YWT-200DC

HF TIG, LIFT TIG, PULSED HF TIG, COLD SPOT TIG, AND STICK

May., 2023

OPERATOR'S MANUAL

YESWELDER®

To help us serve you better, go to www.YesWelder.com

Congratulations on your new YesWelder product! YesWelder creates quality products at discounted prices to make welding affordable to everyone. To help us serve you better and for further questions, visit www.yeswelder.com. Thank you for your purchase.

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SAFETY

THANK YOU FOR SELECTING A QUALITY PRODUCT BY YESWELDER.

PLEASE EXAMINE THE PACKING BOX AND EQUIPMENT FOR DAMAGE IMMEDIATELY

When this equipment is shipped, the title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be filed by the purchaser against the transportation company when the shipment is received.

SAFETY DEPENDS ON YOU

YESWELDER arc welding and cutting equipment are designed and built with safety. However, your overall safety can be increased by proper installation and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And most importantly, think before you act and be careful.

⚠ WARNING

This statement appears where the information must be followed precisely to avoid serious personal injury or loss of life.

⚠ CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.

KEEP YOUR HEAD OUT OF THE FUMES.

DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance from the arc.
READ and obey the Safety Data Sheet (SDS) and the warning label on all welding materials containers.
USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.
IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).
USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).
PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.
PROTECT others from spatter, flash, and glare with protective screens or barriers.
IN SOME AREAS, protection from noise may be appropriate.
BE SURE protective equipment is in good condition. Also, wear safety glasses in work area
AT ALL TIMES.

SPECIAL SITUATIONS
DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned.
DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

Additional precautionary measures:
PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.
BE SURE cylinders are never grounded or part of an electrical circuit.
REMOVE all potential fire hazards from welding area.
ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.

WARNINGS

CALIFORNIA PROPOSITION 65 WARNINGS

WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65 warnings.ca.gov/diesel

WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code § 25249.5 et seq.)

WARNING: Cancer and Reproductive Harm
www.P65warnings.ca.gov

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended you download free PDF of Standard ANSI Z49.1 from the American Welding Society.

https://www.aws.org/library/doclib/AWS-Z49-2021.pdf

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

FOR ENGINE POWERED EQUIPMENT.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and workcables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

ELECTRIC SHOCK CAN KILL.

3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing.

Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.
In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:
- Semiautomatic DC Constant Voltage (Wire) Welder.
- DC Manual (Stick) Welder.
- AC Welder with Reduced Voltage Control.

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode stinger, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically “hot” parts of electrode stingers connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.

ARC RAYS CAN BURN.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Welding shield and filter lens should conform to ANSI Z87. I standards.

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, nonflammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES CAN BE DANGEROUS.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**

5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.

6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to “Safety in Welding and Cutting” (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances”, AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B “Standard for Fire Prevention During Welding, Cutting and Other Hot Work”, available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

CYLINDER MAY EXPLODE IF DAMAGED.

7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:
- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode stringer or any other electrically “hot” parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-l, “Precautions for Safe Handling of Compressed Gases in Cylinders,” available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.

FOR ELECTRICALLY POWERED EQUIPMENT.

8.a. Turn off the power using the disconnect switch at the fuse box before working on the equipment.

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer’s recommendations.

8.c. Ground the equipment following the U.S. National Electrical Code and the manufacturer’s recommendations.

INSTALLATION

TECHNICAL SPECIFICATIONS: YWT-200DC

INPUT-SINGLE PHASE ONLY				
Standard Voltage/Frequency			Input Current	
220V±10% 50/60Hz			$I_{1\ max}$=56A, $I_{1\ eff}$=43.3A	
110V±10% 50/60Hz			$I_{1\ max}$=33A, $I_{1\ eff}$=25.5A	
RATED OUTPUT-DC ONLY				
Voltage	Mode	Duty Cycle	Current	Volts at Rated Current
220V	GTAW	60%	230A	19.2V
		100%	175A	17V
	SMAW	60%	230A	29.2V
		100%	175A	27V
110V	GTAW	60%	110A	29.2V
		100%	81A	27V
	SMAW	60%	110A	24.2V
		100%	81A	23.2V
OUTPUTRANGE				
Voltage	Mode	Open Circuit Voltage	Welding Current Range	Welding Voltage Range
220V	SMAW	60V	5A ~ 230A	20.2V ~ 29.2V
	GTAW		5A~230A	10.2V ~ 19.2V
110V	SMAW		5A~110A	20.2V ~ 24.2V
	GTAW		5A ~ 110A	10.2V ~ 14.2V
OTHER PARAMETERS				
Machine	Power Factor	Efficiency	Protection Class	Insulation Class
YWT-200DC	0.8	≥80%	IP21S	F
PHYSICAL DIMENSIONS				
Machine	Length	Width	Height	Weight
YWT-200DC	550mm	360mm	445mm	17.95Kg
TEMPERATURE RANGE				
Operating Temperature Range			Storage Temperature Range	
-20°C ~ +50°C(-4°F~122°F)			-20°C ~ +50°C(-4°F~122°F)	

Read the entire installation section before you start the installation.

INSTALLATION

⚠ WARNIG

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Only personnel reading and understanding the YWT-200DC Operator's Manual should install and operate this equipment.**
- **The machine must be plugged into a grounded receptacle per national, local, or other applicable electrical codes.**
- **The YWT-200DC power switch should be in the OFF("O") position when installing the work cable and gun and connecting the power cord to input power.**

SELECT SUITABLE LOCATION

Locate the **YWT-200DC** in a dry place with free clean air circulation to minimize the chance of dirt accumulation that can block air passages and cause overheating.

STACKING

YWT-200DC cannot be stacked.

TILTING

The machine should be placed on a secure, level surface or a recommended cart. The equipment may topple over if this requirement is not followed.

SAFETY PRECAUTIONS

Read entire operation section before operating the WIRE FEEDER WELDER.

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch electrically live parts such as output terminals or internal wiring.
- Insulate yourself from the work and ground.
- Always wear dry insulating gloves.

FUMES AND GASES can be dangerous.

- Keep your head out of fumes.
- Use ventilation or exhaust to remove fumes from breathing zone.

WELDING SPARKS can cause fire or explosion

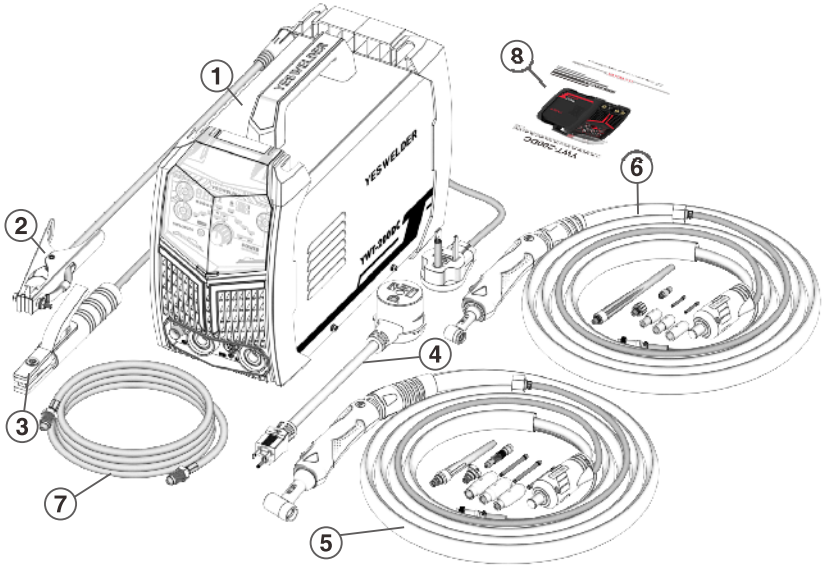
- Keep flammable material away.
- Do not weld on closed containers.

ARC RAYS can burn eyes and skin.

- Wear eye, ear and body protection.

Observe all safety information throughout this manual.

ACCESSORIES



1. Welder
2. Work Clamp
3. Electrode Holder
4. 220V~110V Power Plug
5. 13' WP-26 TIG Torch (KDP35-50 Electric Connector, M16*1.5 Gas Connector, 5-pin Control Cable)
6. 13' WP-9 Spot TIG Torch (KDP35-50 Electric Connector, M16*1.5 Gas Connector, 5-pin Control Cable)
7. 5/8"-18RH Gas Hose
8. Operator's Manual

DESCRIPTION

PRODUCT DESCRIPTION (PRODUCT CAPABILITIES)

This small portable welder is capable of HF TIG, LIFT TIG, PULSED HF TIG, COLD SPOT TIG, AND STICK on steel, mild steel, stainless steel.

GTAW(TIG) welding stands for Gas Tungsten Arc Welding and produces the weld with a non-consumable tungsten electrode. Inert gas is used during the precision welding process and it works as a shield to protect the weld from contamination. Usually Argon is the most common gas for the GTAW process and helium and argon/helium mixtures can be used as well.

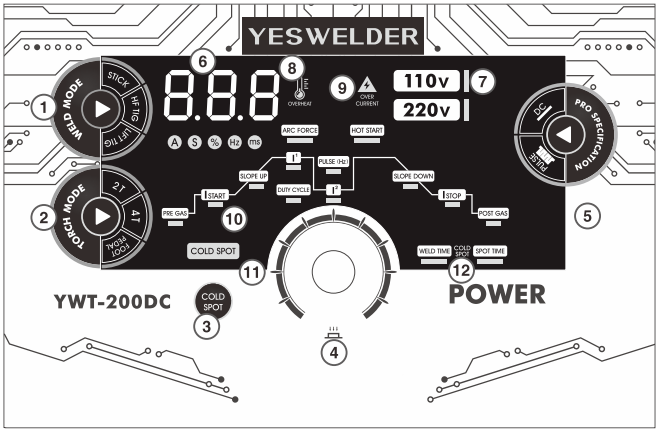
The electrode is made of tungsten alloy which can tolerate a very high temperature and would allow to weld at low current and weld as thin as 0.005-inch-thick material.

Filler material or welding wire/rod is used externally and will be consumed during the welding process. Precision GTAW should be preformed using DCEN (Direct Current Electrode Negative) which focuses the heat on the metal being welded. Precision TIG welding can be used and applied to different industries such as aerospace, medical and automotive.

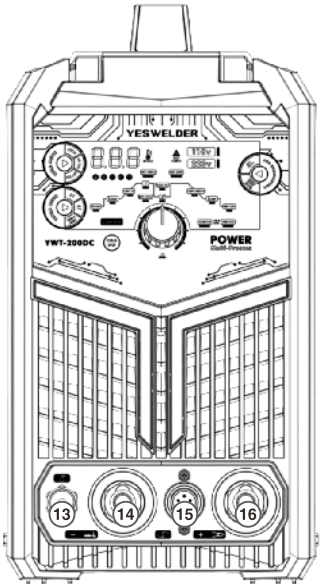
COMMON WELDING ABBREVIATIONS

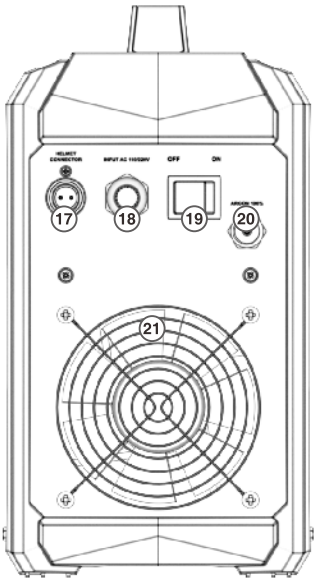
SMAW
Shielded Metal Arc Welding (Stick)
GTAW(TIG)
Gas Tungsten Arc Welding

Controls And Settings



1. Welding Process Selector: Permits selecting different welding processes from STICK, HF TIG, LIFT TIG.
2. Torch Operation Selector: Permit selecting torch operation. Foot pedal will be recognized when plugged in.
3. Cold Spot Button: Permit spot welding on/off.
4. Value Adjusting/Function Knob: Permits selecting and adjustment of parameters parameters.
5. Pulse Selector: Permits selecting pulse TIG or DC TIG.
6. Digital Display: Displays values of selected parameters.
7. Input Voltage: Displays input voltage selection.
8. Over-heat Indicator.
9. Over-current Indicator.
10. Parameter Indicators
11. Cold Spot Indicator.
12. Spot Welding Time Selection: Permits selecting welding time and spot welding time.





13. Gas Connector: Connection for TIG torch gas connector.

14. Positive Output Receptacle: Connection for electrode holder lead (SMAW) or work lead (GTAW).

15. 5-pin Trigger Receptacle: Permits triggering the torch to control welding on/off and adjust welding amperage. Connect the 5-pin connector present on the welding torch to the receptacle.

16. Negative Output Receptacle: Connection for TIG torch electrical connector (GTAW) or work lead (SMAW).

17. 2-Pin Helmet Power Receptacle: Permits supplying input power and pulse signal to external welding helmet.

18. Input Power Cable

19. Power switch

20. Inlet - Argon (inert) gas

21. Cooling Fan

OPERATION

Performance Data Plate And Duty Cycle

On the machine, there is a plate that includes all the operating specifications for your new unit. The duty cycle rating of a welding machine defines how long the operator can weld and how long the welding machine 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 welding machine has a duty cycle rating of 30% at the rated output of 90A. With that welding machine, you can weld at 90 A output for three (3) minutes out of every 10 min with the remaining seven (7) minutes required for cooling.

The duty cycle of your new welding machine can be found on the data plate affixed to the machine. The picture below shows that the “X” row lists duty cycle percentages while the “I2” row lists the amp draw corresponding to the duty cycle. Various duty cycles at other amperages are listed on your data plate.

MODEL: YWT-200DC		**S/N:**					
1~ I1 I2 1~ 1~ ⎓		ANSI/IEC STD.60974-1					
		U_1=110V			U_1=220V		
	⎓	5A/10.2V~110A/14.2V			5A/10.2V~230A/19.2V		
		X	60%	100%	X	60%	100%
	U_0=60V	I_2	110A	81A	I_2	230A	175A
		U_2	14.2V	13.2V	U_2	19.2V	17V
	⎓	U_1=110V			U_1=220V		
		5A/20.2V~110A/24.2V			5A/20.2V~230A/29.2V		
		X	60%	100%	X	60%	100%
	U_0=60V	I_2	110A	81A	I_2	230A	175A
		U_2	24.2V	23.2V	U_2	29.2V	27V
1~50Hz/60Hz	U_1=110V	$I_{1\ max}$=33A			$I_{1\ eff}$=25.5A		
	U_1=220V	$I_{1\ max}$=56A			$I_{1\ eff}$=43.3A		
Cooling Mode: Fan Cooling		Insulation Grade: F			**IP21S**		

Internal Thermal Protection

If you exceed the welding machine duty cycle, the thermal protection system will engage, shutting off all welding current output. After cooling, the thermal protector will automatically reset, and the welding functions can resume. The user needs to know it is the expected behavior of this machine. However, it would be best if you waited at least ten minutes after the thermal protector engages before resuming welding. You must do this even if the thermal protector resets itself before the ten minutes is up, or you may experience less than specified duty cycle performance.

If the welding machine is overheating, the IGBT over-heat protection sensing will send a signal to the welding machine control unit to cut the output welding current OFF and light the over-heat pilot lamp on the front panel. In this case, the machine should not be welding for 10-15 minutes to cool down with the fan running. When operating the machine again, the welding output current or duty cycle should be reduced.

CAUTION: DO NOT REGULARLY EXCEED THE DUTY CYCLE OR DAMAGE TO THE WELDER CAN RESULT.

Welding Preparation

The key to making a good weld is preparation. It includes studying the process and equipment and practicing welding before attempting to weld the finished product. An organized, safe, ergonomic, comfortable, and well-lit work area should be prepared for the operator. The work area should be free of all flammables, with a fire extinguisher and a bucket of sand available to smother potential possible fires.

To properly prepare for welding with your new welder, it is necessary to:

- Read the safety precautions at the front of this manual.
- Prepare an organized, well-lit work area.
- Protect the eyes and skin of the operator and bystanders.
- Attach the work clamp to the bare metal to be welded, ensuring good contact.
- Plug the machine into a suitable power outlet, and recommend NEMA6-50.
- Use 100% Argon gas cylinder, completely open the gas cylinder valve. Adjust the gas pressure regulator to the correct flow rate.
- (Not applicable to Stick welding/SMAW).

EXPOSURE TO A WELDING ARC IS EXTREMELY HARMFUL TO THE EYES AND SKIN. PROLONGED EXPOSURE TO A WELDING ARC CAN CAUSE BLINDNESS AND BURNS. NEVER STRIKE AN ARC OR BEGIN WELDING UNLESS YOU ARE ADEQUATELY PROTECTED. WEAR FIRE RESISTANT WELDING GLOVES, HEAVY LONG SLEEVED SHIRT, CUFFLESS PANTS; HIGH TOPPED SHOES AND A WELDING HELMET.

OPERATION

Welding Process Selection

Press ▶ to choose different welding modes based on welding demands, this button is inoperable when the machine is welding. Please see the description below:

STICK HF TIG LIFT TIG

HF TIG Welding

A high frequency arc initiation has become today's industry standard. Again, the tungsten doesn't touch the workpiece, so there is no risk of contamination, which is excellent when welding delicate materials.

Lift TIG Welding

With the Lift-Arc Ignition feature, the tungsten electrode is touched on the job and lifted off to start the arc. The start-up current is very low therefore, the tungsten barely sticks to the job, and the sharpened point is not damaged. The tungsten is then easily lifted off the job. It is user-friendly and very controllable.

Press ▶ to choose common DC TIG welding and Pulse TIG welding. Allows setting up for Pulse HF TIG and Pulse Lift TIG.

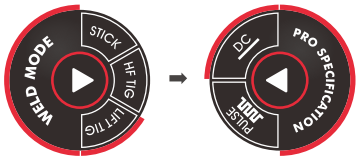
DC TIG

Pulse TIG

Pulse HF TIG

Pulse Lift TIG

DC HF TIG



DC Lift TIG

DC Pulse TIG has the following characteristics:

1)Pulse welding alternates the welding current between a peak (high) and background (lower) current value during welding.

2)This means the welding arc alternates between a high and low current setting on a regular interval which allows for welding on thin materials without burn-through and on thermally sensitive materials.

3)The precise heat input control results in even penetration, controllable weld pool size and more focused arc energy.

4)An even ripple spacing weld appearance (stack of dimes) is easily achievable in the Pulsed TIG mode.

5)User adjusted parameters allow the operator to customize the Pulse Peak Current value (high current setting), the Background Current value (low current setting), the Pulse Frequency (pulses per second), and the Pulse Width (percentage of the time of each pulse that the current is in the Peak value) resulting in complete control of the welding puddle. (see DC Pulse TIG Parameters on page 18)

Cold Spot Welding

Press the COLD SPOT button to set the spot TIG welding. Allows setting up for Cold Spot HF TIG and Cold Spot Lift TIG.

Spot welding is quick and easy and creates a strong join. It doesn't use any flux or filler metal, so there is no need to grind excess slag when finished, and there is no dangerous open flame.

This mode provides the ideal support for larger workpieces in particular, which need several tacking points.

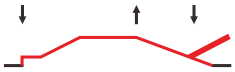
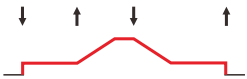
Spot welding is typically used to join two sheets of sheet metal, welded wire mesh or wire mesh, or any combination thereof. between 0.5 and 3 mm (0.020 and 0.118 in) thick.

Torch Operation Selection

When under TIG mode or digital controlled torch mode, press ▶ to select different torch control modes based on actual welding demands.

2T 4T Remote Control

Torch Operation Selection 2T/4T

Mode No.	Operation	Torch Trigger Operation and Current Curve
1	**Standard 2T mode:** 1. Push the torch trigger: arc is ignited and current rises gradually. 2. Release the torch trigger: current drops gradually, and arc stops. Pushing the torch trigger again before the arc stops will result in the current gradually rising again, repeating step 1.	
2	**Standard 4T mode:** 1. Push the torch trigger: arc is ignited and current reaches the initial value. 2. Release it: current rises gradually to the set amperage/voltage. 3. Push it again: current drops to pilot arc current value. 4. Release it: arc stops.	

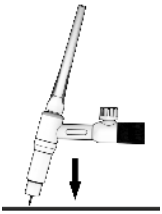
Note: With Foot Pedal attached, torch mode will automatically change to Foot Pedal Mode. The TIG torch trigger will not start the welding arc in Foot Pedal Mode. Amperage is controlled exclusively with the Foot Pedal Mode.

Set Up for TIG Welding (GTAW)

WARNING: TIG TORCH IS ALWAYS LIVE (ELECTRICALLY HOT). Use caution and ensure the TIG torch is not in contact with or close to a conductive or grounded material.

Note: REMOVE ALL THE COLLECTION FROM THE POSITIVE(+) , NEGATIVE(-) OUTPUT RECEPTACLE, AND TORCH CONNECTOR.

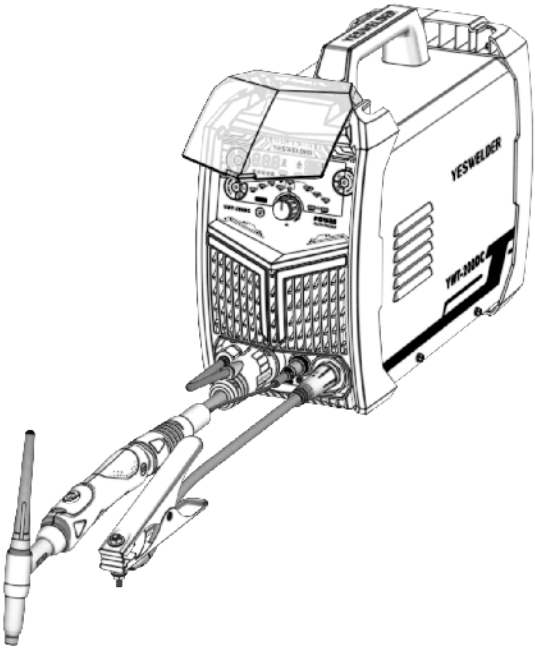
- Connect the TIG torch electric connector to the welder's Negative (-) Output Receptacle.
- Connect the TIG torch gas connector to the Gas Connector.
- Plug the 5-pin torch control switch cable into to Trigger Connector Receptacle.
- Connect the work clamp to the welder's Positive (+) Output Receptacle, ensure it has good contact with the workpiece on a clean, bare metal surface free of rust, paint, or coating.
- Set the tungsten electrode to stick out approximately 1/4" inch from the end face of the gas cup. Please use the correct size and type of tungsten electrode in your project. The small size of tungsten can handle the low welding current. The tungsten electrode requires a sharpened tip in DC welding.
- Attach the work clamp to the workpiece that needs welding.
- Put the TIG torch away from all conductive materials.
- Install the gas hose into the Inlet for Argon Gas and connect to the gas pressure regulator (100% Argon only).
- Open the gas cylinder valve and adjust the gas pressure regulator to the correct flow rate (Recommend 20-35CFH).
- Plug the power cable into a suitable power outlet, recommend NEMA6-50R.
- Turn on the power source and select process with the Welding Process Selection.
- Press the Value Knob to set parameters and rotate the knob to adjust the values.
- Place the electrode to the workpiece and trigger the torch control switch to initiate the welding arc with HF technique. Or depress the foot pedal to initiate the arc if using Foot Pedal Mode.



REMEMBER TO CLOSE THE VALVE ON THE GAS CYLINDER IMMEDIATELY AFTER ALL WELDING IS COMPLETED.

Welding Tips:

- Always weld clean, dry and well-prepared material.
- Hold the torch at a 45° angle to the workpiece with gas cup about 1/2" from the surface.
- Move the torch smoothly and steadily as you weld.
- Avoid welding in very drafty areas. A draft will fail the shielding gas protection and lead to a porosity defect.
- Keep wire and liner clean. Do not use rusty or dirty wire.
- Please don't bend or kink the welding torch cable. Doing so will restrict the gas flow and damage the cables.



Torch Assembling

- Match Collet and Collet Body size tungsten electrode.
- Thread the Collet Body into the front of the Torch.
- Match the size of the Ceramic Nozzle to shielding gas requirements for workpiece material thickness (see Settings Chart). Thread the correct Ceramic Nozzle onto Collet Body.
- Insert Collet into Collet Body. Insert tungsten Electrode into Collet.
- Lock Electrode in place with Back Cap. The electrode should protrude 1/8" to 1/4" beyond the Ceramic nozzle or Pyrex glass cup Nozzle.

1. Pyrex Glass Cup
2. Stubby Gas Lens
3. Temperature Resistant O-ring
4. Collet
5. Insulator Torch Body
6. Torch Head
7. Back Cap

1. Cermic Gas Nozzle
2. Collet Body
3. Collet
4. Insulator Torch Body
5. Torch Head
6. Back Cap

TIG Electrodes Specification Reference Table

Current Ranges Recommendation for Tungsten Electrodes

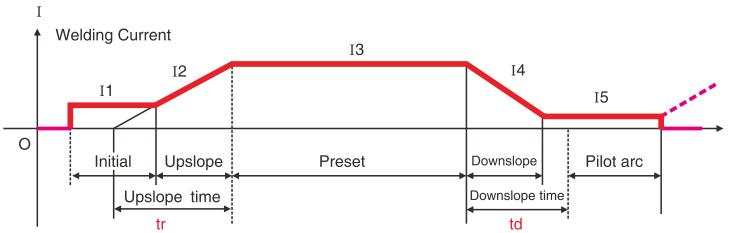
Electrode Dia.	Recommended Welding Current
	DCEN(A)
1/16"	70-150
3/32"	150-250
1/8"	250-400
5/32"	400-500

Welding Material Recommendation

Process	Welding Material	Tungsten Diameter	Metal Thickness	
			110V	220V
DC TIG	Carbon steel, stainless steel, copper, titanium alloy, etc.	.040", 1/16",	1/64"~1/8"mm	1/64"~15/64"mm
DC Pulse TIG				

Settings Chart									
Material	Material Thickness	Amps	Tungsten Color	Tungsten Dia.	Filler Metal	Filler Metal Diameter	Ceramic Nozzle size	Gas Flow	Gas Flow Rate(SCFH)
Mild Steel	1/16"	55~90	Grey, Orange, Red, White	1/16"	ER70S-2	1/16"	#4	2	11-12
Mild Steel	1/32"	90~120	Grey, Orange, Red, White	1/16"	ER70S-2	1/16"	#4-5	2	11-12
Mild Steel	1/8"	95~135	Grey, Orange, Red, White	1/16"~ 3/32"	ER70S-2	3/32"	#5-6	10	11-12
Mild Steel	3/16"	140~165+	Grey, Orange, Red, White	3/32"	ER70S-2	1/8"	#6-7	10	13-14
Stainless Steel	1/16"	50~80	Grey, Orange, Red, White	1/16"	ER70S-2	1/16"	#4	2	11-12
Stainless Steel	1/32"	80~110	Grey, Orange, Red, White	1/16"	ER70S-2	1/16"	#4-5	2	11-12
Stainless Steel	1/8"	85~120	Grey, Orange, Red, White	1/16"~ 3/32"	ER70S-2	3/32"	#5-6	10	11-12
Stainless Steel	3/16"	125~165+	Grey, Orange, Red, White	3/32"	ER70S-2	1/8"	#6-7	10	13-14

DC TIG Welding



I2: The current rise process from I1 to I3

I4: The current decrease process from I3 to I5

DC TIG Current Change Waveform

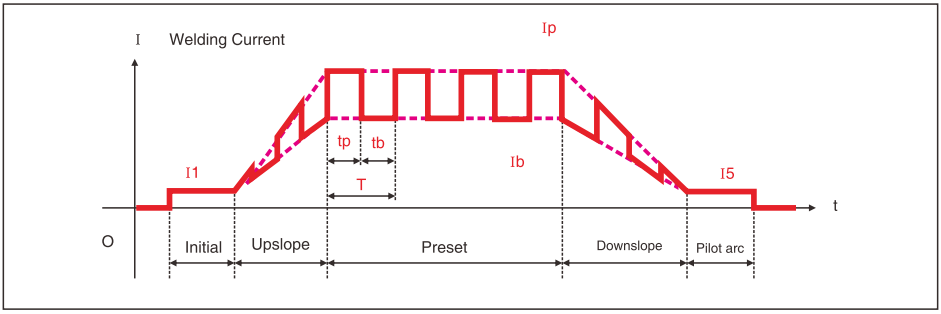
- **Current (I3):** This parameter can be set according to users' own technical requirements.
- **Initial Current (I1):** It is the current when the arc is ignited by pushing the torch trigger, and it should be set according to users' own technical requirements. If the initial current is high enough, the arc is easier to be ignited. However, it should not be too high when welding a thin plate, so as to avoid burning through the workpiece during arc ignition. In some operation modes, the current does not rise but stays at the initial current value to preheat the workpiece or illuminate it.
- **Crater Current (I5):** In some operation modes, the arc does not stop after the current downslope but stays in the pilot arc state. The working current in this state is called pilot arc current, and it should be set according to users' technical requirements.
- **Pre-flow Time:** It indicates the time from the torch trigger being pushed to the arc being ignited in non-contact mode. Commonly it should be longer than 0.5s to make sure that the gas has been delivered to the welding torch in normal flow before arc ignition. The pre-flow time should be increased if the gas hose is long.
- **Post-flow Time:** It indicates the time from the welding current being cut off to the gas valve inside the machine being closed. If it is too long, it will lead to a waste of argon gas; if it is too short, it will result in the oxidation of weld bead. Post-flow time should be longer for sensitive materials.
- **Upslope Time (tr):** It indicates the time spent on current rising from 0 to the preset value, and it should be set according to users' technical requirements.
- **Downslope Time (td):** It indicates the time spent on current dropping from the preset value to 0, and it should be set according to users' technical requirements.

DC TIG Parameters

Process	Parameter	Description	220V	110V	Default
DC TIG	PRE GAS	Pre-flow	0.1~3s	0.1~3s	0.3s
	Istart	Initial Current	5~230A	5~110A	15A
	SLOPE UP	UpSlope Time	0~10s	0~10s	0s
	I1	Peak Current	5-230A	5~110A	50A
	SLOPE DOWN	Downslope Time	0~10s	0~10s	0s
	Istop	Crater Current	5~230A	5~110A	15A
	POST GAS	Post-flow	0.5~20s	0.5~20s	2s

The actual parameter can be flexibly selected according to actual workpiece thickness and technology.

Pulse TIG Welding



DC Pulse TIG Current Change Waveform

In pulse TIG mode, all DC TIG parameters except current (I3), could check the description above DC TIG Welding. There are 4 different adjustable parameters in this process. Describe them as below.

- **Peak Current (Ip):** It should be adjusted according to users' technical requirements.
- **Background Current (Ib):** It should be adjusted according to users' technical requirements.
- **Pulsed Frequency (1/T):** T=Tp+Tb. It should be adjusted according to users' technical requirements.
- **Pulse Duration Ratio (Pulse Width (100%*Tp/T):** The percentage peak current time holding in pulse period. It should be adjusted according to users' technical requirements.

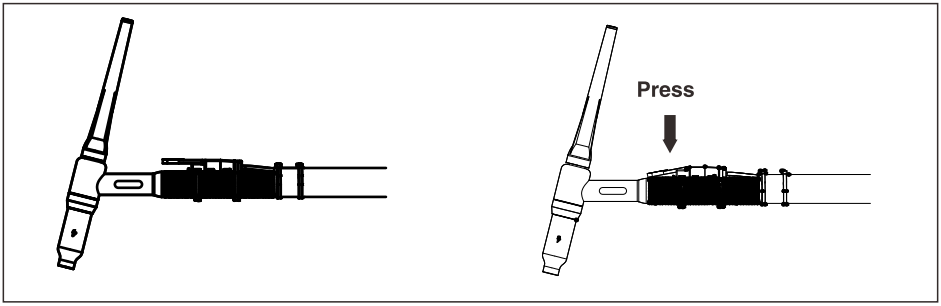
DC Pulse TIG Parameters

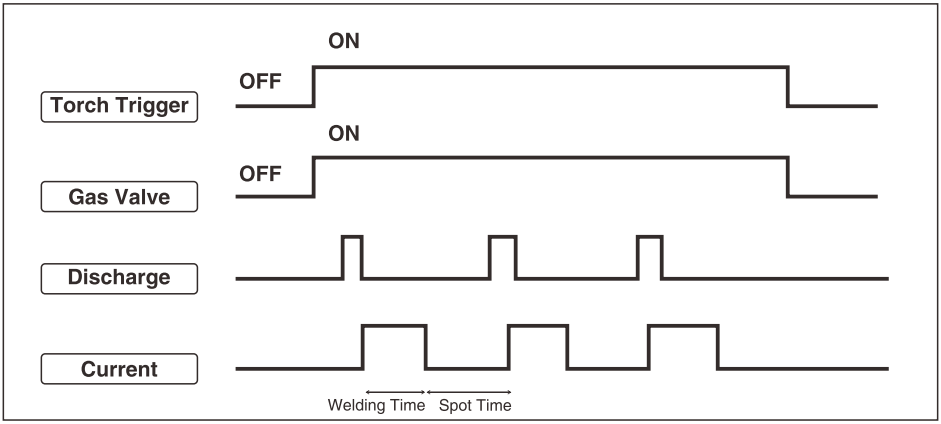
Process	Parameter	Description	220V	110V	Default
DC Pulse TIG	PRE GAS	Pre-flow	0.1~3s	0.1~3s	0.3s
	Istart	Initial Current	5~230A	5~110A	15A
	SLOPE UP	UpSlope Time	0~10s	0~10s	0s
	I1	Peak Current	5-230A	5~110A	50A
	I2	Background Current	I1*10%-I1 A	I1*10%-I1 A	50A
	PULSE(Hz)	Pulse Frequency	0.1-500Hz	0.2-500Hz	0.5Hz
	DUTY CYCLE (I1:I2)	Pulse Width	10%-90%	10%-90%	30%
	SLOPE DOWN	Downslope Time	0-10s	0-10s	0s
	Istop	Crater Current	5-230A	5-110A	15A
	POST GAS	Post-flow	0.1-20s	0.1-20s	2s

Spot TIG Welding

It is primarily the duration of the spot welding action that is defined - three seconds, for instance. Just pressing the torch trigger once is therefore sufficient for the arc to ignite on its own, burn, and extinguish automatically once the defined time has elapsed.

Operation:
Trigger the torch switch to start spot welding, release the trigger to stop spot welding.



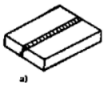
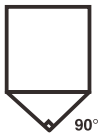
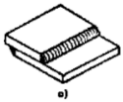


Welding Parameters

Parameter	110V	220V
PRE GAS	0.1~3s	0.1~3s
Current	5~230A	5~110A
SLOPE UP	0~10s	0~10s
POST GAS	0.5~20s	0.5~20s
Welding Time	1~500(MS)	1~500(MS)
Stop Time	OFF, 500~990(MS)	OFF, 500~990(MS)

In this mode, set spot welding time and welding current, press the trigger to release the pulse current to realize continuous and repeated arc starting, and finish the welding by releasing the trigger within the set spot welding time. The pulse frequency is determined by the welding interval spot time.

Spot TIG Welding Parameter Recommendation

Welding Joints		Thickness	Current	Welding Time	Recommendation	Gas Flow	Tungsten Dia.	Tungsten Tip Shapes
Butt Joint		0.5mm 0.023"	80-240A	2-20ms	160A 4ms	2l/min 0.119cfm	2.4mm 3/32"	 90°
		1.0mm .040"	60-240A	4-20ms	160A 8ms			
Corner Joint		0.5mm 0.023"	120-220A	4-10ms	160A 8ms	2l/min 0.119cfm	1.6mm 1/16" 2.4mm 3/32"	 45°
		1.0mm .040"	180-220A	5-20ms	220A 5ms			
Over Lap		0.5mm 0.023"	100-180A	2-10ms	120A 8ms	1l/min 0.119cfm	1.6mm 1/16"	 30°
		1.0mm .040"	120-240A	5-20ms	200A 10ms			

Cautions

1. Above parameter chart is for reference only, welders could fine-tune parameters according to actual application.
2. Use Spot-Arc welding frequently, and the arc length should be less than .040".
3. Set the welding interval according to the user's welding speed and proficiency, recommended to use 0.5~0.8s.
4. When the arc diverges or the arc sound becomes louder in the welding, polish the tungsten point.
5. Wear a special cold spot welding auto-darkening helmet. The common auto-darkening helmet is difficult to see the molten pool and will damage eyes.

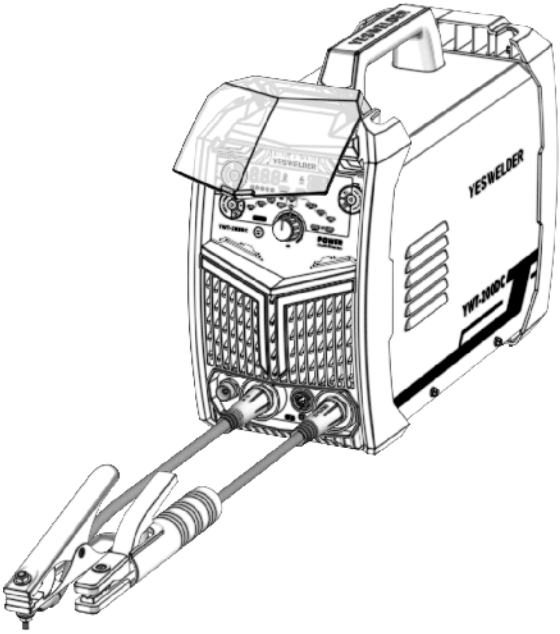
Set Up for Stick Welding (SMAW)

- Remove all the connection from the Positive (+) or Negative (-) Output Receptacle (Remove the TIG torch at the same time.).
- Check the electrode packaging to determine the recommended polarity and connect the electrode stringer and work clamp to the Positive (+) or Negative (-) Output Receptacle accordingly.
- Place the electrode into the electrode holder firmly.
- Ensure the work clamp has a good contact with the workpiece on a clean, bare metal surface free of rust, paint, or coating.
- Attach the work clamp to the workpiece that needs welding.

Note: For Stick welding, DCEP means the electrode holder is connected to the positive socket while the work clamp (workpiece) is connected to the negative socket.
However, various electrodes require a different polarity for optimum results. Please follow the electrode manufacturer's recommendation on the correct polarity.

Electrode	Polarity	Usage
E7018, E6011, E6013	DCEP	This electrode is best for use with clean, bare steel and is suitable for moderate penetration.

• Turn the power source on and select the Stick function with Process Selection Button on the front panel.
• Set the amperage with the Value Adjusting Knob.
• Strike the electrode against the workpiece to create an arc and hold the electrode steady to maintain the arc.
• Hold the electrode slightly above the work, maintaining the arc while traveling at an even speed.
• Break the arc by quickly snapping the electrode away from the workpiece to finish the weld.
• Wait to let the workpiece cool and chip away the slag carefully to reveal the below welding metal.



Welding Current Guide

Choosing the correct current for a particular welding job is critical. If the welding current is too low, the user will experience difficulty in striking and maintaining a stable arc. The electrode tends to stick to the workpiece, penetration is poor, and the weld ends up with a rounded profile. If the current is too high, the problems include burning through the base metal, undercut, and excessive spatters. The standard welding current for a particular job should be the maximum that won't burn through the base metal, overheat electrode, or leave spatters sticking to the workpiece surface.

The table shows current ranges generally recommended for a general purpose type E6013 electrode.

Electrode Size ø mm/Inch	Current Range (Amps)
1/16" (1.6mm)	20A~40A
5/64" (2.0mm)	30A~60A
3/32" (2.4mm)	55A~100A
1/8" (3.2mm)	90A~150A
5/32" (4.0mm)	110A~200A
3/16" (4.8mm)	140A~260A

Stick Welding Recommendation

Stick Welding		110V		220V	
Material	Electrode Type	Electrode Dia	Welding Thickness	Electrode Dia	Welding Thickness
Carbon Steel, Stainless Steel	E7018	1/16"~3/32"	.040"~1/8"	1/16" - 5/32"	.040" - 3/8"

Adjustable Arc Force:

Arc force is a momentarily increase of the welding current during welding when the machine senses the drop of the arc voltage caused by a short arc length when the output voltage is too low. Arc force compensates for the voltage drop by increasing the amperage. Increased amperage ensures that the heat stays the same and that the electrode will not dip into the base metal. This function dramatically helps stabilize the arc, prevent the arc from cutting out during the welding process, and prevent the electrode from sticking to the workpiece.

Arc force should be set according to the electrode diameter, preset current and the technical requirement. If the arc force is big, the molten drop can be transferred quickly, and electrode sticking seldom occurs. However, too high of an arc force may lead to excessive spatter. If the arc force is small, there will be little spatter, and the weld bead will be shaped well. However, too low arc force may lead to soft arc and electrode sticking. Therefore, the arc force should be increased when welding with thick electrode under low current.

In general welding operation, the user can set the arc force between 0-100%. For example, when the preset current is 50A, and the arc force is 50%, the actual welding current will be 75A. However, when the current increases to the maximum allowable value of 230A@220V,110A@110V, the welding current won't increase anymore.

Adjustable Hot Start

Hot start is a feature that pumps up the amperage for a short time when you start the arc. Higher amperage helps to start the arc easier without sticking the electrode to the base metal. A hot start helps warm the base metal to achieve deep penetration at the weld start.

The hot start is essential, especially in working conditions such as damp electrodes, imperfect job surfaces, or when using 'difficult to run' electrodes, etc. Set the hot start amp with a range of 0 to 100%. One example, if the preset current is 50A and the hot start amp is set at 10, the hot start current will be 55A. The current will return to 50A after the arc establishes successfully.

CAUTION

Working Environment

• Welding should be carried out in a dry environment with humidity of 90% or less.
• The working environment temperature should be between -10°C and 40°C.
• Avoid welding in the open air unless sheltered from sunlight and rain. Keep the welder dry.
• Avoid welding in a dusty area or environment with corrosive chemical gas.
• Gas shielded arc welding should be operated in an environment without strong airflow.

Safety Tips

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

1) Ventilation
This is an industrial welding machine and can create a 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 the allowable duty circle (refer to the corresponding duty cycle). Make sure that the welding current does not exceed the max load current. An 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. If the input voltage exceeds the stipulated value, it would possibly damage the components of the machine. The operator should take according measures in this case.

4) Reliable ground connection. There is an ground screw (with ground remark) in the rear part of each machine. Connect it with an earth cable (section ≥ 6mm2) to avoid the static and electric shock.

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

BASIC KNOWLEDGE OF WELDING

Basic Knowledge of Stick

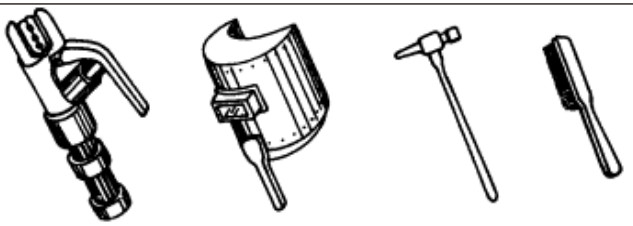
Shielded Metal Arc Welding (SMAW/Stick). is arc welding by manually operating electrodes. Stick requires simple equipment and is a convenient, flexible, and adaptive welding processing type. Stick welding is applied to various metal materials with thicknesses of more than 3/32". It's suitable for various material structures, particularly for workpieces with complex structures and shapes, short weld joints or bending shapes, as well as weld joints in various spatial locations.

Welding Process of Stick

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, the 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 welding crater under the high-temperature arc. The weld crater is quickly cooled and condensed to form a weld joint that can firmly integrally connect two separate pieces of the workpiece. The coating of the electrode is fused to produce slag to cover the weld crater. The cooled slag can form a slag crust to protect the weld joint. The slag crust is removed at last, and the joint welding is finished.

Tools for Stick

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



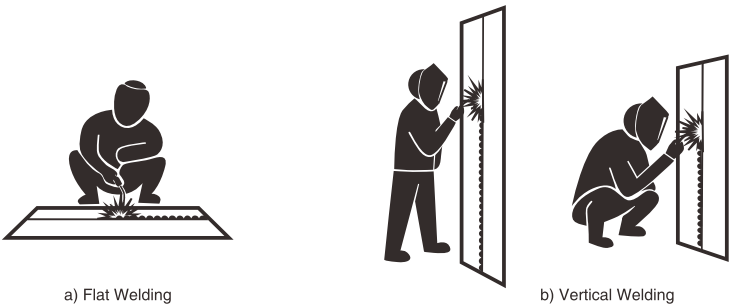
a) Electrode Holder b) Welding Mask c) Slag Hammer d) Wire Brush

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 injury due to arc and spatter, including hand holding type and helmet type. Colored chemical glass is installed on the viewing window of the mask to filter ultraviolet rays and infrared rays. 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 the 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 the 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. The electrode holder and welding machine are connected via a cable, and this cable is named as welding cable (live wire). The welding machine and workpiece are connected via another cable (earth wire). The electrode holder is covered with insulating material performing insulation and heat insulating.

Basic Operation of Stick

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 the weld joint. A wire brush can be used for conditions with low requirements for dust removal; a grinding wheel can be used for conditions with high requirements for dust removal.

2) Posture in operating
Take flat welding of butt joint and T-shaped joint from left to right as an example. The operator should stand on the right side of the working direction of the weld joint with a mask in the left hand and an 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.

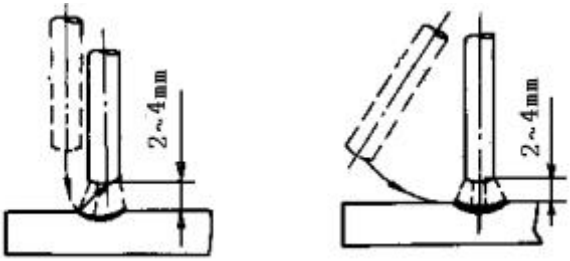


a) Flat Welding

b) Vertical Welding

3) Arc Igniting

Arc igniting is the process of producing a stable arc between electrode and workpiece in order to heat them to implement welding. Common arc ignition mode includes scraping mode and striking mode. During welding, touch the surface of the workpiece with the end of the electrode by scraping or light striking to form a short circuit, and then quickly lift the electrode 2~4mm away to ignite the 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

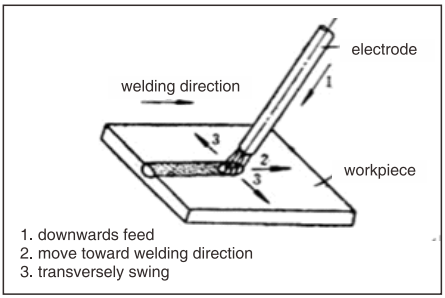
4) Tack Weld

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 tack weld.

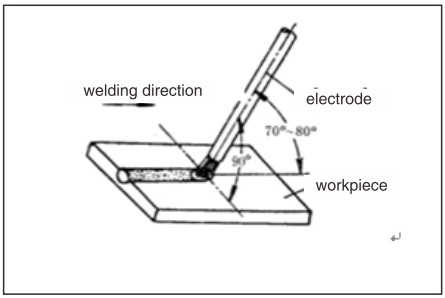
5) Electrode Manipulation

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. Electrode should be correctly manipulated in three movement directions after the 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 70～80º forwards.
(2) Arc length: the proper arc length is equal to the diameter of the 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, the current should be proper, the electrode should be aligned, the arc should be low, and the welding speed should not be too high and should be kept uniform during the whole welding process.

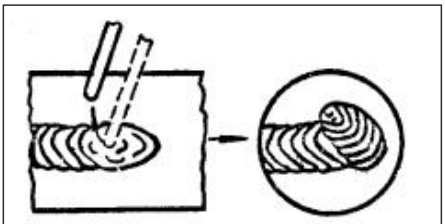


1. downwards feed
2. move toward welding direction
3. transversely swing

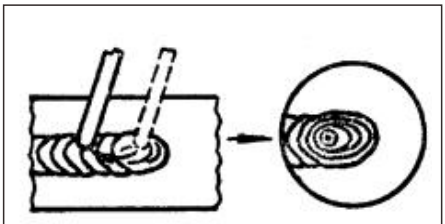


6) Arc Extinguishing

Arc extinguishing is unavoidable during welding. Poor arc extinguishing may bring shallow weld craters 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 the 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 Fig.



a) Arc Extinguishing at the Outside of Weld Bead



b) Arc Extinguishing on the Weld Bead

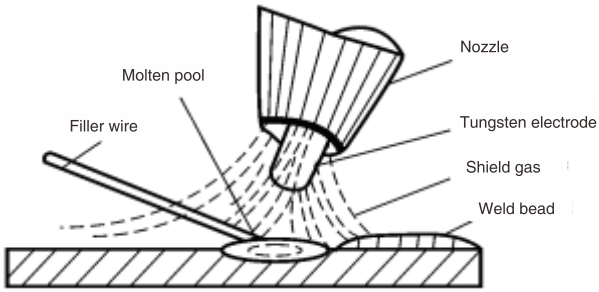
7) Weldment Cleaning

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

GTAW (TIG) with Argon

General Description of GTAW (TIG) with Argon

GTAW (TIG) with Argon is a kind of gas shielded arc welding using argon as shield gas, and the process of GTAW (TIG) with Argon is shown in Fig. 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 are molten by the heat generated from the arc. After the liquid molten pool cools down, a weld bead is formed.



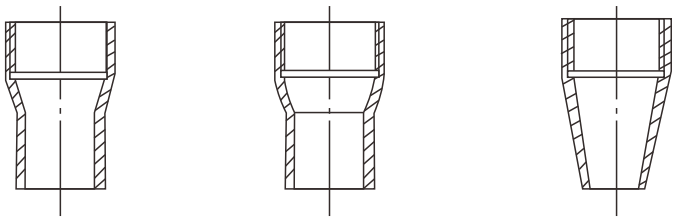
Since argon is a kind of inert gas and it does not react with metals, the alloying elements in the weld metal will not be burned out and the metal molten pool can be fully protected from oxidation. Besides, because argon is insoluble in liquid metal at high temperatures, air holes can be avoided in the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

Characteristics of GTAW (TIG) with Argon

Compared with other arc welding methods, GTAW (TIG) with Argon. has the following features.
1. Argon has excellent protective properties, so corresponding flux is not needed when welding. It is basically a simple process of metal melting and solidification producing high quality, pure weld beads.
2. Due to the ionization potential of the Argon flow, the heat of the arc is concentrated into a high temperature narrow arc. Therefore, the heat-affected zone is very narrow, and there is little welding deformation stress and crack tendency. Thus, GTAW (TIG) with Argon is especially suitable for thin plate welding.
3. GTAW (TIG) with Argon is a kind of open flame welding and is easy to operate and observe, so the mechanization and automation of the welding process can be achieved easily. Besides, welding at various spatial locations can be carried out under certain conditions.
4. GTAW (TIG) with Argon can be applied to welding a wide range of welding materials. Almost all metal materials can be welded by GTAW (TIG) with Argon, 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, refractory steel, etc.
With the increase in popularity and availability 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, GTAW (TIG) with Argon is being more and more widely used due to its remarkable characteristics above.

Gas Tungsten Arc Welding (GTAW)

a) Welding Torch
The function of the welding torch for GTAW is to clamp the electrode, conduct current, and carry argon flow. For manual welding, the 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 torches, the maximum welding current is 100A. And the welding current can reach up to 400~600A for a 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. Cylindrical nozzle with a 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 the 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” with “better, especially in corners and hard to access joint”, so it is also commonly used in welding.



(1) Cylindrical nozzle with cone-shaped end

(2) Cylindrical nozzle with spherical end

(3) Coniform nozzle

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 GTAW (TIG) with Argon 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, mechanical cleaning is done by removing the metal oxide by grinding with a grinding stone or small-diameter stainless steel wire brush or scraping with a metal scraper to expose the bare metal, and then cleaning the weld joint with an organic solvent to eliminated residual contaminations of oils, grease, grinding debris, etc.

B. Chemical cleaning: Chemical cleaning is commonly used for cleaning the filler metal 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 the 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

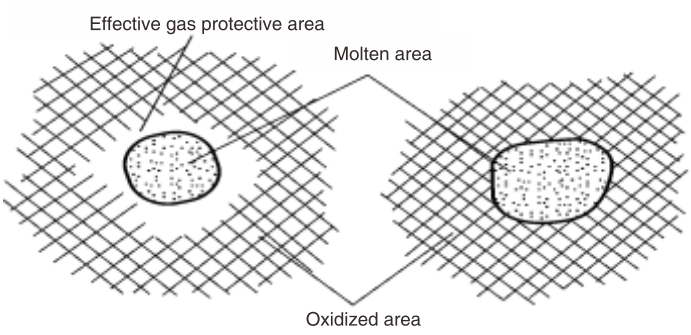
Argon is ideal protective gas. The boiling point of argon is -186°C, which is between that of helium and oxygen. Argon is a product extracted from by the fractional distillation of liquefied air. Bottled argon is used for welding in our country. The filling pressure is 15MPa under room temperature, and the cylinder will be marked with the abbreviation “Ar”. The chemical composition requirements of pure argon are: $Ar \geq 99.99\%$; $He \leq 0.01\%$; $O_2 \leq 0.0015\%$; $H_2 \leq 0.0005\%$; $C \leq 0.001\%$; $H_2O \leq 30mg/m3$.

Since Argon is heavier than air, the welding arc can be better protected 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 porosity 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 as easily dissipated. 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, the 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 by avoiding interference caused by environmental air flow such as fans or wind. 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.



(a) Good protective effect (b) Poor protective effect

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.

Welding Process Parameters

The gas protective effect, welding stability, and weld bead quality of GTAW have a 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, the 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 electrodes with proper diameter mainly according to the thickness of the workpiece. Besides, when the thickness of the 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 the 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)
.040" (1.0m)	15~75	–
1/16" (1.6m)	55~120	10~20
3/32" (2.4m)	80~200	15~30
1/8" (3.2m)	160~250	25~40
5/32" (4.0m)	220~350	40~55

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 6.36 ~42.38CFH.

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 the appropriate welding speed.

F. Process factors mainly refer to the shape and diameter of the nozzle, the distance between the nozzle and workpiece, stick-out and the diameter of filling wire, etc. Although the change in these factors is not big, it has 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 the workpiece.

General Requirements for GTAW (TIG) with Argon

1. The control of gas: Pre-flow and post-flow are required in GTAW (TIG) with Argon. Argon is a kind of inert gas that can be broken down easily. Fill the space between the workpiece and the tungsten electrode with argon firstly, and then the arc can be easier to ignite. Keep the gas flowing after welding ends, and the workpiece will not cool down too quickly. Thus, the oxidization of the workpiece can be avoided, and a 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 GTAW (TIG) with Argon machine adopts high voltage arc ignition mode. It is required that there should be high voltage when igniting the arc and there should be no high voltage after the arc is successfully ignited.

4. Protection from interference: The high voltage for arc ignition in GTAW (TIG) with Argon is accompanied by high frequency, which produces serious interference to the machine circuit. Thus, good anti-interference ability is required for the circuit.

The workpiece is not cut fully. This may be caused by:

The cutting current is too low.
The cutting speed is too high.
The electrode and nozzle of the torch are burned. The workpiece is too thick.

Molten slag drops from the bottom of workpiece. This may be caused by:

The cutting speed is too low.
The electrode and nozzle of the torch are burned.
The cutting current is too high.

Replacement of Electrode and Nozzle

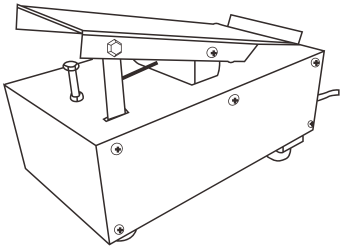
When the phenomena below occur, the electrode and nozzle should be replaced. Otherwise, there will be strong arc in the nozzle, which will break down the electrode and the nozzle, or even burn the torch. Nozzles of different models are different, so ensure the nozzle is of the same model when replacing it.

1) Electrode wear > 1.5mm
2) Distortion of the nozzle
3) Cutting speed declining, arc with green flame
4) Difficult in arc ignition
5) Irregular cut

OPTIONAL ACCESS OPERATION DESCRIPTION

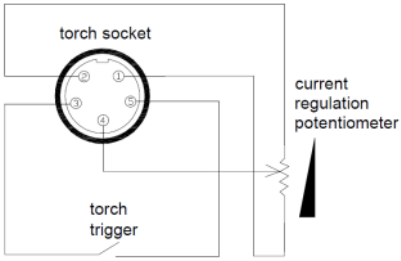
Foot Pedal Operation Operation

Pedal remoter control internal structure is composed by inching switch and sliding potentiometer (10K), as shown in below.



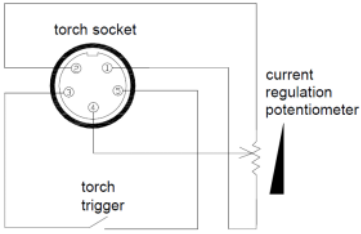
The pedal controlling function is only used while it's set to TIG mode.

• Connect the foot pedal controller to the welder front panel pedal controller interface through dedicated cable.



• When the foot pedal is connected, the welding machine will automatically enter foot pedal mode. In this mode, the displayed amperage will be the maximum amperage setting with the foot pedal completely depressed.
• Depress the foot pedal controller to start the arc ignition. A high frequency current will allow the current to jump the gap between the electrode and the base metal allowing for a non-contact arc start. This is the preferred method to start the arc. Welding current can then be adjusted with the foot pedal. Press the pedal harder to increase current, let off the pedal to decrease the current. The machines preset current will become the maximum current with the foot pedal fully depressed.

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



Analog Regulation Type Torch Socket Interface

• **The torch switch needs connecting when using analog regulation torch function.** Preset the max welding current through front panel and start welding. The welding current can be adjusted through torch potentiometer. The allowable max current is the preset peak current value. The display will show the real-time welding current in the welding process.

MAINTENANCE

GENERAL MAINTENANCE

This welder has been engineered to need minimal service providing that a few very simple steps are taken to properly maintain it.

1. Replace INPUT POWER CABLE, ground cable, work clamp, or gun assembly when damaged or worn.

2. Avoid directing grinding particles towards the welder. These conductive particles can build up inside the machine and cause severe damage.

3. Periodically clean dust, dirt, grease, etc. from your welder. Every six months or as necessary, remove the side panels from the welder and use compressed air to blow out any dust and dirt that may have accumulated inside the welder.

4. Check all cables periodically. They must be in good condition and not cracked.

WARNING: ELECTRIC SHOCK CAN KILL! Be aware that the ON/OFF SWITCH, when OFF, does not remove power from all internal circuitry in the welder. To reduce the risk of electric shock, always unplug the welder from its AC power source and wait several minutes for electrical energy to discharge before removing side panels.

Observe all Safety Guidelines detailed throughout this manual			
Error Code	**Description**	**Possible Cause**	**Course of Action**
E01	Overheating	This error message indicates the fan is not operating properly. This prevents over temperature damage	Turn off the machine, check the Fan and Clear the dust
		Exceeded duty cycle; thermal protector engaged	Allow welder to cool at least 10 minutes with machine ON (observe and maintain proper duty cycle). FAULT/THERMAL OVERLOAD INDICATOR LED should turn off after the machine has cooled
E02	Input voltage too high	Input voltage is higher than 140VAC or spikes above 140VAC during load @110V	Check the input voltage with and without a load applied
		Input voltage is higher than 290VAC or spikes above 290VAC during load @220V	
E03	Machine internal failure	Voltage recognition error, resulting in misoperation of relay	Check input voltage ,Turn off the machine, wait one minute and then turn the machine on
E04	Output Abnormal	Unable to detect open circuit voltage	Check output signal cable or MUR and transformer
E05	Input voltage too low	Input voltage is less than 80VAC, or drops below 80 VAC under load	Check the input voltage with and without a load applied
		Input voltage is less than 170 VAC, or drops below 170VAC under load	
E06	Temperature controller failure	The thermostat is not inserted or the thermostat is damaged	Turn off the machine, wait one minute and then turn the machine on
E07	Machine internal failure	Actual output current do not match preset current	Turn off the machine, wait one minute and then turn the machine on
E08	Machine internal failure	Software exception, welder is locked	Turn off the machine, wait one minute and then turn the machine on
E09	Over-current	Exceeds rated current of IGBT	Turn off the machine, wait one minute and then turn the machine on

HOW TO USE TROUBLESHOOTING GUIDE

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled “PROBLEM (SYMPTOMS)”. This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.
The second column labeled “POSSIBLE CAUSE” lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION
This column provides a course of action for the possible cause, If you do not understand or are unable to perform the Recommended Course of Action safely, contact YESWELDER support@yeswelder.com.

TROUBLESHOOTING

TIG WELDING ISSUES

PROBLEM	POSSIBLE CAUSE	COURSE OF ACTION
Poor starting.	Poor work clamp connection.	Check and secure work connection.
	Start current is too low.	Increase Start current.
Black area along weld bead.	Oily or organic contamination on work	Clean work piece.
	Tungsten electrode may be contaminated.	Grind to clean electrode.
	Leaks in gas line or torch connection.	Check connection.
	Gas tank is near empty.	Replace the gas tank.
Unstable Arc.	Contaminated base metal.	Remove materials like paint, grease, oil, and dirt, including mill scale from base metal.
	Tungsten is contaminated.	Remove 3/8" - 1/2" of contaminated tungsten and re-grind the tungsten.
	Arc length too long.	Lower the torch so the arc length (tungsten to work distance) is approximately 1 to 1.5 times the diameter of the tungsten being used.
Arc wanders.	Tungsten incorrect or in poor condition.	Check that correct type of tungsten is being used. Remove tungsten 3/4" from the weld end and re-sharpen the tungsten.
	Insufficient gas shielding.	Check and set the gas flow between 20-30cfh flow rate.
	Contaminated gas or leaks in gas line, torch, or connections.	Check gas line & connections.
	Poorly prepared tungsten.	Recommend tungsten grind angles range from 15 to 60 degrees based on the type of metal, joint design and penetration you desire. Standard is 30 degrees.
	Contaminated base metal.	Remove contaminating materials like paint, grease, oil, and dirt, including mill scale from base metal.
	Contaminated/Incorrect filler.	Check the filler wire and remove all grease, oil, or moisture from filler metal.

TROUBLESHOOTING

TIG WELDING ISSUES

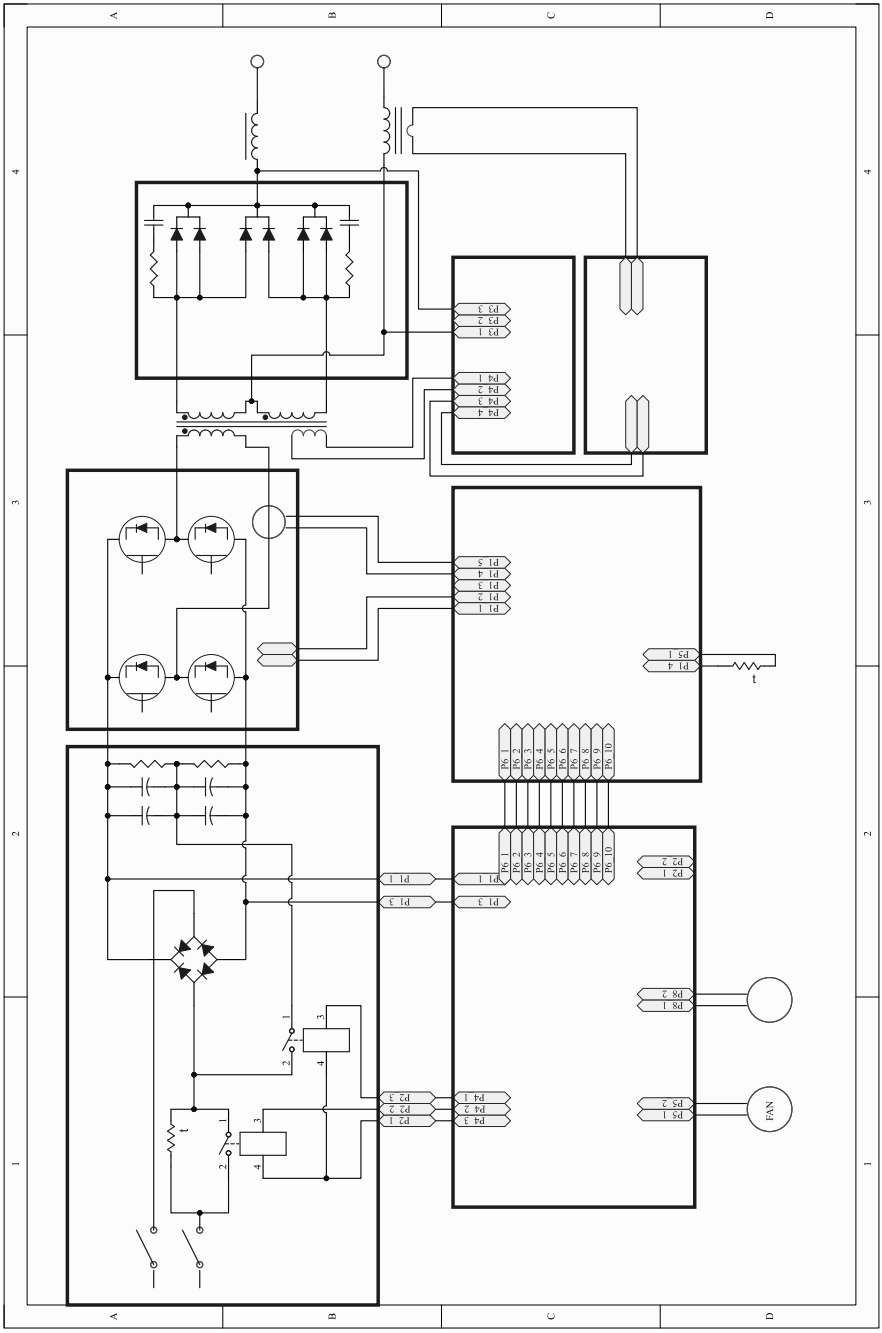
PROBLEM	POSSIBLE CAUSE	COURSE OF ACTION
HF TIG doesn't initiate an arc:	No gas, incorrect gas flow.	Check the gas is connected and cylinder valve open, check hoses, gas valve and torch are not restricted. Set the gas flow between 20-30 cfh flow rate.
	Poor work clamp connection.	Check & secure work clamp.
	Contaninated Tungsten.	Grind to ctean Tungsten.
	Loose connection.	Check all connectors and tighten.
	Earth clamp not connected to work.	Connect the work clamp directly to the work piece wherever possible.
Tungsten burning away quickly.	Incorrect Gas/Inadequate gas flow.	Check the gas cylinder contains pure Argon gas and is connected and the torch gas valve is open. Set the gas flow between 20-30cfh flow rate.
	Back cap not fitted correctly.	Make sure the torch back cap is fitted so that the o-ring is inside the torch body.
	Incorrect tungsten being used.	Check and change the tungsten type if necessary.
Contaminated tungsten.	Touching tungsten into the weld pool.	Keep tungsten from contacting weld puddle. Raise the torch so that the tungsten is off of the work piece 1/8-1/4.
	Touching the filler wire to the tungsten.	Keep the filler wire from touching the tungsten during welding, feed the filler wire into the leading edge of the weld pool in front of the tungsten.
	Tungsten melting into the weld pool.	Check that correct type of tungsten is being used. Too much current for the tungsten size so reduce the amps or change to a larger tungsten.

TROUBLESHOOTING

STICK WELDING ISSUES

PROBLEM	POSSIBLE CAUSE	COURSE OF ACTION
Poor starting.	Poor work clamp connection.	Check and secure work connection
Stick electrode “blasts off” when arc is struck.	Current may be set too high for electrode size.	Adjust current.
Electrode "stick" in weld puddle.	Current may be set too low for electrode size.	Adjust current.
Porosity – small cavities or holes resulting from gas pockets in weld metal.	Arc length too long.	Reduce arc length.
	Damp electrode.	Use dry electrode.
	Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.
Excessive Spatter – scattering of molten metal particles that cool to solid form near weld bead.	Amperage too high for electrode.	Decrease amperage or select larger electrode.
	Arc length too long or voltage too high.	Reduce arc length or voltage.
Incomplete Fusion – failure of weld metal to fuse completely with base metal or a preceeding weld bead.	Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
	Improper welding technique.	Place stringer bead in proper location at joint during welding.
		Ensure you are maintaining the proper electrode angles throughout the entire weld.
		Momentarily hold arc on groove side walls when using weaving technique.
		Keep arc on leading edge of weld puddle.
	Workpiece dirty.	Remove all grease, oil, moisture, rust, paint, coatings, slag, and dirt from work surface before welding.
Lack Of Penetration – shallow fusion between weld metal and base metal.	Improper joint preparation.	Material too thick. Joint preparation and design must provide access to bottom of groove.
	Improper weld technique.	Keep arc on leading edge of weld puddle.
	Insufficient heat input.	Increase amperage. Select larger electrode and increase amperage.
		Reduce travel speed.
Burn Through– weld metal melting completely through base metal resulting in holes where no metal remains.	Excessive heat input.	Select lower amperage. Use smaller electrode.
		Increase or maintain steady travel speed.

WIRING DIAGRAM



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