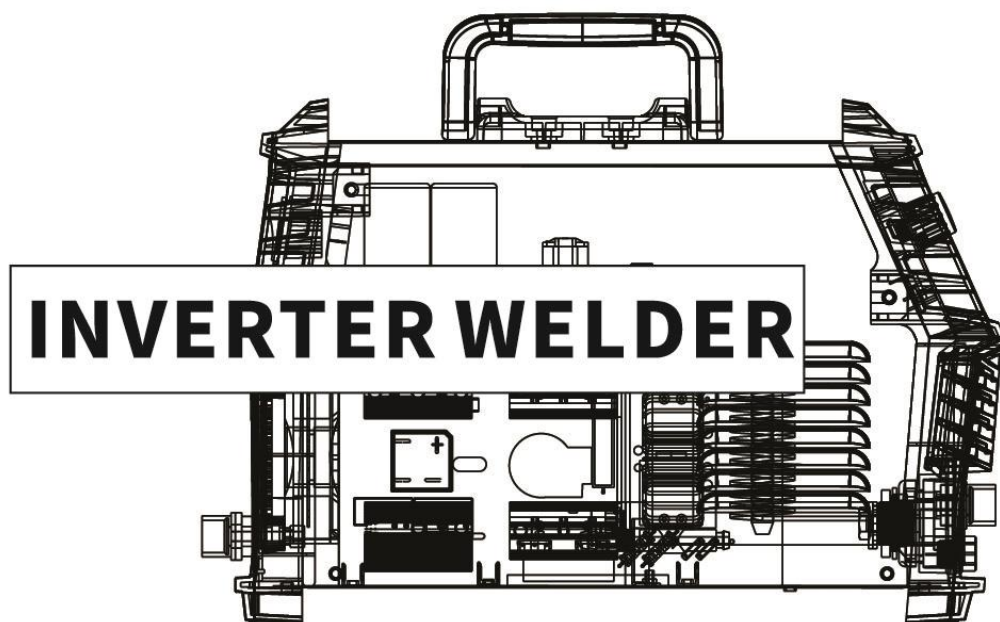




Inverter Welding Machine TIG200P



User Manual

www.arccaptain.com



Dear Valued Customer,

Thank you for going with ARCCAPTAIN! We're all about making welders superior for you. ARCCAPTAIN was built by high quality components, every single unit machine was passed multiple industry leading laboratory tests to provide a great welding experience and performance.

Two-year warranty service is provide to yours! When unpacking, make sure that the product is intact and undamaged. DO NOT return directly before contact our customer service.

Six ways to connect us and join in ARCCAPTAIN Community:

Email: service@arccaptain.com

Online: www.arccaptain.com/pages/contact-us

Facebook: arccaptainwelder

Instagram: arccaptain_welder

Youtube: arccaptain-weld

Whatsapp: +19892449456



This manual is designed to help you get the most out of your ARCCAPTAIN products. Please save this manual and take time to read the safety warnings and precautions, assembly, operating, inspection, maintenance. They will help you protect yourself against potential hazards on the worksite. Failure to do so can result in serious injury!

Save for future reference:

Product:	
Date Purchased:	
Serial Number:	
Product Feedback:	

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User Manual

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1.SAFETY



WARINING READ ALL SAFETY WARNINGS BEFORE WORKING!

Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury. Save all warnings and instructions for future reference!

If you encounter any issues during installation or operation, refer to the relevant sections in this manual for inspection. If you're still unsure or unable to resolve the problem, please contact ARCCAPTAIN professional support.

1.1 General Safety

- Do NOT use the welder if the switch does not turn it on and off.
- Disconnect the plug from the power source before making any adjustments, changing accessories, or storing the welder.
- Ensure the switch is off before connecting to power or moving the welder to prevent accidental starting.
- Always maintain and use safety guards, covers, and devices properly.
- Keep hands, hair, clothing, and tools away from moving parts like V-belts, gears, and fans.
- Follow these instructions and consider working conditions when using the welder and accessories.
- This manual may not cover every possible situation. It's important for the operator to use common sense and caution while using this product.

1.2 Electrical Safety



WARINING

BEWARE OF ELECTRIC SHOCK!

- DO NOT weld in a damp area or come in contact with a moist or wet surface.
- DO NOT modify any wiring, ground connections, switches, or fuses in this welding equipment.
- DO NOT come into physical contact with any part of the welding current circuit, including the workpiece, ground clamp, electrode or welding wire, and metal parts on the electrode holder or MIG gun.
- DO NOT connect the ground clamp to electrical conduit, and DO NOT weld on electrical conduit.
- NEVER leave the Welder unattended while energized. Turn off the power if you have to leave.
- DO NOT attempt to plug the welder into the power source if the ground prong on INPUT POWER CABLE plug is bent over, broken off, or missing.
- DO NOT alter INPUT POWER CABLE or plug in any way.
- People with pacemakers should consult their physicians before use. Magnetic field can make cardiac pacemaker a bit wonky.

WARINING REPLACING COMPONENTS CAN BE DANGEROUS!

- Only experts should replace machine parts. Avoid dropping foreign objects into the machine during component replacement. Ensure correct wire connections after replacing PCBs to prevent property damage.

1.3 Fire Safety



WARINING BEWARE OF FIRE HAZARD!

- Place the machine on non-combustible surfaces to prevent fires.
- Ensure no flammable materials are near the working area to reduce fire risk.
- Avoid installing the machine near water sources to prevent water damage.
- Always weld/cut materials in a dry environment with humidity below 90% and maintain a working temperature between -10°C and 40°C.
- When welding/cutting outdoors, ensure shelter from sunlight and rain, keeping the machine dry at all times.
- Do not operate the machine in dusty or chemically corrosive environments.
- Remove or secure all combustible materials within a 35 feet (10 meters) radius of the work area. Use fire-resistant material to cover or seal open doorways, windows, cracks, and other openings.
- Improper use can lead to fire or explosion. Avoid flammable materials near the working area, keep a fire extinguisher nearby with trained personnel, refrain from cutting closed containers, and do not use the machine for pipe thawing.

1.4 Fumes and Gases Safety



WARINING SMOKE CAN BE HARMFUL TO YOUR HEALTH!

- Keep your head away from the smoke while cutting to avoid breathing in harmful gases.
- Ensure the working area is well-ventilated with exhaust or ventilation equipment during cutting.
- Only work in a confined area if it's well-ventilated, or wear an air-supplied respirator.

1.5 Arc Rays and Notice Safety



WARINING

EXCESSIVE NOISE DOES GREAT HARM TO HEARING!

ARC RADIATION MAY HURT YOUR EYES AND BURN YOUR SKIN !

- Arc radiation can harm eyes and skin; excessive noise can damage hearing.
- Use certified welding eye protection with at least a number 10 shade lens rating.
- Wear leather leggings and fire-resistant shoes or boots; avoid clothing that can catch sparks or

molten metal. Do not touch hot workpiece with bare hands.

- Keep clothing free of flammable substances and wear dry, insulating gloves and protective clothing.
- Wear an approved head covering and use appropriate welding attire.
- When welding overhead or in confined spaces, use flame-resistant ear plugs or ear muffs.
- Wear ear covers or other hearing protectors when cutting.

1.6 Gas Shielded Welding – Cylinder Safety



WARNING

CYLINDERS CAN EXPLODE WHEN DAMAGED!

- Never weld on a pressurized or closed cylinder.
- Avoid letting the electrode holder, electrode, welding torch, or welding wire touch the cylinder.
- Keep cylinders away from all electrical circuits, including welding circuits.
- Always keep the protective cap on the valve except when the cylinder is in use.
- Use only the correct gas shielding equipment designed for your specific type of welding, and maintain it properly.
- Protect gas cylinders from heat, physical damage, slag, flames, sparks, and arcs.
- Always follow proper procedures when moving cylinders.
- Do not install the machine in an environment with explosive gas to avoid an explosion.

1.7 Additional Safety Information

- Use only the supplied power cord for this welder or an identical replacement cord. Do not install a thinner or longer cord on this Welder.
- Maintain labels and nameplates on the Welder. These carry important information.
- Ensure the ground clamp is securely connected to the workpiece during welding.
- Pressing the gun switch when welding or cutting.
- When disposing of the cutting machine, please note the following:
- Burning electrolytic capacitors on the main circuit or PCB board may cause explosions. Burning plastic components such as the front panel may produce toxic gases. Dispose of it as industrial waste.

2.PRODUCT DESCRIPTION

2.1 Product Overview

- TIG welder is of constant current external characteristic. Welding current will not be changed per arc length but being kept at a very stable level. It adopts PWM technology and high-power switching element IGBT (discrete) to rectify AC110V/AC220V (50Hz/60Hz) voltage to DC310V, after inverting it to 45KHz, there is a voltage step-down and rectification again, stable welder current is obtained by output current feedback and adjustment.
- Built-in MCU technology and IGBT inverter Welder, totally digital control, which ensures great and stable welding performance.

- Supports DC TIG, DC pulse TIG , Lift TIG and MMA.
- MMA/Stick welding features: hot start, arc force and anti-stick.
- Multiple TIG operation modes: 2T, 4T and spot welding.
- Smart fan control: Saves energy, reduces noise, reduces dust entry, and prolongs the service life of the fan.
- TIG arc starting mode: Supports HF and lift arc starting with a high success rate.
- Portable and Lightweight: 11.5lb(unknown), carry with handle or shoulder strap.
- Safety protection: over current/over voltage/overheating protection circuit.
- Unique Design & LED Display Panel, read data more clear, concise distribution and convenient operation. Warning indicator for normal working and abnormal working.
- Remote control function available: support foot pedal & analog torch (purchase additional if need).

2.2 Package

Name	Specification	Quantity (pcs)
TIG welder	TIG200P AC	1
TIG torch & accessories	WP-26 (13ft/4m)	1
Electrode Holder	200A-16mm2 (9ft/ 3m) DKJ 35-50	1
Earth clamp	300A-16mm2 (9ft/ 3m) DKJ 35-50	1
Operator's manual	Operator's manual of TIG200P	1
Gas hose	Gas hose with gas connector	1
Conversion adapter	American adapter plug	1
Strap	0.1*4.3ft (30mm*1500mm), Black	1
Tungsten electrode	φ 1/16", 6" (1.6mm, 150mm)	1

2.3 Technical Parameters

TECHNICAL PARAMETERS		Units	Model TIG200P AC	
Input voltage		VAC	AC220V ±15%	AC110V ±15%
Input frequency		Hz	50/60	
Rated input current		A	29.2@TIG 36@MMA	31@TIG 39.4@MMA
Rated input power		kVA	6.4@TIG 7.9@MMA	3.4@TIG 4.3@MMA
No-load voltage		V	60	
VRD voltage		V	15	
TIG	Welding current	A	10~200	10~140
	Welding voltage	V	10.4~18.0	10.4~15.6
	Pre-flow time	S	0~5	
	Initial current	A	10~200	10~140
	Up-slope time	S	0~15	
	Down-slope time	S	0~15	
	Finish current	A	10~200	10~140
	Post-flow time	S	0~15	
	Base current	A	10~200	10~140
	Pulse frequency	Hz	0.5~200	
	Pulse duty factor	%	5~95	
	Spot welding time	S	0.5~5	
	Operation method	-	2T, 4T, spot welding	
	Arc start mode	-	HF arc starting Lift arc starting	
	Duty cycle	-	60%	
MMA	Welding current	A	10~200	10~140
	Welding voltage	V	20.4~28.0	20.4~25.6
	Hot start current	A	0~60	
	Arc-force current	A	0~60	
	Duty cycle	-	60%	
Power factor		-	0.73	
Insulation class		-	H	

Protection class	-	IP21S
Power supply efficiency (at maximum input current)	%	80
Dimension(L*W*H)	Inch	15.1*5.3*9.56
	mm	383*135*243mm
Weight	lb	10.3
	kg	4.7

2.4 Nameplate

On the machine, there is a plate that includes all the operating specifications for your new unit. The serial number of the product is also found on this plate.

The duty cycle rating of a welder defines how long the operator can weld and how long the welder must rest and be cooled. Duty cycle is expressed as a percentage of 10 minutes and represents the maximum welding time allowed. The balance of the 10-minute cycle is required for cooling.

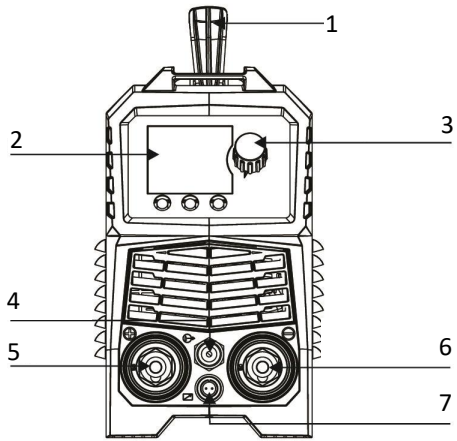
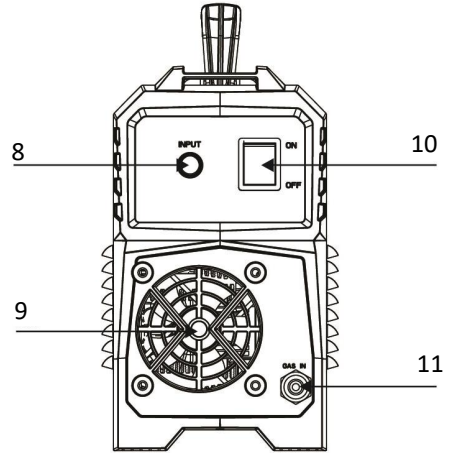
For example, a welder has a duty cycle rating of 60% at the rated output of 200A. This means with that machine: you can weld at 200A output for six (6) minutes out of 10 with the remaining four (4) minutes required for cooling. The duty cycle of your new welder can be found on the data plate affixed to the machine. It looks like the diagram below.

ARCCAPTAIN®					
TIG200P AC			TIG inverter welder		
			Serial No.:		
			ANSI/NEMA/IEC 60974-1		
	10A-200A@220V		10A-140A@110V		
	U ₀ =60V	220V	X	60%	100%
			I ₂	200A	155A
		110V	U ₂	18V	16.2V
			I ₂	140A	108A
	U ₀ =60V U _r =15V	220V	X	60%	100%
			I ₂	200A	155A
		110V	U ₂	28V	26.2V
			I ₂	140A	108A
	U ₁ = ~110V/220V 1~ 50/60Hz	220V	TIG: I _{1max} =29.2A		TIG: I _{1eff} =13A
			MMA: I _{1max} =36A		MMA: I _{1eff} =16A
		110V	TIG: I _{1max} =31A		TIG: I _{1eff} =13.9A
			MMA: I _{1max} =39.4A		MMA: I _{1eff} =17.6A
IP21S			Insulation class:H		

Figure 1

3.FUNCTION

3.1Panel of TIG200P

Part name	Function	Picture
1.Handel	For translation and storage	
2.Control panel	To display the welding information	
3.Parameter adjustment knob	Rotary buttons for adjusting welding parameters	
4.Gas out	For conveying shielding gas	
5.Output “+” terminal	To connect the Electrode Holder/Ground Clamp	
6.Output “-” terminal	To connect the Welding torch/Ground Clamp/Electrode Holder	
7.Aviation socket	To connect the switch of torch/Foot pedal	
		Figure 2 Front panel of TIG200P
8.Power wire	For power supply input	
9.Cooling fan	For heat dissipation through forced air cooling	
10.Power switch	For power supply input	
11.Gas in	Used to connect shielding gas	
		Figure 3 Back panel of TIG200P

3.2 Panel functions of TIG200P

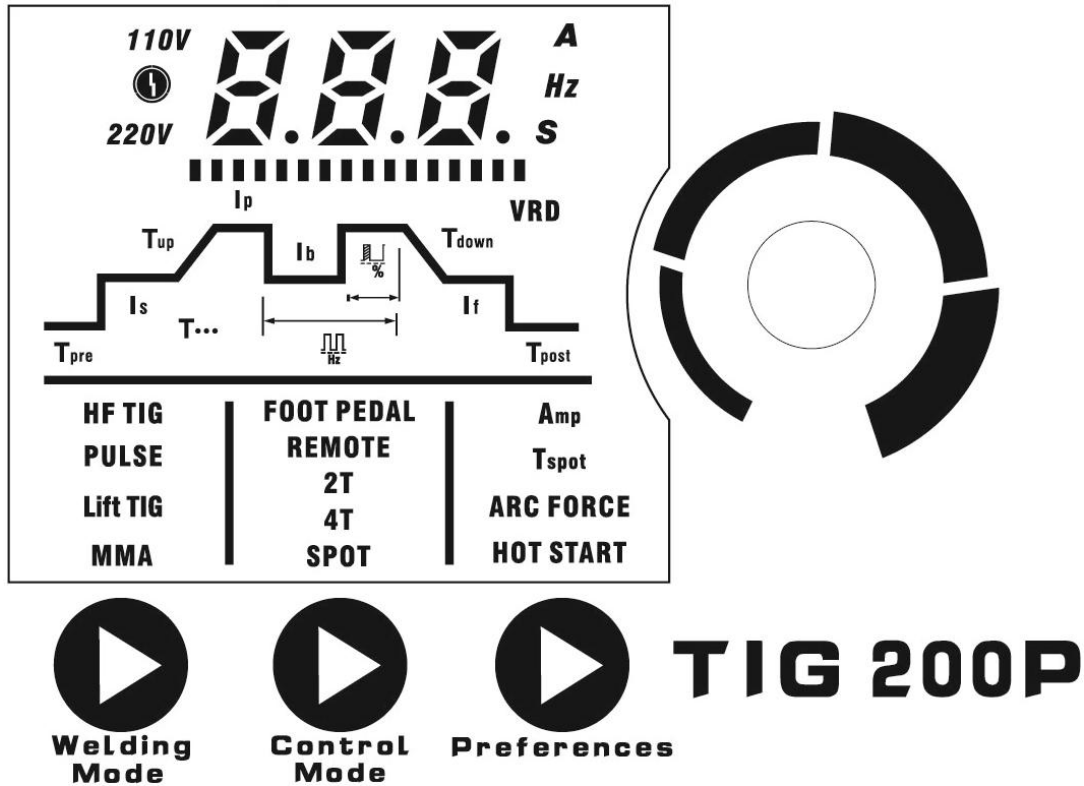


Figure 4 digital panel

No.	Part name	Function
1	110V 220V	The input voltage is AC110V when indicator is on. The input voltage is AC220V when indicator is on.
2		When the indicator is on, it indicates that the welder is in overcurrent protection and has stopped output
3		The table header shows the specific value of the parameters; "A" is current unit indicator. The indicator will flash when there is current; "S" is time unit indicator. The indicator will be on when the time is displayed; "Hz" is frequency unit indicator. The indicator will be on when the frequency is displayed; An error code is displayed when the product is abnormal.
4	VRD	VRD function indicator. When the indicator is on, it indicates the VRD function is enabled.

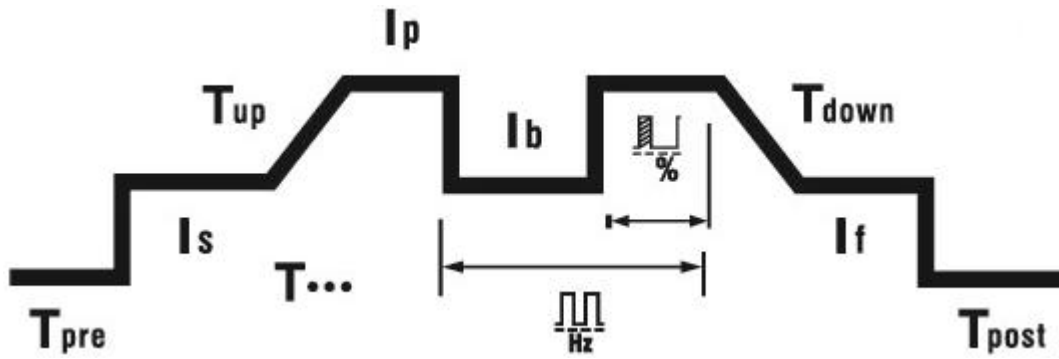
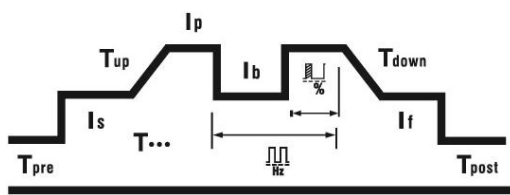


Figure 5

No.	Part name	Function
1	T_{pre}	Pre-flow time indicator. When the indicator is on, it indicates the pre-flow protection time
2	I_s	Initial current indicator. When the indicator is on, it indicates the initial current
3	T_{up}	Up-slope time indicator. When the indicator is on, it indicates the time until the initial current reaches the peak current
4	I_p	Peak current indicator. When the indicator is on, it indicates the welding current
5	I_b	Base current indicator. When the indicator is on, it indicates the pulse base current
6	T_{down}	Down-slope time indicator. When the indicator is on, it indicates the time until the peak current drops to the finish current
7	I_f	Finish current indicator. When the indicator is on, it indicates the finish current
8	T_{post}	Post-flow time indicator. When the indicator is on, it indicates the post-flow time
9	$T_{...}$	Spot welding time indicator. When the indicator is on, it indicates the spot welding time
10		Pulse frequency indicator. When the indicator is on, it indicates the pulse frequency
11		1) Duty-cycle indicator. When the indicator is on, it indicates the ratio of peak current time to pulse period

No.	Part name	Function
1		Parameter adjustment knob 1. Rotate the adjustment knob to adjust the parameter. 2. Rotate the knob clockwise to increase the value, and counterclockwise to decrease the value. 3. When the knob is rotated, the adjustment is displayed in the parameter display area. The progress bar on the left side of the knob is adjusted proportionally with the value.
2	HF TIG PULSE Lift TIG MMA  Welding Mode	1. Press the Welding Mode button to switch the welding mode. 2. HF TIG indicator. When the indicator is on, it indicates the HF TIG mode is selected. 3. PULSE indicator. When the indicator is on, it indicates the Pulse TIG mode is selected. 4. Lift TIG indicator. When the indicator is on, it indicates the Lift TIG mode is selected. 5. MMA indicator. When the indicator is on, it indicates the MMA mode is selected.
3	FOOT PEDAL REMOTE 2T 4T SPOT  Control Mode	1. Press the Control Mode button to switch the control mode. 2. FOOT PEDAL indicator. When the indicator is on, it indicates the Foot pedal mode is selected. 3. REMOTE indicator. When the indicator is on, it indicates the analog TIG torch remote mode is selected. 4. 2T indicator. If the indicator is on, it indicates the machine is in 2T welding mode. 5. 4T indicator. If the indicator is on, it indicates the machine is in 4T welding mode. 6. SPOT indicator. If the indicator is on, it indicates the machine is in spot welding mode.
4	Amp Tspot ARC FORCE HOT START	1. Amp indicator. When the indicator is on, it indicates the welding current. 2. Tspot indicator. When the indicator is on, it indicates the spot welding time. 3. ARC FORCE indicator. When the indicator is on, it indicates the MMA arc-force current. 4. HOT START indicator. When the indicator is on, it indicates the MMA hot start current.

5	 Preferences	Press the Preferences mode button to switch the following parameters..  Amp Tspot ARC FORCE HOT START
---	---	--

4.INSTALLATION AND CONNECTION

WARNING



The following operation requires sufficient professional knowledge on electric aspect and comprehensive safety knowledge. Operators should be holders of valid qualification certificates which can prove their skills and knowledge. Make sure the input cable of the machine is disconnected from the electricity utility

Note:

Turn off the power supply switch before any electric connection operation.

The housing protection grade of this machine is IP21S, so do not use it in rain.

Place the Welder on a level surface that can bear its weight near the work area.



4.1 Installation requirements

Environment requirements



Please pay attention to the following when choosing installation site:

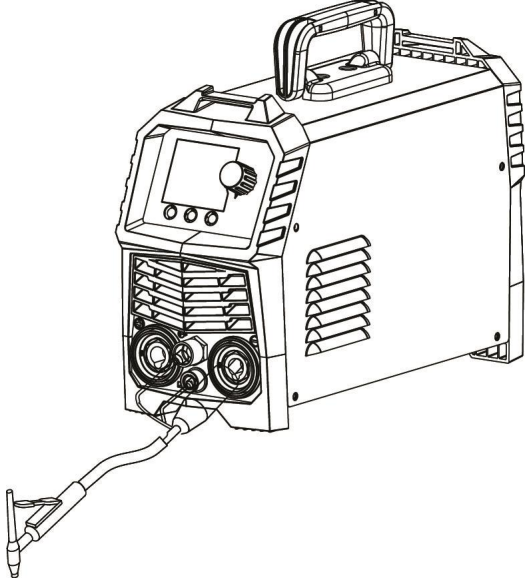
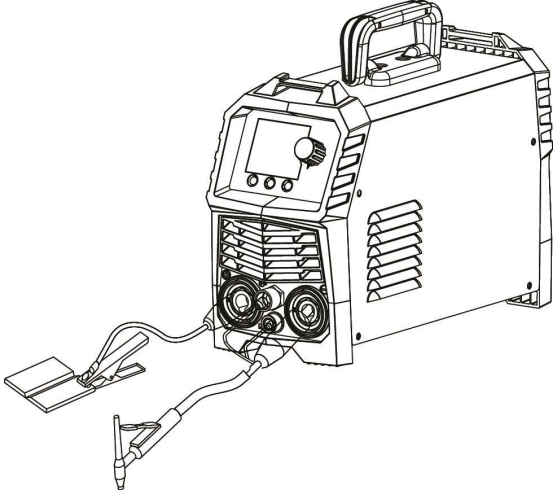
- Please avoid environment which contains too much dusts or metal powder.
- Avoid installation in area which is with corrosive or explosive gases.
- Ambient temperature should be within $-10^{\circ}\text{C} \sim +40^{\circ}\text{C}$; Please reinforce radiation or lessen power machine operation when temperature is over 40°C .
- Installation should be carried out in dry environment with humidity less than 90%.
- Avoid welding in the open air with strong wind; please install windscreen if necessary, or else welding performances may be affected.
- Please consult and confirm in advance if there is any special installation requirement.
- If the Welding power is placed on tilt plane, pay attention to avoid it topple over.
- The Welding power is forbidden to use thaw pipe.

Installation space requirements

Distance between welder and wall should be more than 20cm (7.87") ; distance between two abreast welders should be more than 30cm (11.82"). You may refer to the below suggested reserved installation space to confirm the installation position.

Department	Front	Left Side	Right Side	Back
Reserved Space	≥20cm/7.87"	≥20cm/7.87"	≥20cm/7.87"	≥20cm/7.87"

4.2 TIG Welder Cable Connection

Description	Picture
1.Please connect TIG torch correctly according to Figure 6. Connect the gas & electric connector of the TIG torch to the corresponding connector on the machine panel, and tighten it clockwise. NOTE: Make sure the link is partially tightened.	 Figure 6
2.Connect the aviation plug on the TIG torch to the corresponding socket on the machine panel. (Figure 6.) NOTE: Make sure the link is partially tightened.	
3.Insert the quick plug on the earth cable into the "+" quick socket on the machine panel, and tighten it clockwise. Clamp the workpiece with the earth clamp at the other end of the earth cable. (Figure 7.) NOTE: Make sure the link is partially tightened.	 Figure 7 Installation of Earth cable

4. Gas connection: connect argon tube with welder back panel's brass mouthpiece tightly. Air supply passage should include argon decompressed flowmeter, gas hose; Be sure to secure the hose connections to avoid poor solder joint protection due to gas leakage or air intrusion. (Figure 8)

NOTE: Make sure the link is partially tightened.

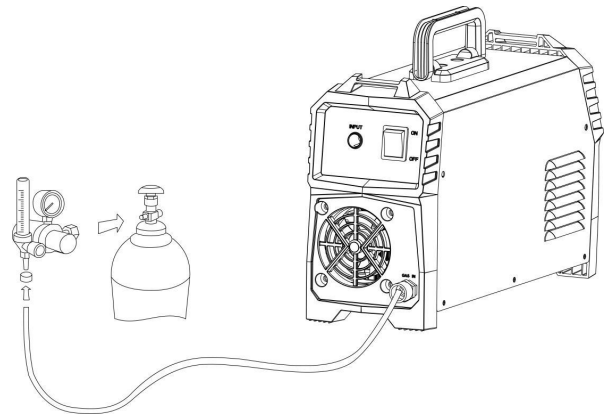


Figure 8 Gas connection

4.3 LIFT TIG Welder Cable Connection

NOTICE: Before setting up or using this product for new function, make sure to read the entire Important Safety Information section at the beginning of this manual !



Description	Picture
Step 1: Connect cables. 1. Insert the ground clamp cable into the positive socket and twist it all the way clockwise to lock it in place. NOTICE: - The ground clamp connector MUST be tightly connected to the socket to avoid power short circuit. Ensure the ground clamp is connected on clean, bare metal (not rusty or painted) 2. Plug the Lift-TIG torch cable into the negative socket and twist it clockwise to lock it in place. 4. For instructions on connecting a shielded gas hose, refer to the 'Connecting Shielded Gas' section on the following page. NOTICE: - The Lift-TIG torch cable MUST be tightly connected to the socket to avoid power short circuit. Set Lift-TIG torch cable down on nonconductive, nonflammable surface away from any grounded objects.	Figure 9

Step 2: connect Shielding gas

1. With assistance, place a 100% Argon cylinder (not included) onto a cabinet or cart near the welder. Secure the cylinder in place with two straps (not included) to prevent tipping.
2. Remove the cylinder's cap. Stand to the side of the valve opening, then briefly open the valve to blow dust and dirt from the valve opening. Close the cylinder valve.
3. Locate the regulator (not included) and loosen its valve. Thread the regulator onto the cylinder and tighten the connection with a wrench.
4. Connect the shielding gas hose on the TIG torch cable connector to the regulator's outlet and tighten the connection with a wrench.

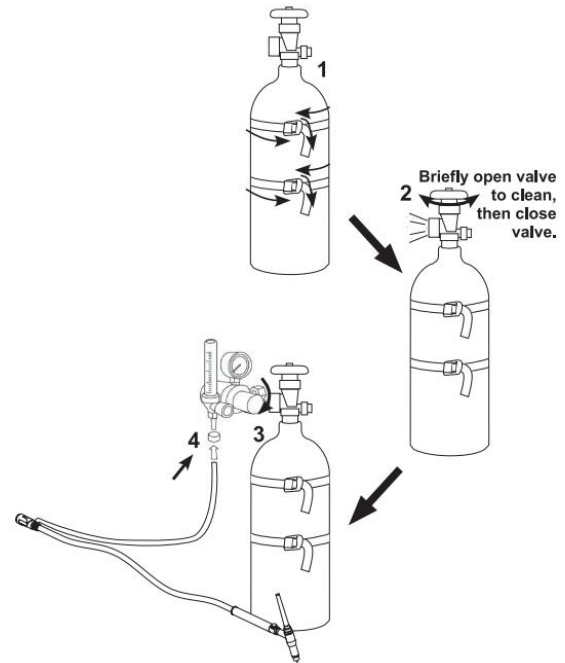


Figure 10

More information:

Sharpen tungsten Electrode

To avoid Electrode contamination, dedicate a fine grit grinding wheel exclusively to Electrode grinding.

1. Shut off the welder and wait until Electrode and Torch have cooled enough to handle.
2. Remove Back Cap to release Collet's grip on Electrode.
3. Pull Electrode out from front of Torch. (Pulling it from rear will damage Collet and create burrs on Electrode).
4. If Electrode has dulled or been otherwise contaminated, use pliers or a suitable tool to grip the Electrode above the contaminated section and snap off the end of the Electrode.
5. Lightly press Electrode tip against the surface of the grinding wheel at an angle. Rotate Electrode tip until a blunt point is formed.

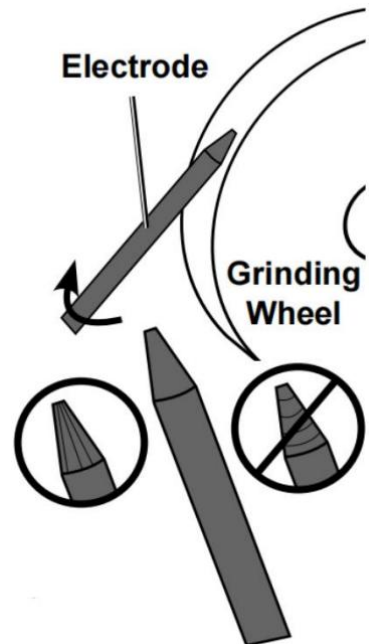


Figure 11

NOTE: Grinding direction must be parallel to length of Electrode.

6. The conical portion of the ideal tip will be 2-1/2 times as long as the Electrode diameter.
7. Re-insert Electrode into Collet with tip protruding 1/8"-1/4" beyond the Ceramic Nozzle, then re-tighten the Back Cap to secure the Electrode in place.

Assemble tig torch

1. Consult Settings Chart, on top of Welder, to determine proper Tungsten Electrode size to be used with thickness of material to be welded.
2. Match Collet and Collet Body sizes to Tungsten Electrode size.
3. Thread Collet Body into the front of the Torch.
4. Make sure Ceramic Nozzle size is appropriate for application.
5. Thread Ceramic Nozzle onto Collet Body.
6. Insert Collet into back of Torch and into Collet Body.
7. Insert Tungsten Electrode into Collet on front of Torch.
8. Lock Electrode in place with Back Cap. Electrode should protrude 1/8" to 1/4" beyond the Ceramic Nozzle.

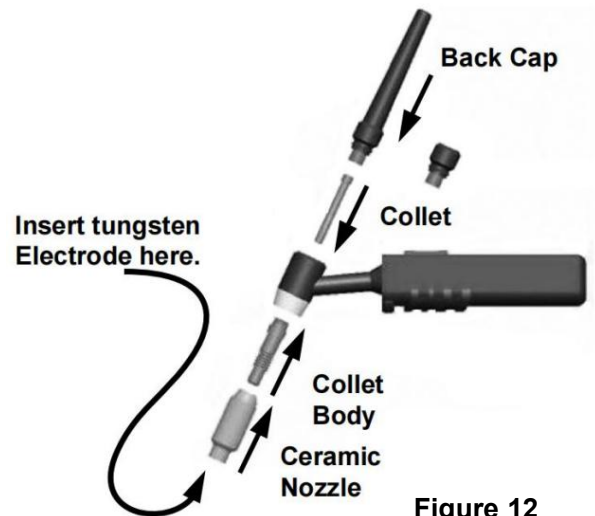


Figure 12

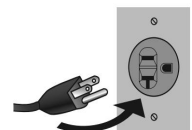
4.4 Input Power Connection

⚠ WARNING BE WARE OF ELECTRIC SHOCK!

NOTICE: The following steps require applying power to the Welder with the cover open.

To prevent serious injury from fire or electric shock:

1. **DO NOT** touch anything, especially not the ground clamp, with the gun or welding wire or an arc will be ignited.
2. **DO NOT** touch internal Welder Components while it is plugged in.



- The TIG200P operates with a 110V or 220V power supply.
- Turn the Power Switch to the OFF position, then plug the Welder into a properly grounded 220V receptacle that matches the plug. Use the included 110V power adaptor if plugging the Welder into a 110V receptacle.
- Plug the Power Cord into a properly grounded. Set Electrode Holder down on nonconductive, nonflammable surface away from any grounded objects. And then turn the Power Switch ON.

NOTE:

- **For optimal performance, connect the TIG200P to a 50A branch circuit. If connected to a circuit with lower capacity, expect reduced welding current and duty cycle. The circuit must be equipped over 50A with delayed action-type circuit breaker or fuse.**

4.5 TIG Welder Operation



Operation step

1. Open gas cylinder's valve all the way.

NOTE: TO PREVENT DEATH FROM ASPHYXIATION:

Do not open gas without proper ventilation. Fix gas leaks immediately. Shielding gas can displace air and cause rapid loss of consciousness and death. **Shielding gas without carbon dioxide can be even more hazardous because asphyxiation can start without feeling shortness of breath.**

2. Set Flow Gauge to SCFH VALUE.

3. connect power cord.

NOTE: Turn the Power Switch off before connecting Power Cord. Plug the Power Cord into a properly grounded and rated receptacle that matches the plug. The circuit must be equipped with delayed action-type circuit breaker or fuses.

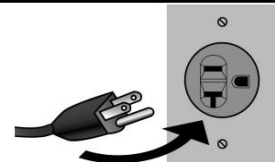
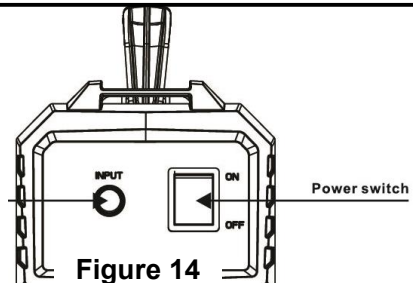


Figure 13

4. Turn the Power Switch ON.

NOTE: Set TIG Torch down on nonconductive, nonflammable surface away from any grounded objects.

The Operation interface will light up and the Cooling fan will rotate.



5. Press the **Welding Mode** button  , for TIG welding mode changeover.

HF TIG

PULSE

Lift TIG

6. Press the **Control Mode** button  , for operation mode changeover.

**FOOT PEDAL
REMOTE**

**2T
4T**

SPOT

7. Hold TIG Torch in one hand and the TIG Rod (sold separately) in other hand. Both hands need to wear protective gloves.

WARNING! TO PREVENT SERIOUS INJURY: Metalwork bench must be grounded when TIG welding.

NOTE: Maintain a constant distance between the Tungsten Electrode and the workpiece: between 1 and 1.5 times the diameter of the Electrode.

8.The initial settings may need to be adjusted after stopping and carefully inspecting the weld. Please refer to **6. WELDING PARAMETERS TABLE**, Proper welding takes experience.

9.When welding puddle is hot enough, tilt Torch backward about 10-15 degrees from vertical and move it back slightly. Add TIG Rod material as needed to the front end of the weld puddle.

10.Alternate between pushing the torch/weld puddle and adding the TIG Rod material.

NOTE: Remove the TIG Rod each time the Electrode is advanced, but do not remove it from the gas shield. This prevents oxidation from contaminating the weld.

11.When finished welding, pull Torch away from work piece until welding arc is broken, then return the gas coverage until weld solidifies.

12.Close valve on TIG Torch and turn Right Knob to OFF to turn off power.

13.Set TIG Torch down on nonconductive, nonflammable surface away from any grounded object.

14.Turn the Power Switch OFF.

15.To prevent accidents, after use:

Allow Welder to cool down.

Remove Ground Clamp from workpiece or table.

Disconnect TIG Torch and Ground Cables.

Close gas cylinder's valve securely, remove regulator and replace cap.

Disconnect Gas.

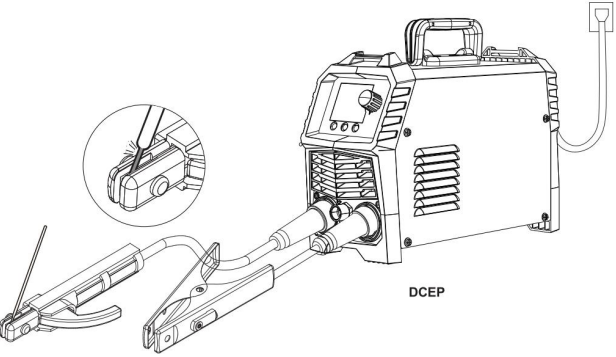
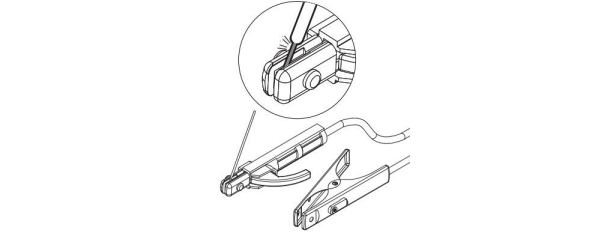
If Electrode has dulled or been otherwise contaminated, use pliers or a suitable tool to grip the Electrode above the contaminated section and snap off the end of the Electrode.

4.6 TIG Welding Mode

Describe	Part	Select
 Press the Mode button , for HF-TIG welding mode changeover. rotate the knob to adjust the current. Adjustment range is 10-200 amps.		HF TIG
 Press the Mode button , for Pulse-TIG welding mode changeover. rotate the knob to adjust the current. Adjustment range is 10-200 amps.		PULSE
 Press the Mode button , for Lift-TIG welding mode changeover. rotate the knob to adjust the current. Adjustment range is 10-200 amps.		Lift TIG
 - Press the Control Mode button  to switch the control mode. FOOT PEDAL indicator. When the indicator is on, it indicates the Foot pedal mode is selected. REMOTE indicator. When the indicator is on, it indicates the analog TIG torch remote mode is selected. 2T indicator. If the indicator is on, it indicates the machine is in 2T welding mode. 4T indicator. If the indicator is on, it indicates the machine is in 4T welding mode. SPOT indicator. If the indicator is on, it indicates the machine is in spot welding mode.		FOOT PEDAL REMOTE 2T 4T SPOT

4.7 Installation for MMA function

Please install the machine strictly according to the following steps.

Description	Picture
1. Insert the cable plug with electrode holder into the “+” socket on the front panel of the welding machine, and tighten it clockwise. NOTICE: The holder connector MUST be tightly connected to the socket to avoid power short circuit. Set Electrode Holder down on nonconductive, nonflammable surface away from any grounded objects.	 Figure 15 DCEP Schematic Diagram of MMA Welding
2. Insert the cable plug with ground clamp into the “-” socket on the front panel of the welding machine, and tighten it clockwise. NOTICE: The ground clamp connector MUST be tightly connected to the socket to avoid power short circuit. Ensure the ground clamp is connected on clean, bare metal. (not rusty or painted)	
3. Place the bare metal end of the Stick Electrode inside the jaws of the Electrode Holder. NOTICE: Ensure that the clip is on the conductive side of the electrode. Ensure that it is securely clamped.	 Figure 16
4. When you use Alkaline rods (E7018), need to DCEP, that is connect the holder and ground clamp as mentioned above in above 1. and 2.	
5. If you use Acidic rods (E6013), need to DCEN, that is connect the holder to “-” and ground clamp to “+”. NOTICE: Incorrect connecting can affect welding results.	 Figure 17 DCEN Schematic Diagram of MMA Welding

4.8 MMA Welding Mode

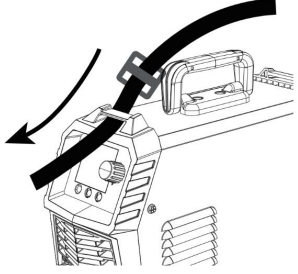
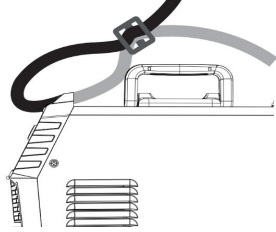
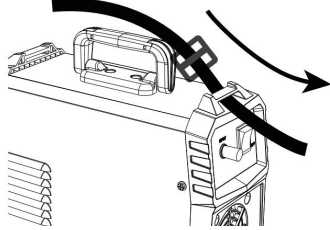
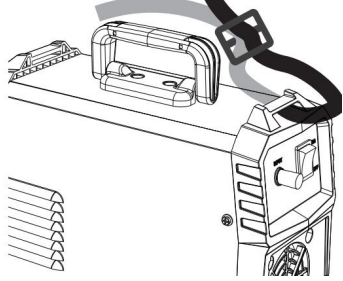
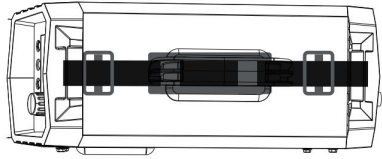
Describe	Part	Select
 Press the Mode button , for MMA welding mode changeover. rotate the knob to adjust the current. Adjustment range is 10-200 amps		MMA
 In MMA mode, press and hold the Preferences for 5 seconds to turn VRD on/off. VRD is not enabled by default.		VRD

4.9 MMA Welding Parameters Table

Note: This table is suitable for mild steel welding. For other materials, consult related materials and welding process for reference.

Electrode Diameter mm(inch)	Plate thickness mm (inch)	Recommended Welding Current(A)
1.6mm 1/16	1~2.5mm 0.04~0.11	30~65
2mm 2/25	2.3~4mm 0.09~0.16	49~94
2.4mm 3/32	3.5~4.5mm 0.14~0.18	78~123
3.2mm 1/8	4.8~8.3mm 0.19~0.33	99~177
4.0mm 5/32	8.6~10mm 0.34~0.39	178~200

5. STRAP INSTALLATION

Step 1: Thread the strap through the strap hole in front of the welder.	 Figure 18
Step 2: Thread the strap through the nylon buckle as shown in the diagram.	 Figure 19
Step 3: Thread the strap through the strap hole in back of the welder.	 Figure 20
Step 4: Thread the strap through the nylon buckle as shown in the diagram.	 Figure 21
Step 5: The strap installation is complete.	 Figure 22

6. WELDING PARAMETERS TABLE

6.1 Parameters for TIG electrode

Electrode diameter		Amperage range on DCEN	Amperage range on DCEP
mm	inch	Straight polarity	Straight polarity
1	.040"	15-80	/
1.6	1/16"	70-150	10-20
2.4	3/32"	150-200	15-30

6.2 Parameters for TIG welding on stainless steel sheet

Electrode diameter	Plate thickness	Welding current(A)	Gas flow(L/min)
mm (inch)	mm (inch)		
1~2mm (0.040"-5/64")	1~3mm (0.040"- 0.12")	50	5
		50~80	6
2~4mm (5/64"-5/32 ")	3~6mm (0.12"-0.24")	80~120	7
		121~160	8
		161~200	9

6.3 Parameters for TIG welding

Plate thickness mm (inch)	Welding layers	Electrode diameter mm (inch)	Wire diameter mm (inch)	Welding current(A)	Gas flow (L/min)			Nozzle diameter mm (inch)
					Square groove	Single V groove with root face	Double V groove with root face	
0.5(0.020")	1	1.5(0.059")	1 (0.040")	30~50	8~10	6~8	14~16	10(0.393")
1 (0.040")	1	2(0.079")	1.0~2.0 (0.040"-0.079")	40~60	8~10	6~8	14~16	10(0.393")
1.5(0.060")	1	2(0.079")	1.0~2.0 (0.040"-0.079")	60~80	10~12	8~10	14~16	10~12 (0.393"-0.472")
2(0.079")	1	2.0~3.0 (0.079"-0.118")	1.0~2.0 (0.040"-0.079")	80~110	12~14	10~12	16~20	12~14 (0.472"-0.551")
2.5(0.098")	1	2.0~3.0 (0.079"-0.118")	2 (0.079")	110~120	12~14	10~12	16~20	12~14 (0.472"-0.551")
3(0.118")	1~2	3(0.12")	2.0~3.0 (0.079"-0.118")	120~140	12~14	10~12	16~20	14~18 (0.551"-0.708")
4(0.157")	2	3.0~4.0 (0.12~5/32")	2.0~3.0 (0.079"-0.118")	130~150	14~16	12~14	20~25	18~20 (0.708"-0.787")
5(0.197")	2~3	4.0(5/32")	3(0.118")	130~150	14~16	12~14	20~25	18~20 (0.708"-0.787")
6(0.236")	2~3	4.0(5/32")	3.0~4.0 (0.118"-5/32")	140~180	14~16	12~14	25~28	18~20 (0.708"-0.787")
7(0.257")	2~3	4.0(5/32")	3.0~4.0 (0.118"-5/32")	140~180	14~16	12~14	25~28	20~22 (0.787"-0.866")
8(0.315")	3~4	4.0(5/32")	3.0~4.0 (0.118"-5/32")	140~180	14~16	12~14	25~28	20~22 (0.787"-0.866")
10(0.394")	4~6	4.0(5/32")	3.0~4.0 (0.118"-5/32")	160~200	14~16	12~14	25~28	20~22 (0.787"-0.866")
20(0.787")	12	4.0(5/32")	4(5/32")	200~240	12~14	10~12	20	18(0.708")
22(0.866")	12	4.0(5/32")	4.0~5.0 (5/32"-0.197")	230~250	15~18	18~20	18~20	20(0.787")
25(0.984")	15~16	4.0(5/32")	3.0~4.0 (0.118"-5/32")	200~220	16~18	20~26	26~30	22(0.866")
30(1.181")	17~18	4.0(5/32")	3.0~4.0 (0.118"-5/32")	200~220	16~18	20~26	26~30	22(0.866")

7. BASIC KNOWLEDGE OF TIG WELDING

7.1 TIG Overview and Characteristics

TIG is a gas shielded arc welding that uses argon as the protective gas. TIG welding process is as shown in the figure. It uses the argon gas flow ejected from the nozzle of the welding gun to form a tightly closed protector in the arc area to isolate the metal molten pool from the air, so as to prevent air intrusion. Besides, it uses the heat generated by the arc to melt the filler wire and base metal, and the liquid metal molten pool will form weld after cooling.

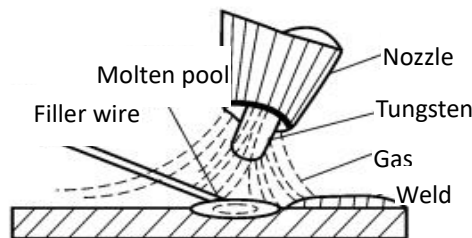


Figure 23 TIG diagram

Argon is an inert-gas and does not react chemically with metal, so it will not burn the alloy elements in the metal being welded and can fully protect the metal molten pool from oxidation. Moreover, argon is insoluble in liquid metal at high temperature, so it is not easy to cause gas pores in the weld. Therefore, argon can provide effective and reliable protection effect, thus obtaining higher welding quality.

7.2 TIG Characteristics

Compared with other stud arc welding methods, TIG enjoys the following characteristics:

- Argon has excellent protection performance, and there is no need to prepare corresponding flux during welding. It is basically a simple process of metal melting and crystallization, which can obtain
- relatively pure and high-quality welds.
- Because the arc is compressed and cooled by the argon gas flow, the heat of arc is concentrated, and the temperature of the argon arc is very high. Therefore, the heat-affected zone is very narrow,
- the welding deformation and stress are small, and the crack tendency is small. It is especially suitable for welding of thin plates.
- TIG is open arc welding, which is convenient to operate and observe, making it easy to realize the mechanization and automation of the welding process. In addition, welding in various
- spatial positions can be performed under certain conditions.

- TIG supports a wide range of weldable materials, including almost all metal materials, especially suitable for welding chemically active metals and alloys.

It is generally used for welding aluminum, titanium, copper and their low alloy steels, stainless steels and heat resistant steels, etc.

Because of these outstanding characteristics of TIG, with the increasing product structure of non-ferrous metals, high alloy steels and rare metals, and unattainable welding quality requirements by the common gas welding or arc welding methods, TIG welding is more and more widely used.

7.3 TIG Welding Gun

The TIG welding gun is used to clamp the electrode, conduct electricity and transport argon gas flow, which are controlled by the start and stop buttons on the holder. The welding gun comprises three types, the maximum welding current for small type is 100A, and for large type is 400-600A, all adopting water cooling. The welding gun body is pressed by nylon, featuring with light weight, small volume, good insulation and heat resistance.

The welding gun nozzle serves as an important component that determines the gas shield protection performance, and the common nozzle shapes are as shown in the figure. The cylindrical nozzle with conical or spherical tail has the best protection effect, as the argon gas flow rate is uniform, which makes it easy to maintain laminar flow. The conical nozzle has poorer protection effect because of the rapid argon airflow speed, but it is easy to operate and has good visibility of molten pool, and is often used in welding.

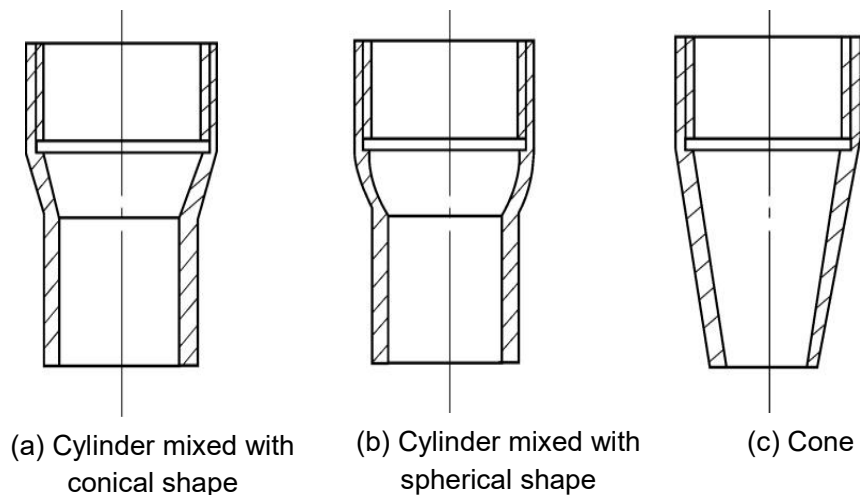


Figure 24 Welding gun nozzle diagram

7.4 TIG Process

Cleaning before welding

Before carrying out TIG, the joint of the welded material and the welding wire must be cleaned to remove the oxide film and oil stains on the metal surface to ensure the quality of the weld. The cleaning methods include mechanical cleaning, chemical cleaning and chemical mechanical cleaning.

- Mechanical cleaning: This method is simple and effective. It is suitable for cleaning weldments with large size and long welding cycle. Usually use a stainless steel wire brush and other tools with a small diameter for polishing, or use a spatula to remove the surface oxide film to expose the metal luster of the welding part, and then use an organic solvent to remove oil stains to clean the vicinity of the weldment joints.
- Chemical cleaning: This method is often used for cleaning filler wire and small weldments. Compared with the mechanical cleaning method, this method has the characteristics of high cleaning efficiency, stable and uniform quality, and long retention time. The chemical solution and process used in the chemical cleaning should be determined according to the material to be welded and welding requirements.
- Chemical mechanical cleaning: First use chemical cleaning, and then use mechanical cleaning at the welding parts before welding. This combined cleaning method is suitable for weldments with higher quality requirements.

Gas protection effect

Argon is an ideal protective gas, with a boiling point of -186°C , between the boiling points of oxygen and helium. It is a by-product of fractional distillation of liquid air in an oxygen plant to produce oxygen. In China, bottled argon is used for welding, and its filling pressure is 15MPa at room temperature. The cylinder is painted gray and marked with the word "Argon". The chemical composition requirements of pure argon are: $\text{Ar} \geq 99.99\%$; $\text{He} \leq 0.01\%$; $\text{O}_2 \leq 0.0015\%$; $\text{H}_2 \leq 0.0005\%$; total carbon content $\leq 0.001\%$; moisture $\leq 30\text{mg/m}^3$.

It is beneficial to protect welding arc and reduce the consumption of protective gas during flat position welding. Argon is a chemically inactive gas and does not chemically react with metals even at high temperatures, so there is no oxidation and burning of alloying elements and a series of problems caused by it. Argon is also insoluble in liquid metal, so it does not cause gas pores. Argon is a monatomic gas that exists in atomic state and has no molecular decomposition or atomic endothermic phenomena at high temperatures. Argon has small specific heat capacity and heat conduction capacity, that is, small heat absorption and less heat transfer. Therefore, the heat in the arc is not easy to lose, making the welding arc combustion stable and the heat concentrated, which are conducive to welding.

The disadvantage of argon is its high ionization potential. When the arc space is filled with argon, it is difficult to ignite the arc, but the arc is very stable once ignited.

In the process of welding, the protection effect of argon is affected by many technological factors. Therefore, it is necessary to pay attention to the effective protection of argon during TIG welding to prevent interference and damage to the protection effect of argon; otherwise, it is difficult to obtain required welding quality.

The welding technology factors affecting the argon protection effect include gas flow rate, nozzle shape and diameter, distance between nozzle and weldment, welding speed, welding joint form, etc., which should be considered comprehensively and selected correctly.

The quality of the argon protection effect is often evaluated by the welding spot test method by measuring the range of effective argon protection zone. For example, use AC manual tungsten electrode TIG to conduct spot welding on the aluminum plate, and the welding process conditions remain the same during welding; after striking arc, hold the welding gun for 5-10s before turning off the power. At this time, a melting point will be left on the aluminum plate. The "cathode crushing" around the welding spot will remove the oxide film on the surface of the aluminum plate, and a grayish-white area with metallic luster will appear. This part where the oxide film is removed is the effective argon protection zone, as shown in the figure. The larger the diameter of the effective protection zone, the better the protection effect.

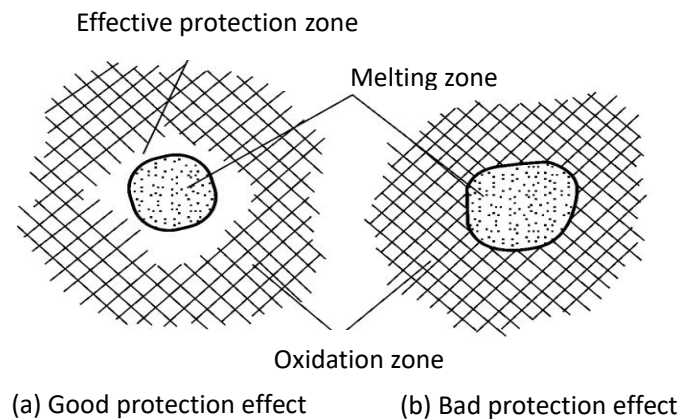


Figure 25 Argon protection effect diagram

In addition, the argon protection effect can be evaluated by directly observing the color of the weld face. Taking welding on stainless steels as an example, if the weld metal surface is silvery white or golden yellow, it means that the protection effect is good; if the color is grey or black, it means that the protection effect is bad.

7.5 Welding Parameters

The gas protection effect, welding process stability and weld quality of TIG are directly related to welding parameters. Therefore, reasonable selection of welding parameters is an important guarantee for obtaining high-quality welded joints.

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

- Current type and polarity: The current type and polarity of TIG should be selected according to the material to be welded and the operation method.
- Tungsten electrode diameter: It is mainly selected according to the thickness of the weldment. In addition, when the thickness of the material to be welded is equal, the allowable current of the tungsten electrode is different due to the different types and polarities of the current used, so the diameter of the tungsten electrode used is also different. If the diameter of the tungsten electrode is not selected properly, it will cause unstable arc, severe burnout and tungsten inclusion in the weld.
- Welding current: After the diameter of the tungsten electrode is selected, select the applicable welding current. Too large or too small welding current will cause poor weld formation or welding defects.
- Argon flow: It is mainly selected according to the tungsten electrode diameter and the nozzle diameter. For nozzles with a certain aperture, the selected argon flow rate should be appropriate.
- If the flow rate is too large, the gas flow rate will increase, and it will be difficult to maintain a stable laminar flow, which is not good for the protection of the welding zone. Besides, it will take away a lot of heat from the arc zone, which will affect the stable combustion of the arc. However, if the flow rate is too small, it is easy to be interfered by the outside air flow, so as to reduce the argon protection effect. Usually the flow of argon is in the range of 3-20L/min.
- Welding speed: Under certain conditions of tungsten electrode diameter, welding current and argon gas flow, too fast welding speed will cause the shielding gas flow to deviate from the tungsten electrode and the molten pool, thereby affecting the argon protection effect. Moreover, the welding speed significantly affects the shape of the weld. Therefore, an appropriate welding speed should be selected.
- Process factors: Mainly include the shape and diameter of the nozzle, the distance from the nozzle to the weldment, the length of the tungsten electrode, the diameter of the filler wire, etc. These process factors do not change much, but they have different degrees of influence on the welding process and argon protection effect. Therefore, they should be selected according to specific welding requirements.
- Generally, the nozzle diameter can be selected within 5-20 mm; the distance from the nozzle to the weldment shall not exceed 15 mm; the length of tungsten electrode out of the nozzle shall be 3-4 mm; and the diameter of filler wire shall be selected according to the thickness of weldment.

7.6 General Requirements of TIG

- Control requirements of gas: It is required that the gas is supplied first and exhausted last. Argon is an inert-gas which is easy to be broken down. First fill argon between the workpiece and the electrode needle, which is conducive to arc starting; after welding, keeping on supplying argon can prevent the workpiece from oxidation due to rapid cooling and ensure good welding effect.
- Current manual switch control requirements: When the manual switch is pressed, the current is delayed compared to the gas. After the manual switch is turned off (after the welding is completed), and the gas supply current is cut off first according to the requirements.
- High-voltage generation and control requirements: TIG adopts the high-voltage arc starting mode, which requires to have high voltage when arcing, and no high voltage after arcing.
- Interference protection requirements: High frequency is accompanied by high voltage of arcing in TIG, which causes serious interference to the whole circuit and requires the circuit to have good anti-interference ability.

8. BASIC KNOWLEDGE OF MMA

Manual metal arc welding, MMA for short, is an arc welding mode by manually operating electrode. Equipment for MMA is simple, convenient and flexible to operate, and with high adaptability. MMA is applied to various metal materials with thickness more than 0.08inch and various structures, in particular to weldment with complex structure and shape, short weld joint or bending shape, as well as weld joints in various spatial locations.

8.1 Welding Process Of MMA

Connect the two output terminals of the welder to the weldment and electrode holder respectively, and then clamp the electrode by the electrode holder. When welding, arc is ignited between the electrode and the weldment, and the end of the electrode and part of the weldment are 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 connect two separate pieces of weldment as a whole. 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.

8.2 Tools For MMA

Common tools for MMA include electrode holder, welding mask, slag hammer, wire brush (see **Figure 26**), welding cable and labor protection supplies.

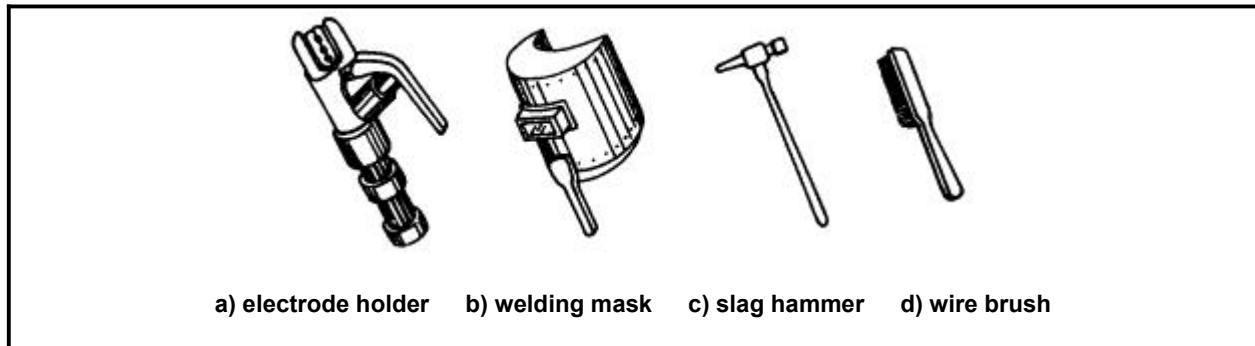


Figure 26 Tools for MMA

- Electrode holder: a tool for clamping electrode and conducting current, mainly including 300A type and 500A type.
- 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 arc burning. Thus, welding can be carried out by operators conveniently.
- Slag hammer (peen hammer): for the use of removing slag crust on the surface of weld joint.
- Wire brush: for the use of removing dirt and rust at the joints of the weldment before welding, as well as cleaning the surface of weld joint and the spatter after welding.
- 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.

8.3 Basic Operation Of MMA

- **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.

- **Posture in operating**

Take flat welding of butt joint and T-shaped joint from left to right as an example. **(See Figure 27)** 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.

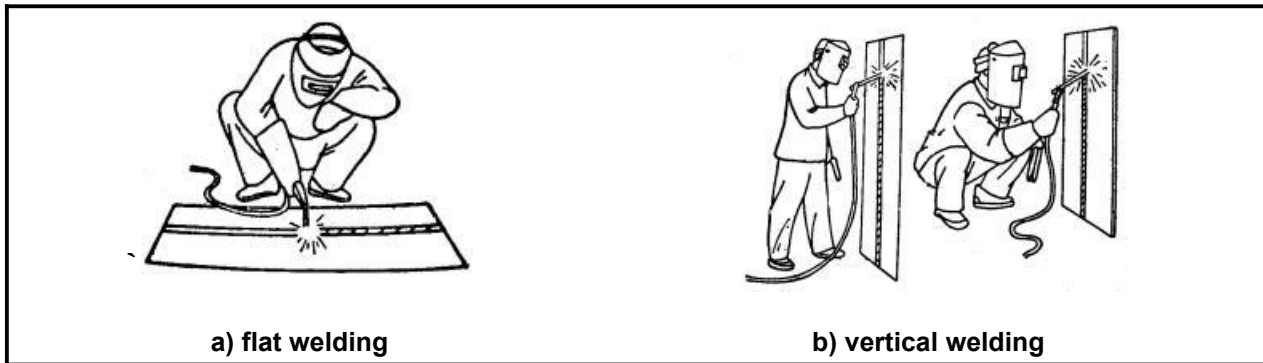
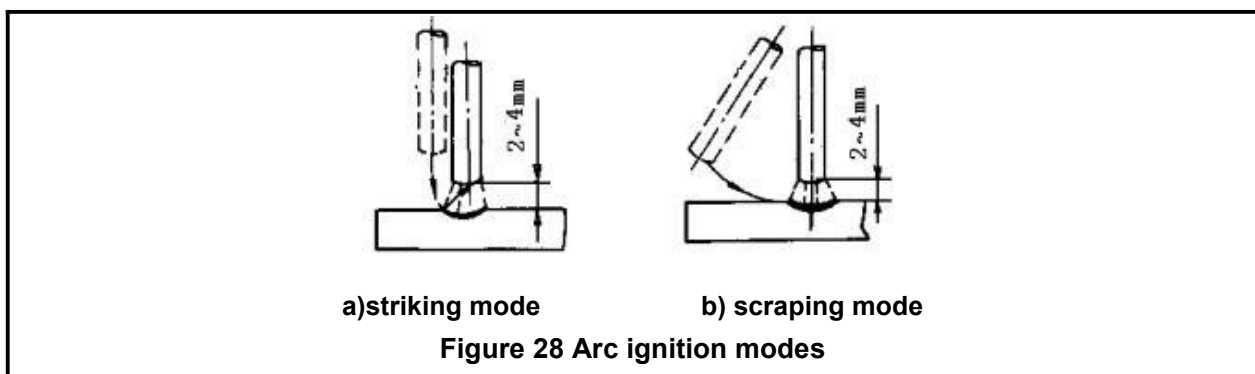


Figure 27 Posture in welding

- **Arc Igniting**

Arc igniting is the process for producing stable arc between electrode and weldment in order to heat them to implement welding. Common arc ignition mode includes scraping mode and striking mode. **(See Figure 28)** During welding, touch the surface of the weldment with the end of the electrode by scraping or light striking to form short circuit, and then quickly lift the electrode 0.08-0.16inch 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.



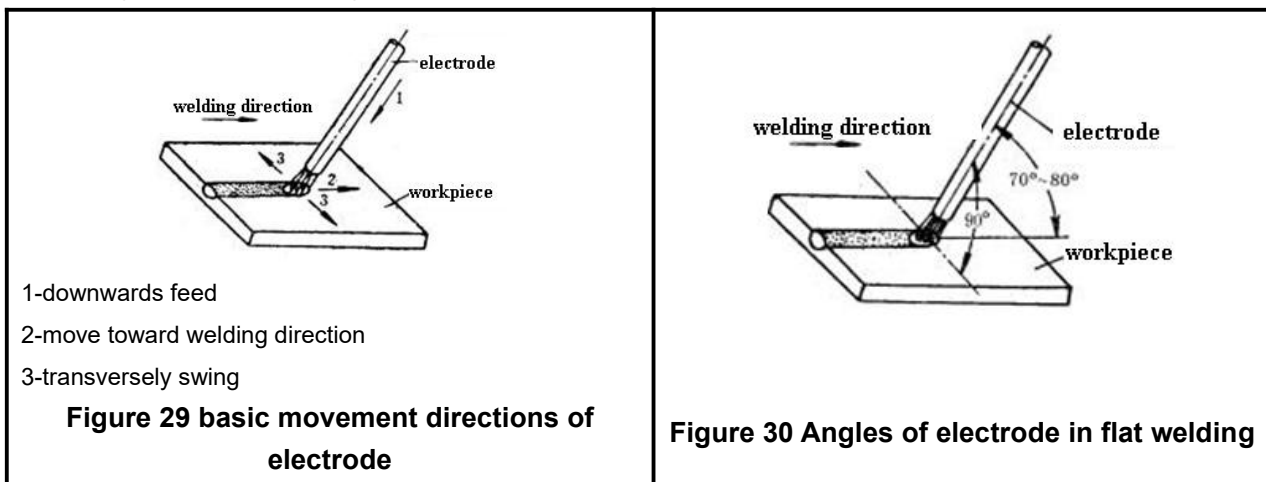
- **Tack weld**

For fixing the relative positions of the two pieces of weldment and welding conveniently, 1.2-1.6inch short weld joints are welded every certain distance in order to fix the relative positions of the weldment during welding assembly. This process is named as tack weld.

- **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 Figure 29)** 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.

- Welding angle: the electrode should be inclined in $70^{\circ}\sim 80^{\circ}$ forwards. **(See Figure 30)**
- Arc length: the proper arc length is equal to the diameter of electrode in general.
- 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.



- **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 when extinguishing arc. Then, remove the excessive part after welding. The operation modes of arc extinguishing are shown in the figure below.

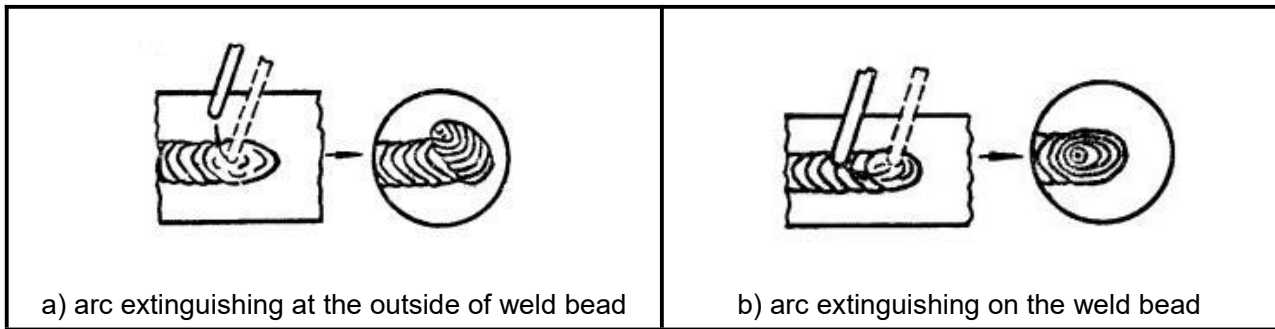


Figure 31 Arc extinguishing modes

- **Weldment cleaning**

Clean welding slag and spatter with wire brush, etc after welding.

9. TROUBLESHOOTING

WARNING



All welder maintenance should be carried out by qualified professional operators; any wrong connection or installation will damage to PCB or components. To avoid electric shock, burning or other personal injuries, please do maintenance 5 minutes after welder is powered off.



Please do the following inspection before maintenance:

- 1) Please check if welder input voltage is within 220V/110V $\pm$ 15%.
- 2) Please make sure the correct and tight connection of input cable.
- 3) Please make sure the correct and tight connection of welding cable.
- 4) Please make sure gas circulation is normal; please use pure argon gas and adjust gas flow per actual welding demands.
- 5) Please make sure all PCB terminals are correctly and tightly connected.

9.1 Error code and welding processing problems

Welder failure and welding process problems

Malfunction phenomena	Solutions
Power supply indicator doesn't light Fan doesn't work and there is no current output	• Please make sure power switch is on. • Please make sure there is electricity input.
Power supply indicator lights Fan doesn't work and there is no current output	• Under-powered DC24V supply or main replay is not closed. • Check if DC15V power supply is normal or not.
Fan works; abnormality light doesn't light, but with no welding output;	• Make sure operator has pulled the torch trigger and make sure it's in good contact. • Check whether DC15V power supply is normal; • Check whether drive wire is tightly connected. • Check whether panel potentiometer is open-circuited. • Output terminal connection is in poor connection.
Black welding spot	• Please make sure argon outlet from welding torch nozzle is normal. • Argon flow is too small; generally argon flow should be 5L/min; • Please check whether air circulation is in good sealing condition and please check gas purity; • Please make sure there is no strong airflow in the welding site.
Poor protection for welding bead in the end of welding processing.	• Don't move the welding torch immediately after welding is finished, so that to retain the shielding gas's protection for high temperature welding bead. • Prolong post-flow time.
Hard to achieve successful arc ignition; frequent current interruption.	• Change a new tungsten; • Remove tungsten oxidation layer. • Prolong post-flow time; • Adjust tungsten electrode discharge distance(around0.8mm)
Unstable welding current	• Please make sure power network is normal. • Connect different power input cables if there are other equipments of strong interferences.

No HF discharge when pull the torch trigger	• Please check whether OCV is normal (DC65V); • Please make sure torch trigger control loop is normal; • Please check whether HF control loop is normal;
Display indicates E10	Over-current protection • Restart machine. • Check if flat cable between front PCB and top PCB is well connected. • If it is not fixed, the circuit fails. Please contact your distributor.
Display indicates E61	Over-heat protection • Wait for 5-7 minutes and machine will go back to normal operation automatically; • The thermistor is damaged. Please replace it.
Display indicates E34	Under-voltage protection for 15V Turn off the machine and restart it. If this the alarm cannot be eliminated, please contact professional maintenance personnel.

10. MAINTENANCE

WARNING



The following operation requires sufficient professional knowledge on electric aspect and comprehensive safety knowledge. Operators should be holders of valid qualification certificates which can prove their skills and knowledge. Make sure the input cable of the machine is disconnected from the electricity utility before uncovering the welding machine.

- Check periodically whether inner circuit connection is in good condition, connector is fastened (esp. plugs or components). Tighten the loose connection. If there is oxidization, remove it with sandpaper and then reconnect.
- Keep hands, hair and tools away from the charged parts such as the fan to avoid personal injury or machine damage when the machine is energized.
- 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.

- Avoid water and vapor infiltrating the machine. If there is, dry it and use tramegger to 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.
- Check periodically whether the insulation cover of all cables is in good condition. If there is any dilapidation, rewrap it or replace it.
- Put the machine into the original packing in dry location if it is not to be used for a long time.