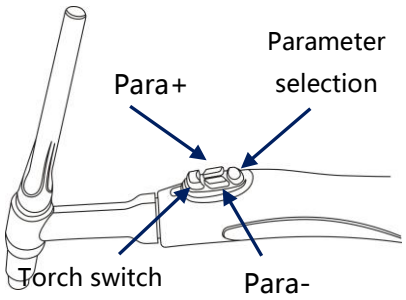
to turn on the indicator  . The foot pedal enters the pedal remote control mode.
4. Adjust the maximum welding current through the panel before welding.
5. Step on the pedal control to start arc striking. Normally, non-contact arc striking is used. When the arc striking is successful, the welding current is controlled by the pedal control. The maximum output is the set current.
6. Pin2 is the common terminal of the potentiometer. It uses the minimum pedal control current as the starting position. When the resistance of Pin1 and Pin2 is 10 KΩ, the resistance of Pin2 and Pin3 is 0Ω. When the pedal is pressed to the end and the current is the maximum, the resistance of Pin1 and Pin2 is 0Ω, and the resistance of Pin2 and Pin3 is 10KΩ.

Note:Pedal switch is optional. Please clarify your needs before placing orders.

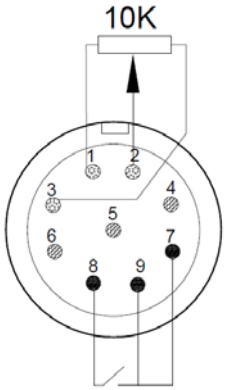
17.3 Use of wire control welding torch



Analog adjustable welding

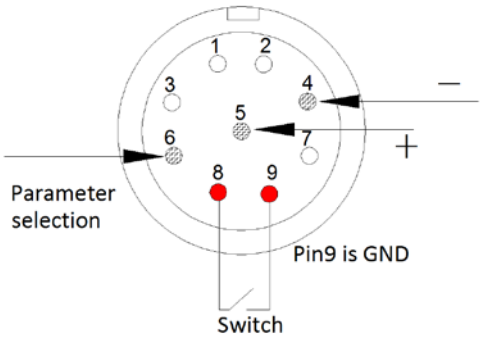


Digital adjustable welding torch



Analog torch wiring diagram

Digital torch control



Digital torch wiring diagram

1. The wire control welding torch is divided into digital adjustable type and analog adjustable type, as shown in the figure below.
2. Connect the analog adjustable welding torch to Pin1, Pin2, Pin3, Pin8 and Pin9 of the torch switch aviation socket on the front panel of the welder through a special cable.Pin7 andPin9 must be short-circuited.
Pin2 is the common terminal of the potentiometer. It uses the torch control wheel 0 as the starting position. When the current is the minimum, the resistance of Pin1 and Pin2 is 10KΩ, and the resistance of Pin2 and Pin3 is 0Ω. When the wheel rotates to the maximum and the current is the maximum, the resistance of Pin1 and Pin2 is 0Ω, and the resistance of Pin2 and Pin3 is 10KΩ.
3. Connect the digital adjustable welding torch to Pin4, Pin5, Pin6, Pin7, Pin8, and Pin9 of the torch switch aviation socket on the front panel of the welder through a special cable. Pin4 -, Pin5 +, Pin6 2T/4T.Pin7 does not connect.

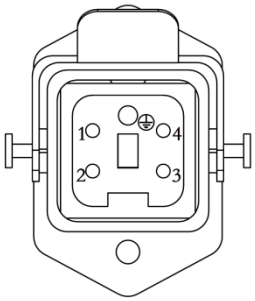
4. Under no load, press 

to turn on the indicator  . The welding torch enters the torch control mode.
5. Set the welding current through the panel before welding. Adjust the current by adjusting the welding torch potentiometer in the welding process. The adjustable range is the minimum value to the set value.

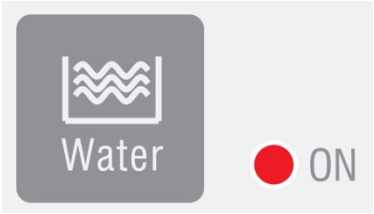
6. When using digital adjustable welding torch, the adjustment parameter can be switched through the “Parameter selection ” button on the welding torch, and the parameters can be adjusted through the “Para+” and “Para-” button, the “Torch switch” of the welding torch controls the output mode.
6.1 Wiring method:
Torch Switch:Pin8-Pin9
Parameter selection:Pin6-Pin9
+: Pin5-Pin9
-: Pin4-Pin9

Note:Both Analog adjustable welding torch and Digital adjustable welding torch are optional. Please clarify your needs before placing orders.

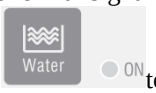
17.4 Water tank connector



Water tank connector



1. Pin1 and Pin2 are the 220VAC output terminals of the water tank. Pin3 and Pin4 are the abnormal signal input terminals of the water tank.

2. Under no load, press 

to turn on the indicator 

, and enters water cooling cycle mode during welding.

3. When the welding is stopped, the water tank will work for 5 minutes. If there is no welding in 5 minutes, the water circulation shuts off automatically.

18. MAINTENANCE

rning! All of the maintenance must be carried out after power source is disconnected completely.
ıse check and confirm the power source plug has already unplugged before opening housing case.

1) Check periodically whether inner circuit connection is in good condition (esp. plugs). Tighten the loose connection. If there is oxidization, remove it with sandpaper and then reconnect.
2) Keep hands, hair and tools away from the moving parts such as the fan to avoid personal injury or machine damage.
3) Clean the dust periodically with dry and clean compressed air. If welding environment with heavy smoke and pollution, the machine should be cleaned daily. The pressure of compressed air should be at a proper level in order to avoid the small parts inside the machine being damaged.
4) Avoid rain, water and vapor infiltrating the machine. If there is, dry it and check the insulation of the equipment (including that between the connections and that between the connection and the enclosure). Only when there are no abnormal phenomena anymore, can the machine be used.
6) Check periodically whether the insulation cover of all cables is in good condition. If there is any dilapidation, rewrap it or replace it.
7) Put the machine into the original packing in dry location if it is not to be used for a long time.
8) Routine maintenance on power control switch, grounding device, welding torch coupling device and set screws should be performed on a regular basis. If looseness, rust, bad connection of screws are identified, ıse tighten the screws and remove rusty spots.

the case of failure or replacement of wearing parts, please ask professionals to repair or replace parts.

19. Troubleshooting

arning! the following operation requires the operator must have adequate professional knowledge in ctrics and overall safety common sense, and hold the valid qualification certificate to support is competence and knowledge. Please check and confirm the power source plug has already unplugged before opening housing case.

19.1 General troubleshooting

rning! The welder may be damaged during use, and should be repaired in time. Only fessionally trained personnel can repair the welder, or else it may further expand the scope of the failure or cause damage to more expensive components.

The phenomena listed here may be related to your use of accessories, gas, environmental factors and power supply. Please try to improve the environment and avoid such situations.

Manual welding troubleshooting

Phenomena		Causes	User measures
Fan does not turn or the speed is abnormal after turning on		Temperature is too low or the fan is damaged	When the temperature is too low, let the machine work for a period of time until the temperature rises and the machine runs normally. If it still does not work, replace the fan.
Manual welding	Difficult to strike arc	Arc striking current is too low Or arc striking time is too short	Appropriately increase arc striking current or time
	Arc striking is fiery or molten pool is too large when the arc is struck	Arc striking current is too high Or arc striking time is too long	Appropriately reduce arc striking current or time
	Can't establish normal arc	Power cord isn't connected properly	Connect the power cord properly
	Sticky	Thrust current is low	Appropriately increase the thrust current
	Welding tongs hot	Rated current of welding tongs is too low	Replace welding tongs of larger current
	Easy to break arc	Grid voltage is low	Wait until the grid power is normal
Other failures			Please contact the service personnel of JASIC

Argon arc welding troubleshooting

Phenomena	Causes	User measures

Fan does not turn or the speed is abnormal after turning on		Temperature is too low or the fan is damaged	When the temperature is too low, let the machine work for a period of time until the temperature rises and the machine runs normally. If it still does not work, replace the fan.
Argon arc welding	No current output when the torch switch is pressed down	Some TIG methods allow to exit welding when the torch switch is pressed down	Release the torch switch and try again
		Welding circuit is blocked	Check the welding circuit and reconnect
	No discharge arc striking at high frequency mode when the torch switch is pressed down	Torch switch isn't inserted properly	Plug in the torch switch properly
		Spark gap of discharge plate is too large	Adjust the spark gap on the discharge plate (about 0.8mm)
	Tungsten electrode burned too fast	Welding torch and ground wire reversed	Exchange the two plugs
		Clearing strength is too high in AC state	Reduce clearing strength
	Welding spot is black	Welding spots have not been effectively protected from oxidation	(1) Make sure that the valve of the argon cylinder is open and has enough pressure. If the pressure in the cylinder is lower than 0.5MPa, it is necessary to refill the cylinder. (2) Check if the argon flow rate is normal. You can choose different flow rates according to welding current conditions. However, too small flow rate may result in insufficient shielding gas and can't completely cover the welding spots. The recommended argon flow is at least 5L/min, no matter how small the current is. (3) Check if the gas path is sealed and if the gas purity is high enough. (4) Check if there is strong air flow in the environment.
	Difficult to strike arc Easy to break arc	Poor tungsten electrode Or tungsten electrode oxidized	(1) Replace a tungsten electrode with good quality. (2) Grind the oxide layer from the tungsten electrode. (3) Select a setting with a longer hysteresis off time to avoid oxidation of tungsten electrode. (4) Adjust the spark gap (about 0.8mm) on the discharge plate.
	Current instable during welding	Grid voltage changes greatly or poor contact with grid connector. Severe interference from Other electrical equipment	(1) Check if the power grid is normal and connect the power connector. (2) Connect a power cord separately from the equipment with interference.
Other failures			Please contact the service personnel of JASIC

19.2 Alarms and Processing Methods

Category	Alarm method	Error code	Welder processing	Causes	User measures
Overheated	Display error code, accompanied by alarm sound, Indicator	Err 1	Temporarily turn off the main circuit	Main circuit working time is too long	Do not turn off, wait for a while, and continue to weld when the overheating indicator goes out.

	light  is on				
Phase loss	Display error code, accompanied by alarm sound, Indicator light  is on	Err 2	Permanently turn off the main circuit; need to restart	Power line input isn't connected properly	Reconnect the power input line.
Undervoltage	Display error code, accompanied by alarm sound, Indicator light  is on	Err 3	Temporarily turn off the main circuit	Grid undervoltage (lower than 323VAC)	Please turn off the machine and restart it. If the problem can't be eliminated and the grid voltage is still too low, ask an electrician to check the power grid voltage and wait until the grid is normal before welding. If the grid voltage is normal but there is still an undervoltage alarm, contact qualified service personnel.
Overvoltage	Display error code, accompanied by alarm sound, Indicator light  is on	Err 4	Temporarily turn off the main circuit	Grid overvoltage (higher than 437VAC)	Please turn off the machine and restart it. If the problem can't be eliminated and the grid voltage is still too high, ask an electrician to check the power grid voltage and wait until the grid is normal before welding. If the grid voltage is normal but there is still an overvoltage alarm, contact qualified service personnel.
Control board abnormal	Display error code, accompanied by alarm sound, Indicator light  is on	Err 5	Permanently turn off the main circuit; need to restart	Control board +15V power supply is abnormal or board socket is not plugged in	If the socket is not plugged in properly, re-plug it. If the problem can't be eliminated, contact a qualified service person.
Water tank abnormal	Display error code, accompanied by alarm sound, Indicator light  is on	Err 6	Temporarily turn off the main circuit	No water in the tank or tank isn't connected properly	Add water to the tank and check if the tank is connected properly.
Secondary inverter board abnormal	Display error code, accompanied by alarm sound, Indicator light  is on	Err 7	Permanently turn off the main circuit; need to restart	Thermistor has large temperature difference or drive line isn't inserted properly	Reassemble the thermistor as symmetrically as possible. Plug in the drive line properly if it isn't

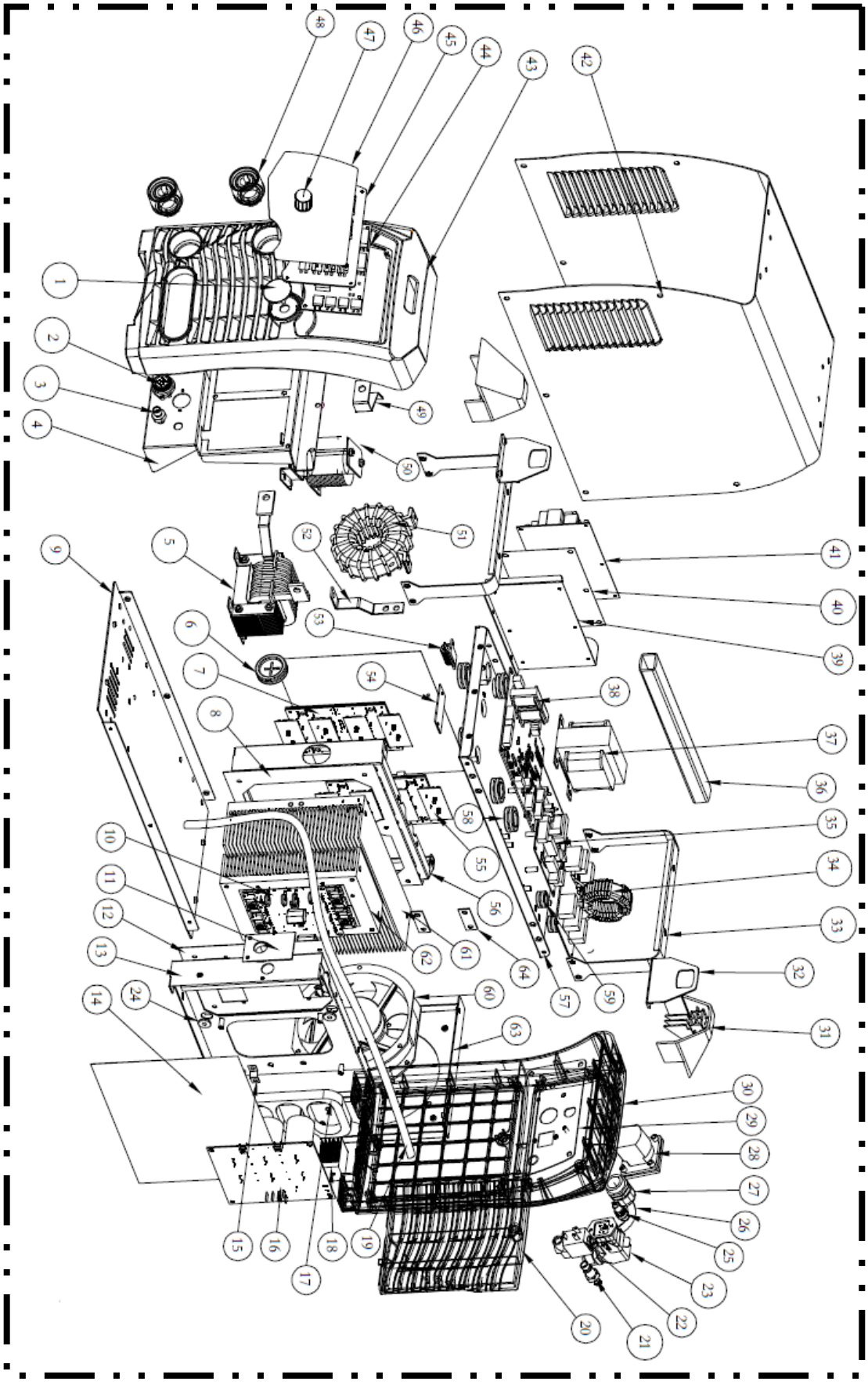
Output overvoltage	Display error code, accompanied by alarm sound, Indicator light  is on	Err 8	Permanently turn off the main circuit; need to restart	The output line is too long and the winding is folded or the wire is cross-wound	Check whether the output line exceeds 10m. If yes, shorten and straighten the output line to avoid folding. If the welding lines cross, arrange them in parallel.
Communication abnormal	Display error code, accompanied by alarm sound, Indicator light  is on	Err9	Permanently turn off the main circuit; need to restart	Control board and Display board Communication abnormal	Check whether Control board and Display board is connected,If there is no problem on the connection,Restart the machine accompanied by alarm sound,Please contact the repairman.

Note: When the welding machine exceeds the standard duty cycle in work, it may enter into protection mode and pause, which indicates that welding machine has exceeded standard duty cycle and the excessive heat energy will activate the temperature detect switch to make welding machine stop, at the same time, the Yellow indicator on front panel will light. Under this circumstances, power source plug need not to be unplugged so that the cooling fan can work continuously to cool the welding machine. When the Yellow indicator extinguishes, it indicates that the temperature has dropped to standard range and the welding can restart.

rning!

ıd experiment and careless repair may lead to more problem of the machine that will make formal ck and repair more difficult. When the machine is electrified, the naked parts contain life-threatening voltage. Any direct and indirect touch will cause electric shock, and severe electric shock will lead to death.

19.3 List of parts available for repair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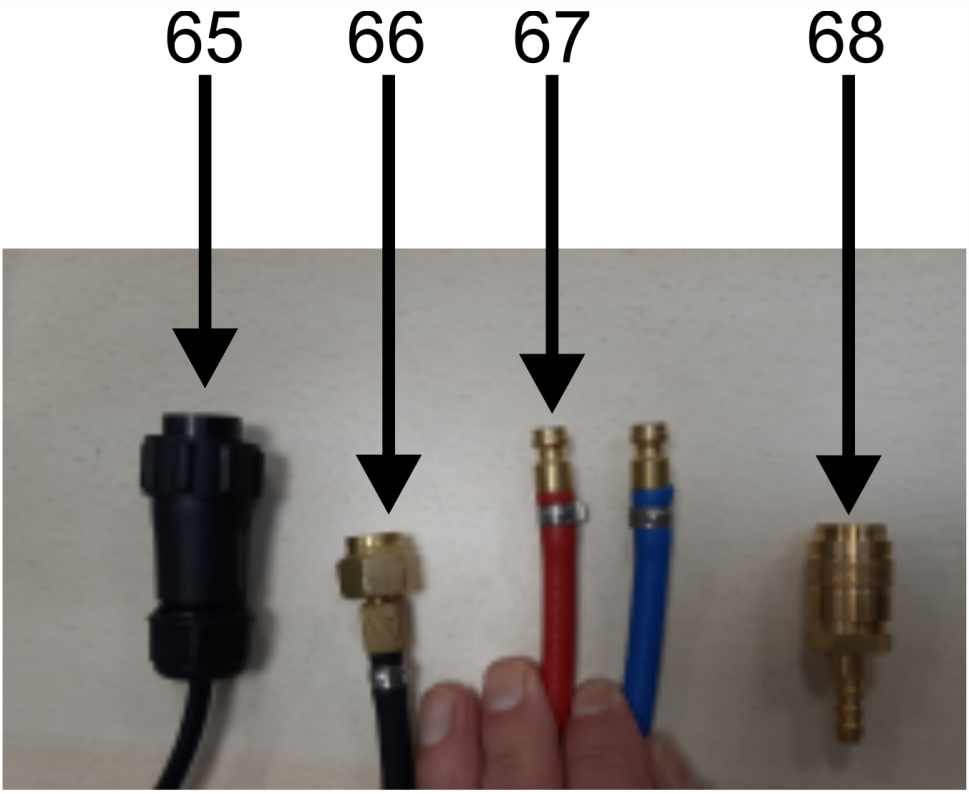
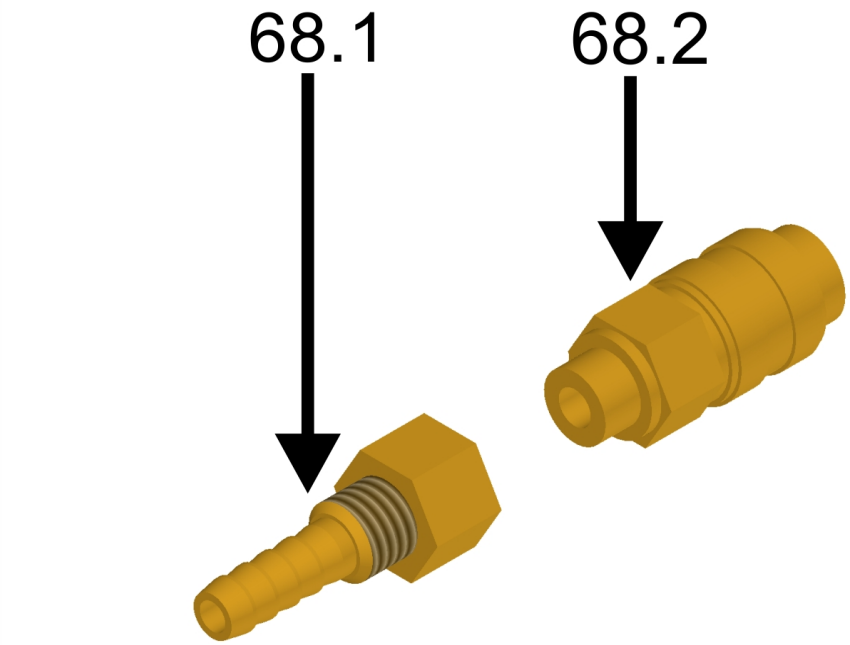
1	222910041712	Trademark cover	33	222910066434	Cover bracket
2	222910066345	Aviation outlet	34	222910068082	EMC board
3	222910042337	Gas fitting (front panel)	35	222910066937	Switch power board
4	222910066398	Front support	36	222910058227	Handle bar
5	222910066723	Reactor	37	222910064706	Power frequency transformer
6	222910050722	Ø30 coil	38	222910066731	Main control board
7	222910066582	Secondary inverter board	39	222910064369	PCB bracket
8	222910066439	Secondary inverter side insulation paper	40	222910066446	PCB insulation board
9	222910066393	Machine bottom	41	222910066623	Arc strike stabilization plate
10	222910066501	Primary inverter board	42	222910066444	Cover
11	222910000815	Current sampling board	43	222910065002	Front panel
12	222910066440	Primary inverter side insulation paper	44	222910066433	Display panel
13	222910066442	Primary inverter side bracket	45	222910066375	Control panel indicator module
14	222910066441	Insulation baffle	46	222910066426	Front panel sticker
15	222910064404	Primary inverter side connector	47	222910040930	Knob
16	222910066430	Filter plate	48	222910045432	Quick outlet
17	222910066603	PCB cotton pad	49	222910066438	Output connector
18	222910066510	Silicon bridge radiator	50	222910066722	Arc starter
19	222910066347	Gas pipe	51	222910068137	Main transformer
20	222910058230	Shutters	52	222910066436	Arc starter connector
21	222910027490	Gas fitting	53	222910064729	Resistor
22	222910063644	Electromagnetic valve	54	222910066647	Port board
23	222910068600	Rectangular aviation outlet	55	222910064093	Ceramic wafer
24	222910064426	Insulation mat	56	222910066443	Secondary side bracket
25	222910045291	Fuse holder	57	222910066445	Middle partition
26	222910050672	Power cable	58	222910046803	Ø20 protective coil
27	222910021913	Line buckle	59	222910046802	Ø14 protective coil
28	222910064104	Rotary switch	60	222910067624	Fan
29	222910065285	Rear fixing plate	61	222910066511	Secondary side radiator
30	222910060838	Plastic rear panel	62	222910066512	Primary side radiator
31	222910060835	Plastic handle seat	63	222910065284	Rear support plate
32	222910058239	Handle seat bracket	64	222910066395	Secondary side connector





65	222941399	Switch Plug 9 Pin.	68	222938768	Quick Socket Φ6.5x3
66	222916397	torch/gas connector. M10*1	68.1	63101010	Quick coupling connector
67	222916392	Quick Socket Φ6	68.2	63106115	M-1/8" quick disconnect coupling

Appendix A Packaging, Transport and Storage

A.1 Packaging

No.	Name	Unit	Qty.
1	E202 User Manual	Pcs	1
2	Product certificate	Pcs	1
3	Warranty card	Pcs	1
4	Desiccant	Bag	1
5	Ground wire clamp: 500A-32mm2-DKJ35-50(3M)	Pcs	1
6	Argon arc torch: WP-18(5M) split, vacant	Pcs	1
7	Tungsten needle: 2.4*150MM (non-red) lead-free	Pcs	1

Note: * indicates that not all products include this part

A.2 Transport

In the transport process, handle the equipment gently, avoid severe impact, and prevent moisture and rain.

A.3 Storage

Storage temperature: -25°C~+50°C

Storage humidity: RH≤90%

Storage period: 12 months

Storage site: No corrosive gas, ventilated indoor

Appendix B Revision History

No.	Description	Version	Date
1	**Initial release**	**E202 SC-A0**	**2018.05.30**
2	**Add warning**	**E202 SC-A1**	**2018.08.15**
3	**...**		
4	**...**		
5	**...**		
6	**...**		
7	**...**		
8	**...**		
9	**...**		
10	**...**		

MANUFACTURE AND SALE OF AUTOGENOUS, AND ELECTRIC WELDING APPLIANCES, AND ELECTROMECHANICAL CONSTRUCTIONS.

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WELDING

CENTRAL:
Jaime Ferrán, 19, nave 30 - Apartado de Correos 5058
50080 ZARAGOZA - Teléfono 976 47 34 10
E-mail: comercial@galagar.com