

EVERLAST

POWERTIG 250/315 EXT



Operator's Manual for the PowerTig 250/315 EXT

Safety, Setup and General Use Guide

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Dear Customer,

THANKS! You had a choice, and you bought an Everlast. We appreciate you as a customer and hope that you will enjoy years of use from your welder.

Please go directly to the Everlast website to register your unit and receive your warranty information. Your unit registration is important should any information such as product updates or recalls be issued. It is also important so that we may track your satisfaction with Everlast products and services. If you are unable to register by website, contact Everlast directly through the sales department through the main customer service number in your country. Your unit will be registered and warranty will be issued and in full effect. Keep all information regarding your purchase. **In the event of a problem you must contact technical support before your welder can be a candidate for warranty service and returned.**

Please review the current online warranty statement and information found on the website of the Everlast division located in or nearest to your country. Print it for your records and become familiar of its terms and conditions.

Everlast offers full technical support, in several different forms. We have online support available through email, and a welding support forum designed for customers and noncustomer interaction. Technical advisors are active on the forum daily. We also divide our support into two divisions: technical and welding performance. Should you have an issue or question concerning your unit, please contact performance/technical support available through the main company headquarters available in your country. For best service call the appropriate support line and follow up with an email, particularly if off hours, or you cannot reach a live person. In the event you do not reach a live person, particularly during heavy call volume times, holidays, and off hours, leave a message and your call will normally be returned within 24 hours. Also for quick answers to your basic questions, join the company owned forum available through the website. You'll find knowledgeable, helpful people and staff available to answer your questions, and perhaps find a topic that already addresses your question at <http://www.everlastgenerators.com/forums/>.

Should you need to call or write, always know your model name, purchase date and welder manufacturing inspection date. This will assure quick and accurate customer service. **REMEMBER: Be as specific and informed as possible. Technical and performance advisors rely upon you to carefully describe the conditions and circumstances of your problem or question. Take notes of any issues as best you can. You may be asked many questions by the advisors to clarify problems or issues that may seem very basic. However, diagnosis procedures MUST be followed to begin the warranty process. Advisors can't assume anything, even with experienced users, and must cover all aspects to properly diagnose the problem. Depending upon your issue, it is advisable to have basic tools handy such as screwdrivers, wrenches, pliers, and even an inexpensive test meter with volt/ohm functions before you call.**

Let us know how we may be of service to you should you have any questions.

Sincerely,

Everlast Customer Service

Serial number: _____

Model number: _____

Date of Purchase _____

EVERLAST

Contact Information

Everlast US:

Everlast consumer satisfaction email: sales@everlastwelders.com

Everlast Website: everlastwelders.com

Everlast Technical Support: support@everlastwelders.com

Everlast Support Forum: <http://www.everlastgenerators.com/forums/index.php>

Main toll free number: 1-877-755 WELD (9353) 9am—5pm PST M-F
11am-4pm PST Sat.

FAX: 1-650-588-8817

Everlast Canada:

Everlast consumer satisfaction email: sales@everlastwelders.ca

Everlast Website: everlastwelders.ca

Everlast Technical Support: sales@everlastwelders.ca

Telephone: 905-630-8246 9am-4:30pm EST M-F
10am-1pm EST Sat.

FAX: 1-905-639-2817

Everlast Australia:

Sydney: 5A Karloo Parade Newport NSW 2106

(02) 9999 2949

Port Macquarie: 2B Pandorea Place Port Macquarie

(02) 6584 2037

After hours support: 0410 661 334

Everlast Technical Support: support@pickproducts.com

SAFETY PRECAUTIONS

Everlast is dedicated to providing you with the best possible equipment and service to meet the demanding jobs that you have. We want to go beyond delivering a satisfactory product to you. That is the reason we offer technical support to assist you with your needs should an occasion occur. With proper use and care your product should deliver years of trouble free service.



Safe operation and proper maintenance is your responsibility.

We have compiled this operator's manual, to instruct you in basic safety, operation and maintenance of your Everlast product to give you the best possible experience. Much of welding and cutting is based upon experience and common sense. As thorough as this welding manual may be, it is no substitute for either. Exercise extreme caution and care in all activities related to welding or cutting. Your safety, health and even life depends upon it. While accidents are never planned, preventing an accident requires careful planning.

Please carefully read this manual before you operate your Everlast unit. This manual is not only for the use of the machine, but to assist in obtaining the best performance out of your unit. Do not operate the unit until you have read this manual and you are thoroughly familiar with the safe operation of the unit. If you feel you need more information please contact Everlast Support.

The warranty does not cover improper use, maintenance or consumables. **Do not attempt to alter or defeat any piece or part of your unit, particularly any safety device.** Keep all shields and covers in place during unit operation should an unlikely failure of internal components result in the possible presence of sparks and explosions. If a failure occurs, discontinue further use until malfunctioning parts or accessories have been repaired or replaced by qualified personnel.



Note on High Frequency electromagnetic disturbances:

Certain welding and cutting processes generate High Frequency (HF) waves. These waves may disturb sensitive electronic equipment such as televisions, radios, computers, cell phones, and related equipment. High Frequency may also interfere with fluorescent lights. Consult with an electrician if disturbance is noted. Sometimes, improper wire routing or poor shielding may be the cause.



HF can interfere with pacemakers. See EMF warnings in following safety section for further information. Always consult your physician before entering an area known to have welding or cutting equipment if you have a pacemaker.

SAFETY PRECAUTIONS



These safety precautions are for protection of safety and health. Failure to follow these guidelines may result in serious injury or death. Be careful to read and follow all cautions and warnings. Protect yourself and others.



Welding and cutting processes produce high levels of ultraviolet (UV) radiation that can cause severe skin burn and damage. There are other potential hazards involved with welding such as severe burns and respiratory related illnesses. Therefore observe the following to minimize potential accidents and injury:



Use appropriate safety glasses with wrap around shields while in the work area, even under welding helmets to protect your eyes from flying sparks and debris. When chipping slag or grinding, goggles and face shields may be required.



When welding or cutting, always use an approved shielding device, with the correct shade of filter installed. Always use a welding helmet in good condition. Discard any broken or cracked filters or helmets. Using broken or cracked filters or helmets can cause severe eye injury and burn. Filter shades of no less than shade 5 for cutting and no less than shade 9 for welding are highly recommended. Shades greater than 9 may be required for high amperage welds. Keep filter lenses clean and clear for maximum visibility. It is also advisable to consult with your eye doctor should you wear contacts for corrective vision before you wear them while welding.



Do not allow personnel to watch or observe the welding or cutting operation unless fully protected by a filter screen, protective curtains or equivalent protective equipment. If no protection is available, exclude them from the work area. Even brief exposure to the rays from the welding arc can damage unprotected eyes.



Always wear hearing protection because welding and cutting can be extremely noisy. Ear protection is necessary to prevent hearing loss. Even prolonged low levels of noise has been known to create long term hearing damage. Hearing protection also further protects against hot sparks and debris from entering the ear canal and doing harm.



Always wear personal protective clothing. Flame proof clothing is required at all times. Sparks and hot metal can lodge in pockets, hems and cuffs. Make sure loose clothing is tucked in neatly. Leather aprons and jackets are recommended. Suitable welding jackets and coats may be purchased made from fire proof material from welding supply stores. Discard any burned or frayed clothing. Keep clothing away from oil, grease and flammable liquids.



Leather boots or steel toed leather boots with rubber bottoms are required for adequate foot protection. Canvas, polyester and other man made materials often found in shoes will either burn or melt. Rubber or other non conductive soles are necessary to help protect from electrical shock.



Flame proof and insulated gauntlet gloves are required whether welding or cutting or handling metal. Simple work gloves for the garden or chore work are not sufficient. Gauntlet type welding gloves are available from your local welding supply companies. Never attempt to weld with out gloves. Welding with out gloves can result in serious burns and electrical shock. If your hand or body parts comes into contact with the arc of a plasma cutter or welder, instant and serious burns will occur. **Proper hand protection is required at all times when working with welding or cutting machines!**

SAFETY PRECAUTIONS



WARNING! Persons with pacemakers should not weld, cut or be in the welding area until they consult with their physician. Some pacemakers are sensitive to EMF radiation and could severely malfunction while welding or while being in the vicinity of someone welding. *Serious injury or death may occur!*



Welding and plasma cutting processes generate electro-magnetic fields and radiation. While the effects of EMF radiation are not known, it is suspected that there may be some harm from long term exposure to electromagnetic fields. Therefore, certain precautions should be taken to minimize exposure:

- Lay welding leads and lines neatly away from the body.
- Never coil cables around the body.
- Secure cables with tape if necessary to keep from the body.
- Keep all cables and leads on the same side the body.
- Never stand between cables or leads.
- Keep as far away from the power source (welder) as possible while welding.
- Never stand between the ground clamp and the torch.
- Keep the ground clamp grounded as close to the weld or cut as possible.



Welding and cutting processes pose certain inhalation risks. Be sure to follow any guidelines from your chosen consumable and electrode suppliers regarding possible need for respiratory equipment while welding or cutting. Always weld with adequate ventilation. Never weld in closed rooms or confined spaces. Fumes and gases released while welding or cutting may be poisonous. Take precautions at all times. Any burning of the eyes, nose or throat are signs that you need to increase ventilation.

- Stop immediately and relocate work if necessary until adequate ventilation is obtained.
- Stop work completely and seek medical help if irritation and discomfort persists.



WARNING! Do not weld on galvanized steel, stainless steel, beryllium, titanium, copper, cadmium, lead or zinc without proper respiratory equipment and or ventilation.



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



WARNING! Do not weld or cut around Chlorinated solvents or degreasing areas. Release of Phosgene gas can be deadly. Consider all chemicals to have potential deadly results if welded on or near metal containing residual amounts of chemicals.



Keep all cylinders upright and chained to a wall or appropriate holding pen. Certain regulations regarding high pressure cylinders can be obtained from OSHA or local regulatory agency. Consult also with your welding supply company in your area for further recommendations. The regulatory changes are frequent so keep informed.



All cylinders have a potential explosion hazard. When not in use, keep capped and closed. Store chained so that overturn is not likely. Transporting cylinders incorrectly can lead to an explosion. Do not attempt to adapt regulators to fit cylinders. Do not use faulty regulators. Do not allow cylinders to come into contact with work piece or work. Do not weld or strike arcs on cylinders. Keep cylinders away from direct heat, flame and sparks.

SAFETY PRECAUTIONS



WARNING! Electrical shock can kill. Make sure all electrical equipment is properly grounded. Do not use frayed, cut or otherwise damaged cables and leads. Do not stand, lean or rest on ground clamp. Do not stand in water or damp areas while welding or cutting. Keep work surface dry. Do not use welder or plasma cutter in the rain or in extremely humid conditions. Use dry rubber soled shoes and dry gloves when welding or cutting to insulate against electrical shock. Turn machine on or off only with gloved hand. Keep all parts of the body insulated from work, and work tables. Keep away from direct contact with skin against work. If tight or close quarters necessitates standing or resting on work piece, insulate with dry boards and rubber mats designed to insulate the body from direct contact.



All work cables, leads, and hoses pose trip hazards. Be aware of their location and make sure all personnel in area are advised of their location. Taping or securing cables with appropriate restraints can help reduce trips and falls.



WARNING! Fire and explosions are real risks while welding or cutting. Always keep fire extinguishers close by and additionally a water hose or bucket of sand. Periodically check work area for smoldering embers or smoke. It is a good idea to have someone help watch for possible fires while you are welding. Sparks and hot metal may travel a long distance. They may go into cracks in walls and floors and start a fire that would not be immediately visible. Here are some things you can do to reduce the possibility of fire or explosion:

- Keep all combustible materials including rags and spare clothing away from area.
- Keep all flammable fuels and liquids stored separately from work area.
- Visually inspect work area when job is completed for the slightest traces of smoke or embers.
- If welding or cutting outside, make sure you are in a cleared off area, free from dry tender and debris that might start a forest or grass fire.
- Do not weld on tanks, drums or barrels that are closed, pressurized or anything that held flammable liquid or material.



Metal is hot after welding or cutting! Always use gloves and or tongs when handling hot pieces of metal. Remember to place hot metal on fire-proof surfaces after handling. Serious burns and injury can result if material is improperly handled.



WARNING! Faulty or poorly maintained equipment can cause injury or death. Proper maintenance is your responsibility. Make sure all equipment is properly maintained and serviced by qualified personnel. Do not abuse or misuse equipment.

Keep all covers in place. A faulty machine may shoot sparks or may have exploding parts. Touching uncovered parts inside machine can cause discharge of high amounts of electricity. **Do not allow employees to operate poorly serviced equipment.** Always check condition of equipment thoroughly before start up. Disconnect unit from power source before any service attempt is made and for long term storage or electrical storms.



Further information can be obtained from The American Welding Society (AWS) that relates directly to safe welding and plasma cutting. Additionally, your local welding supply company may have additional pamphlets available concerning their products. Do not operate machinery until you are comfortable with proper operation and are able to assume inherent risks of cutting or welding.

EVERLAST INVERTER TECHNOLOGY					EVERLAST INVERTER TECHNOLOGY				
MODEL: PowerTIG 250 EXT			No.		MODEL: PowerTIG 315 EXT			No.	
			EN/ IEC60974.1					EN/ IEC60974.1	
		3-250 A / 10.1V-20V					3-315 A / 10.1V-22.6 V		
	U ₀ V 64	X	60%	100%		U ₀ V 64	X	60%	100%
		I ₂	250A	194A			I ₂	315A	244A
		U ₂	20V	17.8V			U ₂	22.6V	20V
		20-250 A					20-315 A		
	U ₀ V 51	X	60%	100%		U ₀ V 51	X	60%	100%
		I ₂	250 A	194A			I ₂	250 A	194A
		U ₂					U ₂		
	U ₁ 220-240V ±10%	220V: TIG I1MAX :27.5; I1eff: 21.3 STICK I1MAX: 41; I1eff: 29				U ₁ 460V	220V: TIG I1MAX: 20.5; I1eff: 11.2 STICK I1MAX: 29.5; I1eff: 16		
1~ 50/60 Hz		240V: TIG I1MAX: 21.5; I1eff:19.4 STICK I1MAX: 37.5; I1eff: 29			1~ 50/60 Hz		240V: TIG I1MAX: 21.5; I1eff:19.4 STICK I1MAX: 37.5; I1eff: 29		
INSULATION IP21S	COOLING METHOD: FAN	INSULATION: F			INSULATION IP21S	COOLING METHOD: FAN	INSULATION: F		

PowerTIG 250/315 EXT Technical Parameters

U₀ = Open Circuit Voltage

U₁ = Input Voltage

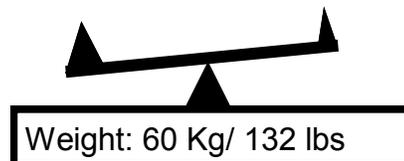
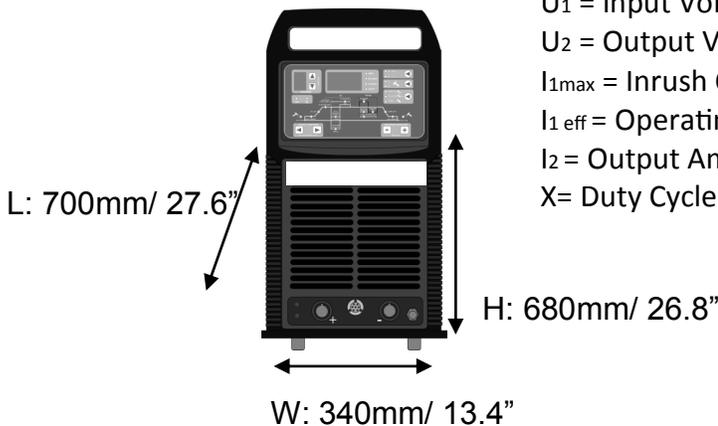
U₂ = Output Voltage

I_{1max} = Inrush Current (Maximum Amp Demand)

I_{1 eff} = Operating Current (Amperage use after start)

I₂ = Output Amps

X= Duty Cycle



GENERAL PERFORMANCE SPECIFICATIONS FOR POWERTIG 250/315 EXT

PARAMETER	PT 250 EXT	PT 315 EXT
IGBT MODULE TYPE	SIEMENS	SIEMENS
INPUT VOLTAGE/PHASE/Hz	220-240 V; 1 PH, 50-60 HZ	460-480 V; 3 PH, 50-60 Hz
PROCESS	TIG/ PULSE TIG/STICK (GTAW, GTAW-P, SMAW)	TIG/PULSE TIG/STICK (GTAW,GTAW-P,SMAW)
INPUT CURRENT MAX	27.5 A TIG/ 41A STICK	20.5 A TIG/ 29.5 A STICK
OPEN CIRCUIT VOLTAGE	64 TIG/ 51 STICK	64 TIG/ 51 STICK
DUTY CYCLE	60%@ 250 A/ 100% @ 194	60% @315 A / 100% @ 244
OUTPUT CURRENT TIG	3-250 A	3-315A
OUTPUT CURRENT STICK	20-250 A	20-315 A
STICK ARC FORCE	0-100%	0-100%
TIG START TYPE	HF/ LIFT START	HF/LIFT START
PREFLOW TIME	0-30 SECONDS	0-30 SECONDS
POST FLOW TIME	0-30 SECONDS	0-60 SECONDS
START CURRENT	5-250 A	5-315 A
END CURRENT	3-250 A	3-315 A
UP SLOPE	0-15 SECONDS	0-15 SECONDS
DOWN SLOPE	0-60 SECONDS	0-60 SECONDS
AC BALANCE	5-95%	5-95%
AC AMPLITUDE/BIAS	-50%-30%	-50%-30%
AC FREQUENCY	20-200 Hz	20-200 Hz
PULSE PEAK CURRENT	3-250 A	3-315 A
PULSE BASE CURRENT	5-95%	5-95%
PULSE FREQUENCY DC	.1-500 Hz	.1-500 Hz
PULSE FREQUENCY AC	.1-100 Hz.	.1-100 Hz
PULSE TIME ON (DUTY)	1-99%	1-99%
EFFICIENCY	80%	80%
POWER FACTOR CORRECTION	95%	95%
HF POINT GAP	.045"-.065"	.045"-.065"
GENERATOR REQUIREMENT	≥10,000KW CLEAN POWER	≥10,000 KW (3 PH 480) CLEAN POWER
SELF DIAGNOSING	YES	YES

1.1 General overview. The new industrial EXT series from Everlast are the latest in a new generation of true digital GTAW (TIG) /SMAW (Stick) welders. With an Siemens IGBT design the inverter cycles at a frequency of around 20 kHz, to deliver a stable smooth arc. Several key design elements give the PowerTig EXT series a competitive edge:

- A. Siemens IGBT modules improve reliability while make servicing a unit quicker, and more cost efficient.
- B. Full bridge design features soft switching technology which further extends IGBT component life and extends its capabilities.
- C. 10 function memory automatically saves favorite settings for convenient and fast recall.
- D. Improved HF design offers better and more stable arc starts, even at lower amperages.
- E. The Self diagnosing feature helps to determine possible problems with either the welder or the torch. Features over-voltage, over current and overheat protection.
- F. The square wave AC design features Amplitude/ Bias control which allows the positive and negative half cycle amps to be individually set, improving arc cleaning characteristics, penetration, and tungsten life.
- G. Arc force control and built in hot start helps improve the SMAW process, allowing for cellulosic rods to be used.
- H. Microprocessor circuitry accurately manages inverter functions and improves reliability.

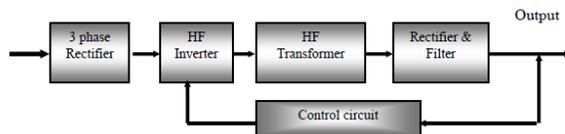


Figure 1.1 Basic Inverter design (315 EXT)

1.2 Use and Care. The welders are recommended for use in many industrial environments such as ship yards, fabrication shops, pipelines. However, care should be taken to keep the unit out of direct contact with water spray. The unit is rated IP21S, which rates it for light contact with dripping water. It is a good idea to remove the welder from the vicinity any water source if possible to reduce the possibility of electrocution or other shock hazard.

Every 1-2 months, depending upon use, the welder should be unplugged, opened up and carefully cleaned

with compressed air. Regular maintenance will extend the life of the unit.

IMPORTANT: Before opening the unit for any reason, make sure the unit has been unplugged for at least 10 minutes to allow time for the capacitors to fully discharge. Otherwise, severe shock and/or death can occur.

Do not restrict air flow or movement of air around the welder. Allow a buffer distance of 1-2 ft from all sides if possible. Less is permissible in banks of welders, but keep them spaced 6 inches from the sides and 12 inches from the rear of the unit.

Do not mount in areas that are prone to severe shock or vibration. Make sure the welder’s castors are blocked so that it will not roll down an incline.

Do not direct dust or dirt intentionally toward the machine, particularly in grinding and welding operations. Make sure the digital panel is protected from damage at all times.

1.3 Duty Cycle. The duty cycle has been determined for both the 250 EXT (220/240 V 1 phase)and 315 EXT (460/480 V 3 phase operation). For the 250EXT, the duty cycle is rated for 60% at 250 amps. For the 315EXT, the duty cycle is rated for 60% at 315 amps.

The duty cycle is based off a 10 minute duty cycle rating at 40° C. **This means that the unit is capable of being**

operated at the stated amps for 6 out of every 10 minutes without a break for cooling down the unit.



This does NOT mean that the unit can work 60% of any other length of time. A full 4 minute rest should

be given to the welder for maximum life. The welder will automatically stop welding when an overheat

condition has occurred and display an error code. If the unit does not kick out, this does not necessarily

mean that you have not exceeded duty cycle. It simply means that the thermal sensor has not reached its

preset limit value. Heat continues to to be generated by and transferred to the electronics. Welding in humid, or hot conditions can affect duty cycle as well.

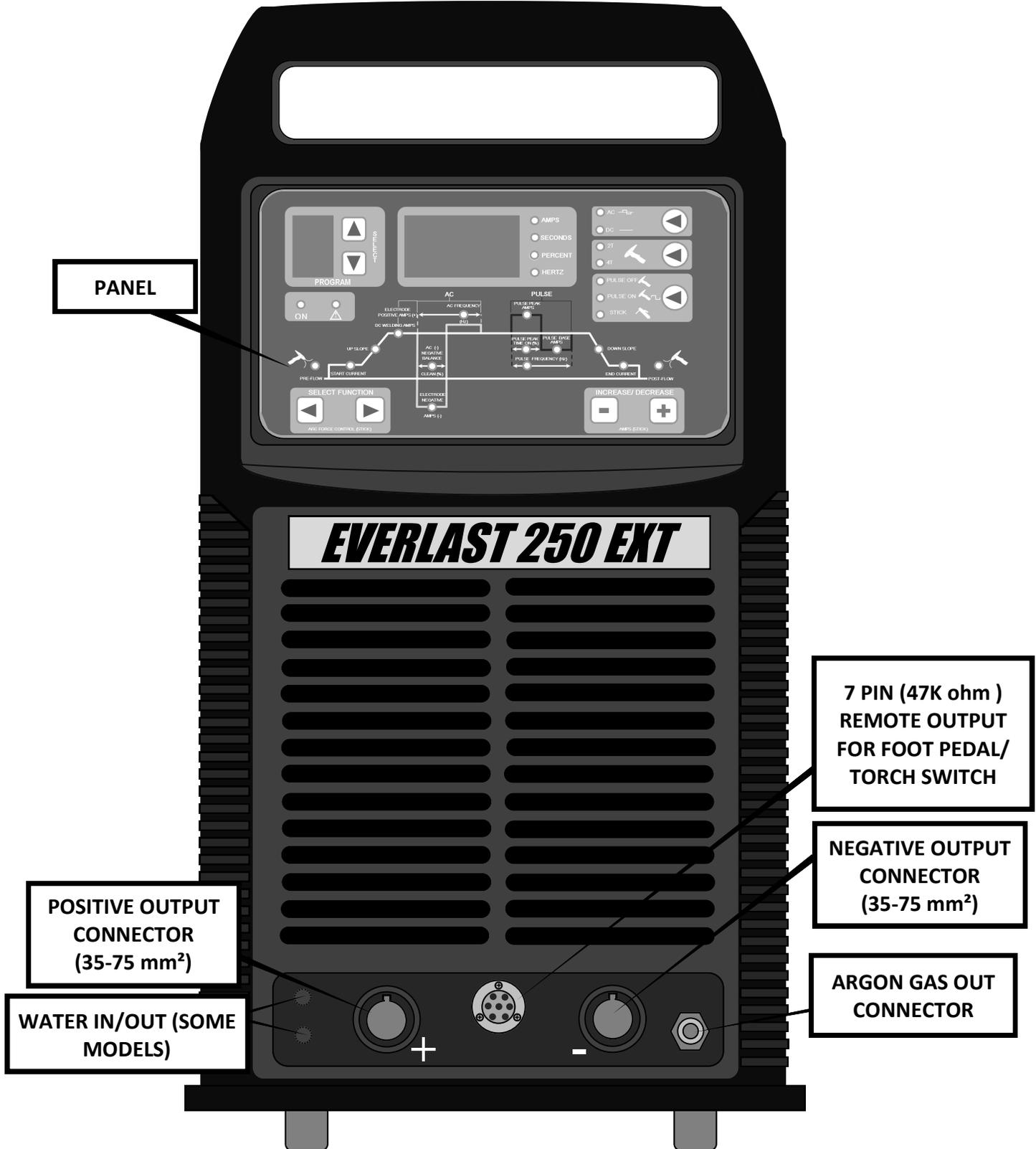
DO NOT SHUT DOWN AN OVERHEATED WELDER UNTIL IT HAS SAFELY COOLED. WELDING CAN RESUME

AFTER OVERHEAT CONDITION HAS CLEARED. NEVER USE WATER TO COOL OFF AN OVERHEATED

WELDER! DO NOT OPERATE WITH COVERS REMOVED. THIS PREVENTS PROPER COOLING.

NOTES:

MAIN WELDER/POWER SOURCE FRONT



PANEL

POSITIVE OUTPUT CONNECTOR (35-75 mm²)

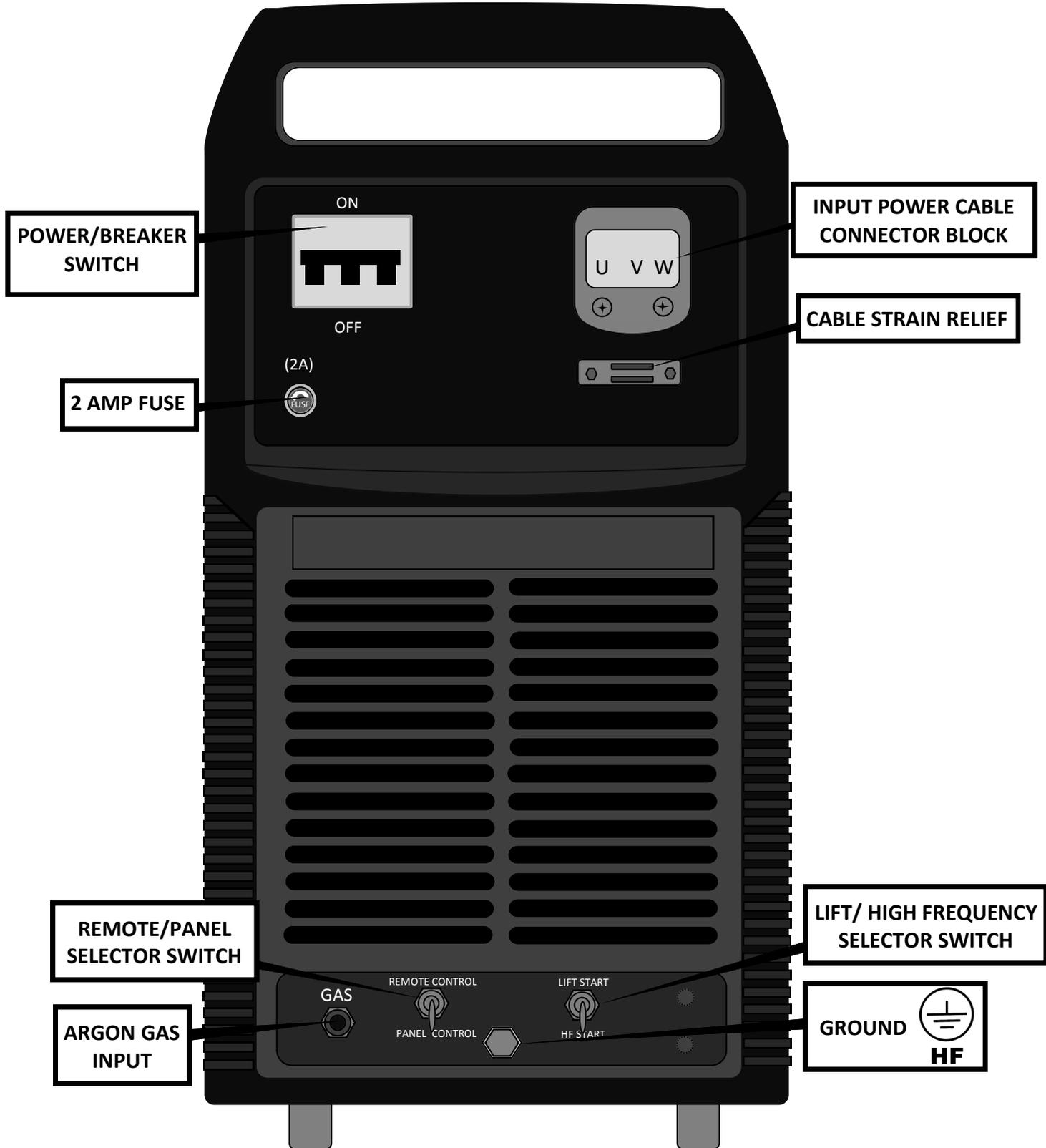
7 PIN (47K ohm) REMOTE OUTPUT FOR FOOT PEDAL/ TORCH SWITCH

NEGATIVE OUTPUT CONNECTOR (35-75 mm²)

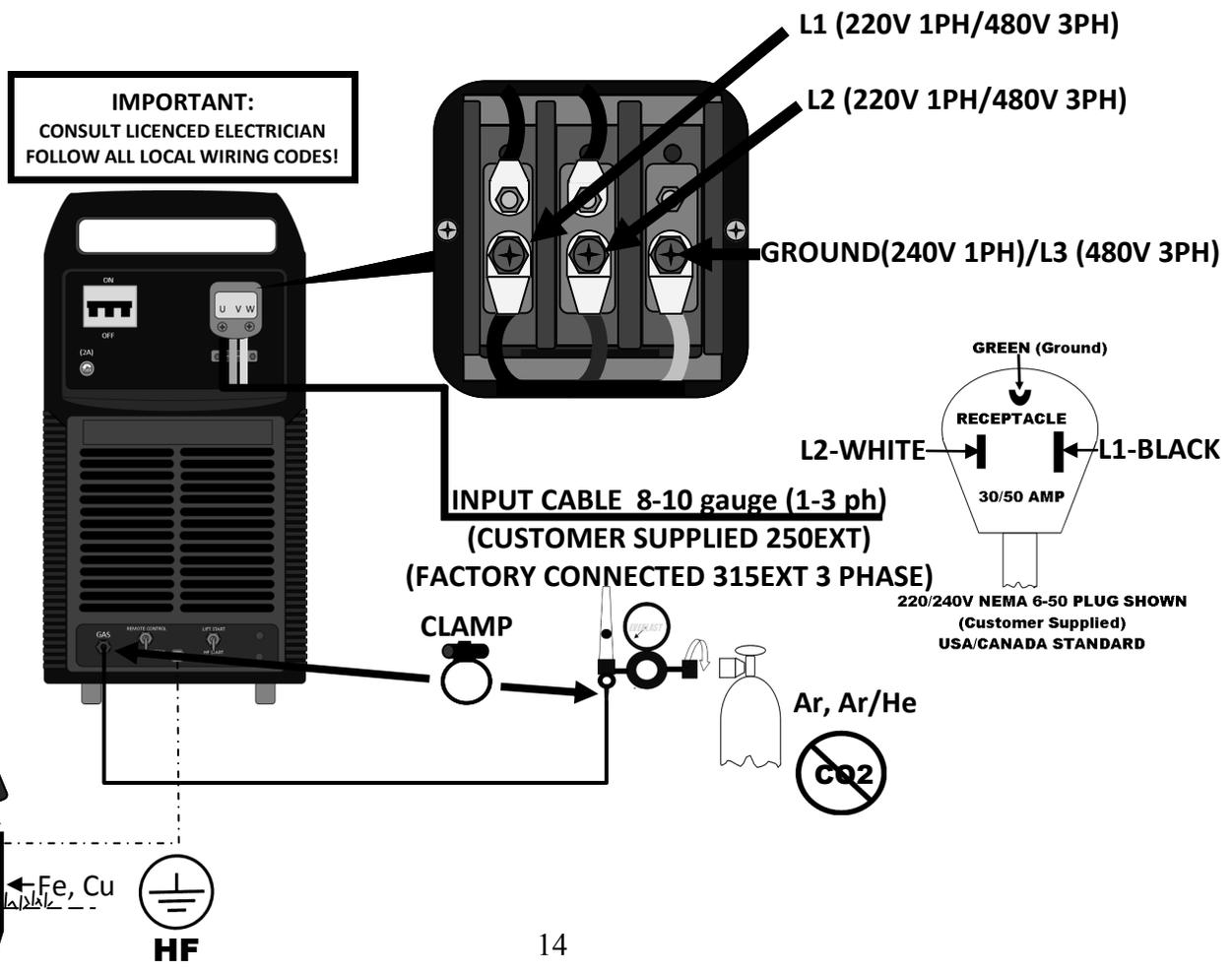
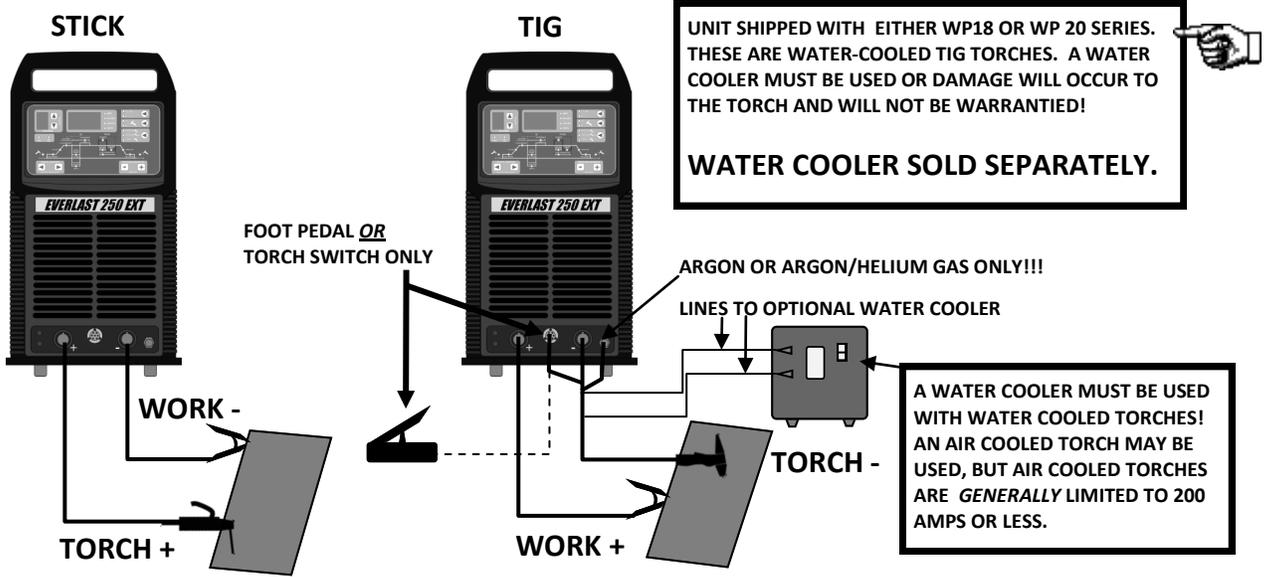
ARGON GAS OUT CONNECTOR

WATER IN/OUT (SOME MODELS)

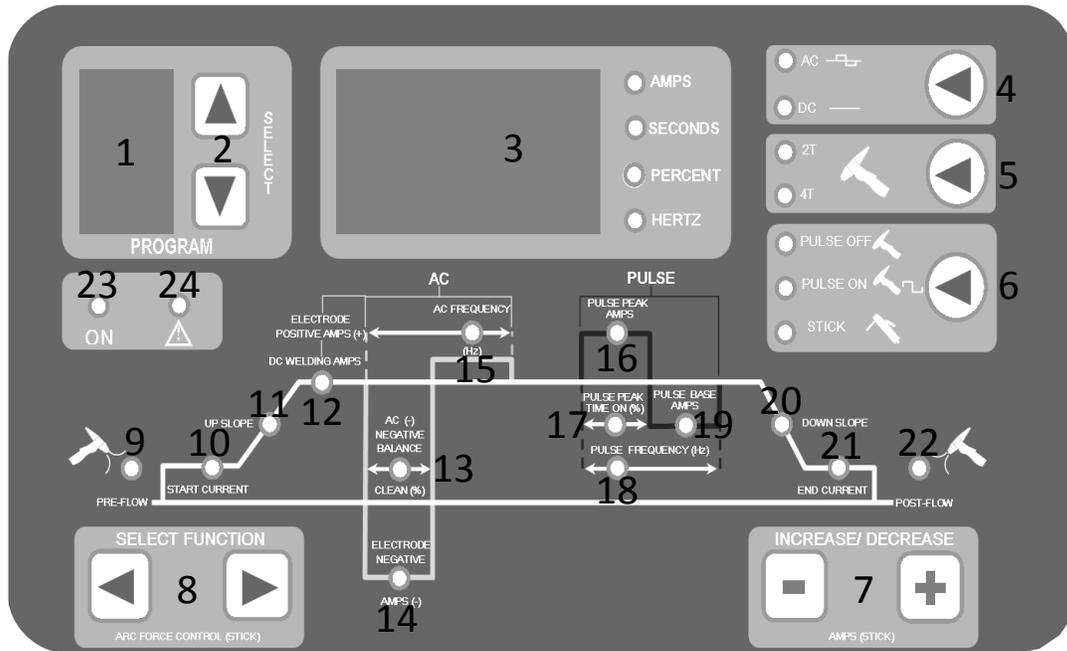
MAIN WELDER/POWER SOURCE REAR VIEW



POLARITY AND WIRING CONNECTIONS



DIGITAL PANEL CONTROLS AND FEATURES



ITEM	POWERTIG 250/315 EXT FEATURE FUNCTION AND DESCRIPTION
1	Memory. Automatically stores last panel setting to the corresponding numbers 0-9. To operate, simply select the memory number desired, and then program desired panel parameters, such as amps, pulse frequency, up slope/down slope etc, and the settings will automatically save to the number selected. Any changes made to the settings after recalling a program number will be automatically re-saved. If frequent changes to programming are to be made, use "0" as default program on start up and the last program when turning off the unit. The last setup saved to "0" will be recalled as default on startup.
2	Memory Channel Selector. Choose favorite program by toggling between numbers 0-9. To setup a program, advance to desired number, then enter desired parameters for the selected numbers. To enter another program, advance to the next number, and enter the next desired set of parameters. Last setting will automatically saved to the channel. Will recall upon startup.
3	Data Display. Displays selected parameter and real time welding output value. The type of parameter displayed is indicated by the appropriate LED located next to the display indicating amps, percent, seconds, or Hertz. Error codes are indicated by indicating an "800" code and the warning light located next to the "ON" light.
4	AC/DC Selector. Select AC for welding aluminum/magnesium or DC for welding all other metals.
5	2T/4T Sequencer. Used with torch switch function. Select 2T for simple press and hold operation of the torch switch. Release the switch to cease operation. Select 4T for advanced use of the panel sequencer controls such as start amps, end amps, up/down slope. 1) Press and hold switch to start arc. 2) Release switch to begin current upslope to normal welding current. 3) Press and hold switch once again to begin downslope. 4) Release switch to terminate the arc. To control heat similar to using the foot pedal use 4T by lightly tapping the switch to begin downslope and tapping again to restart upslope before end current is reached. IMPORTANT: Select 2T while in REMOTE (foot pedal) mode.
6	Pulse/Process Selector. Select type of TIG (GTAW) operation with Pulse On/Pulse Off or select Stick operation (SMAW, MMA).
7	Increase/Decrease Value/Amp Selector. Used to increase (+) or decrease (-) parameter values for each function. In Stick mode, amps are simply increased or decreased up (+) or down (-).
8	Parameter/Arc Force Selector. Used to highlight desired parameter by toggling switch. LED on panel next to corresponding parameter will light up. When desired parameter is selected, use Increase/Decrease Value selector to change the desired value of the parameter. Functions as Arc force (dig) control for stick mode. Arc force controls automatic amp offset % that is used to help keep arc stable and puddle fluid while welding in stick mode. Arc force ,represented by %, controls the aggressiveness of the arc response.
9	Pre-Flow. Controls the amount of time in seconds that the gas flows prior to initiating the arc after pedal or torch switch is pressed. Used to purge the torch and help shield the metal from hard starts, and contamination.

SECTION 2

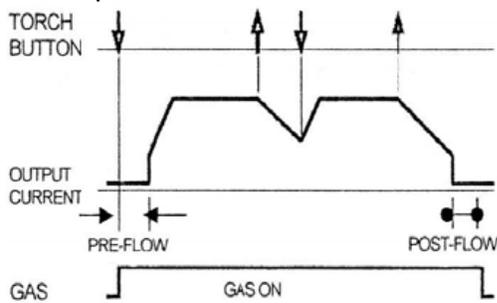
SETUP GUIDE AND COMPONENT IDENTIFICATION

ITEM	POWERTIG 250/315 EXT FEATURE FUNCTION AND DESCRIPTION CONT'D.
10	Start Current/ Amps. For use with the 2T/4T torch switch sequencer. Sets the arc start current. Allows arc to be started at a lower current than normal welding current without burning through.
11	Up Slope. For use with the 2T/4T torch switch sequencer. Controls the time in seconds that the unit takes to reach the normal welding current after the arc is started.
12	DC Welding Amps/ Electrode Positive (+) AC amps. This is the non-pulse maximum amp value for DC welding. For non-pulse AC welding, this sets the current (amps) for the positive (+) half-cycle. The amplitude control gives the operator optimum control over heat input at the work piece and helps maintain tungsten sharpness by keeping the tungsten cool. If using the foot pedal, this is the maximum current that the foot pedal can control while in DC. For AC, this is average current value and is reflected as such in real time welding activity. This means that the current value shown in the display may be higher or lower than actual selected AC Electrode Positive amps.
13	AC Electrode Negative (-) Balance (Cleaning Width). Controls the amount of cleaning, and penetration via a ratio to achieve the best balance while welding on AC. NOTE This unit uses Electrode NEGATIVE as the frame of reference, which is just the opposite from other Everlast Tig welder models. When more Electrode Negative % used, more penetration will be achieved. When less Electrode Negative %, less penetration will be achieved and more cleaning action results. Too much cleaning action will result in tungsten balling or splitting, making a larger tungsten necessary for the same amperage range. Too little cleaning can result in dirty, sooty welds and even a dull weld appearance. Ideally, start with roughly 60-65% for a reference point, and adjust % up or down to achieve best results. Can be used in conjunction with AC amplitude control to adjust cleaning and penetration as well. 
14	Electrode Negative Amps. Represented by % of Electrode Positive Amps. This sets the current (amps) for the negative half-cycle while welding in AC mode. To operate normally in AC, the value should be set at "0". This makes both AC+ and AC- amp values the same. The percent is either positive (+) or negative (-). When in the negative range, the display will display a minus (-) sign. Negative percent means that the electrode negative amps are lower than the electrode positive amps. Positive percentage will display without a symbol. When the % is positive, the electrode negative amps are higher than the electrode positive amps.
15	AC Frequency Control. To achieve greater arc focus (constriction) and increase puddle agitation while welding in AC mode, the AC frequency can be increased. It allows pinpoint use on thin materials, and helps penetration on thicker materials. Ideal adjustment range is usually 50-120 Hertz. For comparison most transformer welders in the US operate on 60 Hz. But, greater results can be achieved through the higher frequency range offered by this welder. WARNING: INCREASING THE FREQUENCY ALSO INCREASES THE DECIBEL/NOISE LEVEL OF THE ARC. HEARING PROTECTION IS HIGHLY RECOMMENDED! 
16	Peak Pulse Amps. When pulse mode is selected, the machine will default automatically to "Peak Pulse Amps" to begin the setup of the pulse functions. This controls the actual maximum output amps whether using the torch switch or the foot pedal in DC or AC modes. This is the portion of the pulse cycle yields the most penetration.
17	Peak Pulse Time On (Duty Cycle). The pulse consists of two stages: Peak (high) and Base (low) current. The peak pulse amp duration can be skewed to control the length of each stage within a single pulse cycle. Represented by a % of total time of one full pulse cycle, the Peak Pulse time can be increased or decreased relative to the Base current part of the cycle to help manage heat input.
18	Pulse Frequency. Represented by Hertz (Hz), the pulse frequency adjusts the actual number of times per second the pulse makes one complete cycle between peak and base amps. This is also commonly referred to as Pulses Per Second (PPS). Low pulse frequencies are ideal for timing the point where filler metal is added. This helps improve appearance and uniformity. Higher pulse frequencies are useful for welding seams and edges of thin material. Also it is useful for overall heat input control for thicker metals. Higher pulse frequencies are highly useful for automated welding processes. WARNING: WELDING AT HIGH PULSE FREQUENCIES INCREASES THE DECIBEL /NOISE LEVEL OF THE ARC. HEARING PROTECTION IS HIGHLY RECOMMENDED! 
19	Base Pulse Amps. Represented as a % of Peak Amps. This is the low amp portion of the pulse, or in effect, the cooling portion of the pulse. This is a ratio controlled pulse, and will automatically maintain the same % of amp differential while using the foot pedal.
20	Down Slope. For use with the 2T/4T sequencer. Controls the time in seconds that the unit takes to descend from the normal welding current to the end amp (final) current before the arc is terminated. Used for filling craters at the ends of the weld and crack prevention. Can also be used in the 4T mode to help with heat control by briefly tapping the switch to cool off the weld before tapping it again to restart the up slope sequence before the arc reaches the end amp stage.
21	End Current/Amps. For use with the 2T/4T torch switch sequencer. Sets the End amps. Helps cool the weld and prevent cracks in heat sensitive material and allows the puddle to be properly filled at a cooler amp setting before abruptly terminating the arc.
22	Post Flow. Controls the amount of time in seconds that the argon flows after the arc has terminated. Provides proper shielding during cooling to prevent rapid oxidation of the weld and porosity.
23	ON. Indicates the welder is switched on.
24	Warning indicator. Indicates any overheat or fault condition which will be accompanied by an "800" level error code in the display. Consult manual for error code and remedy. Do not attempt to weld until the code is properly cleared.

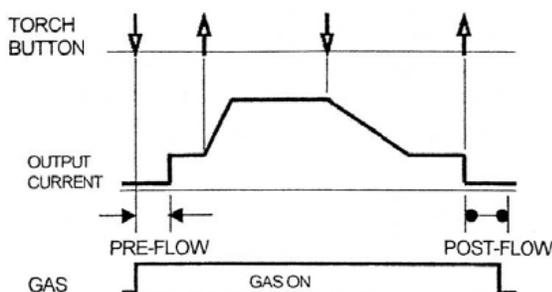
Welder Function Overview and Explanations.

1. 2T/4T sequencer. The 2T/4T feature allows operation of the welder without a foot pedal. In many circumstances, a foot pedal is not practical for use. So, the 2T/4T function has been created to allow programming of the welder to simulate the activities of the foot pedal while providing more accurate control. The “T” refers to the number of touches/taps of the remote switch installed on the torch required to operate the programming. 2T is essentially a “press and hold” operation and all programming is cycled automatically. Releasing the switch begins the final stage of programming. 4T operates differently in the fact that each touch activates a different stage of the programming, allowing for greater control. Also, in 4T, while actually welding at full amps, no finger contact with the switch is required. Following the graphic lines on the panel, you can visually trace and learn the activity and function of each part of the welding cycle indicated by the LED lamps. In either 2T or 4T operation the programming can be reset to “upslope” before reaching the end amp stage by pressing and holding the switch once more. See the graphics below for further explanation. The up and down arrows indicate the switch travel direction.

2T Torch Operation



4T Torch Operation



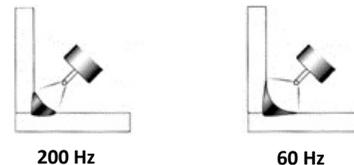
Many of the features on the welder panel are devoted to the use of the 2T/4T operation and do not work or apply to foot pedal use. The following features are exclusive features that can only be used with the 2T/4T sequencer function:

- 1) Start Current/Amps
- 2) Up Slope
- 3) Down Slope
- 4) End Current/Amps



Pre-Flow and Post-Flow are features that work in conjunction with both the foot pedal and the 2T/4T sequencer.

2. AC Frequency. The AC frequency can be adjusted only when in AC mode. Standard transformer welders typically have a fixed frequency of 60 Hz which is essentially the line input frequency supplied by the power company. But with inverters, the capability of AC frequency adjustment is practically limitless due to the IGBT components that create its own frequency. Frequency adjustment capability is useful to help improve directional control of the arc, and to focus the arc so that a narrower bead profile can be achieved. Also, at higher frequencies, the puddle agitation is greater, improving the breakup of undesirable oxides. See the graphic below.



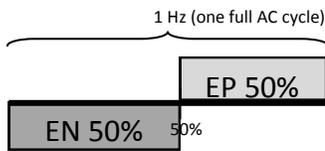
3. AC Balance. The standard AC square wave output of the welder is formed by alternating polarity rapidly between electrode negative and electrode positive, creating a wave form that resembles a square sine wave when viewed on an oscilloscope. Normally, with standard transformer welders, both standard sine wave and even square wave welders have little or no way to change the balance of EN to EP, resulting in having to carry a molten ball at the tip of the tungsten and a less stable arc. Electrode negative (EN) provides penetration in the TIG welding process. Electrode positive creates as strong reverse flow of electricity that breaks up the weld resistant oxidation that covers aluminum and magnesium components. It also places a lot of heat on the tungsten. In a “balanced” wave where both EP and

SECTION 2

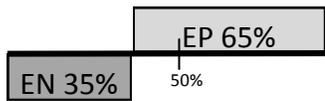
SETUP GUIDE AND COMPONENT IDENTIFICATION

EN are equal in time length, or 50%, penetration is reduced and over-cleaning results in wide etch lines running parallel to the side of the weld. Not all welds conditions will be alike so more cleaning is required at times than others. Similarly, more penetration will be required at times than others. Ordinarily, about 60-65% electrode negative is considered an ideal amount (30-35% electrode positive). This means that more heat is put into the work than on the tungsten and a sharper point can be used. Cleaning is still sufficient at that level. Good results can be achieved with about 80% EN or more. The cleaning action is still quite significant even at these levels. Ideally, the cleaning action should be adjusted until a small amount of frosting can be seen no more than 1/8" distance from the edge of the weld. If a piece of metal is particularly heavily oxidized or dirty, more cleaning action will be required. If too much cleaning action is used, the tungsten will begin to ball and even may start to burn away. If this much cleaning action is truly needed, switch to a larger sized tungsten that can handle the increased heating level. Signs of too little cleaning action while welding aluminum are sooty, black, or dull looking welds. A dedicated stainless brush should still be used before starting any weld in aluminum to help break up the heaviest oxide layer so less EP is needed and better penetration can be achieved.

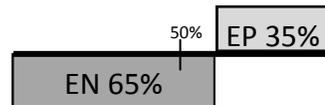
EXAMPLE: AC EN (-) BALANCE



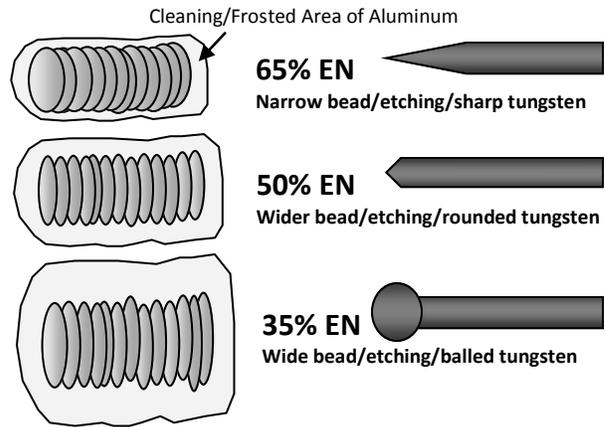
Standard transformer welder balance: 50% EN/EP
Balling tungsten, light penetration, wide cleaning area.



Extreme cleaning setting. 65% EP:
Shallow penetration, balling tungsten, excessive cleaning area.

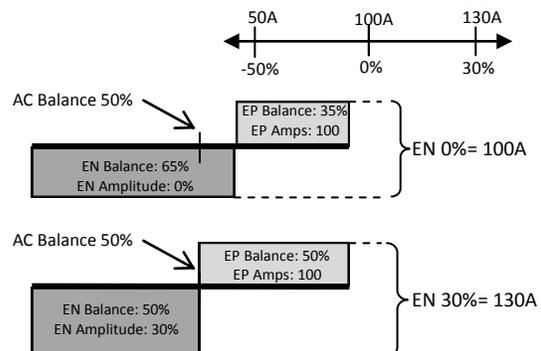


Good penetration setting 65% EN:
Deeper penetration, sharper tungsten, narrow cleaning area.



4. AC Bias/Amplitude. Amplitude control helps to further fine tune the ability of the machine to control and balance cleaning and penetration, while maintaining a sharper tungsten. Simply put, the AC amplitude adjustment splits the amp adjustment up into EP amps and EN amps. This means that during one full AC output cycle, there are two amp levels. The actual adjustment on the welder adjusts percent (%) EN in ratio to the EP amp level. Increasing EN amps relative to EP amps concentrates heat on the work piece, making a narrower bead, and decreasing cleaning width. Tungsten sharpness is retained. Decreasing EN % increases tungsten balling, cleaning area width, while making a broader, shallower weld. For the EXT series, when the unit is set at 0%, both EP and EN amps are equal. **Negative % values mean that EN current is that percent lower than EP welding amps. When the % becomes a positive number, EN current is that percent higher than EP welding amps.** For further explanation see the graphics below. Note the overlay of AC balance control and the limitless number of combinations possible with AC balance and amplitude. When used correctly this can help perfect the welding. If used incorrectly, it will create several problems, including poor cleaning or rapid tungsten wear.

EXAMPLE: AC 100 A EP (+)



SECTION 2

SETUP GUIDE AND COMPONENT IDENTIFICATION

5. Pulse. The pulse creates two amp values, a high and a low value that cycle back and forth between each other while welding. The high is called a “Peak” current and the low is called “base” current (sometimes called background current). This creates a situation where penetration can be achieved without overheating the metal, particularly on metals that are prone to structural deterioration or burn through. In effect you are creating an average of amps. The EXT series feature 3 adjustable parameters concerning the pulse:

1. Pulse Amps. Both Peak and Base amps can be independently set. When setting Peak Pulse Amps, the welder will display actual amp value when the Peak LED is selected. However, when the base % current (AC or DC) LED is lit, the amp value is represented in a ratio of percent (%). So, using an example of 100 Peak Amps, setting the pulse base amps to 50% would yield a 50 amp value for the base amps. The foot pedal will control both Peak Pulse Amps and Base Pulse Amps through the Base amp % selected on the panel. For AC Pulse operation, the AC + Welding amps LED will be blocked when Pulse is selected. Peak Pulse Current will then represent the AC+ welding amps. AC Balance and AC Amplitude control will still be available for adjustment since they operate as a ratio adjustment. These functions will also “stack” together with the Pulse Peak Amps and Pulse Base Amps in AC to give complete control over cleaning, arc directability, and penetration.

2. Pulse Frequency. Pulse speed or frequency as it is referred to is measured in the unit standard “Hertz”. Simply, it is the number of pulses per second that occur. Pulse also has two other features that are completely adjustable on the EXT series.

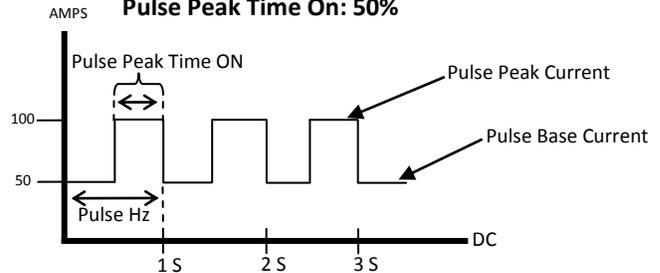
3. Pulse (Peak) Time On. Pulse Balance is the percentage (%) of time that the pulse stays in the Peak Current (High amp) stage of the cycle. Increasing the Pulse time on can increase the duration the Peak stage of the cycle to increase penetration. Pulse Balance is also known in the electronic industry as duty cycle. For welding purposes the term “Pulse Time On” is used for the EXT series.



Setting up the pulse is not a process with a fixed adjustment procedure. Changes to balance, and time will skew the final result. A slow pulse with a equal 50% pulse time on and somewhere around a

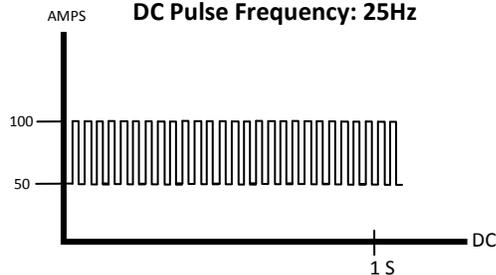
EXAMPLE 1

Pulse Peak: 100 amps, Pulse Base: 50%
DC Pulse Frequency: 1 Hz
Pulse Peak Time On: 50%



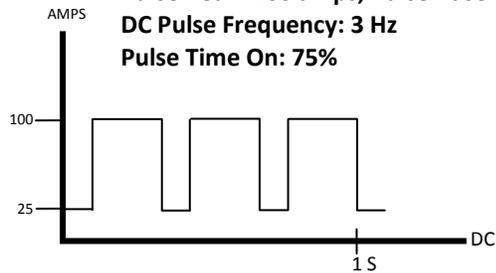
EXAMPLE 2

Pulse Peak: 100 amps, Pulse Base 50%
Pulse Peak Time On 50%
DC Pulse Frequency: 25Hz



EXAMPLE 3

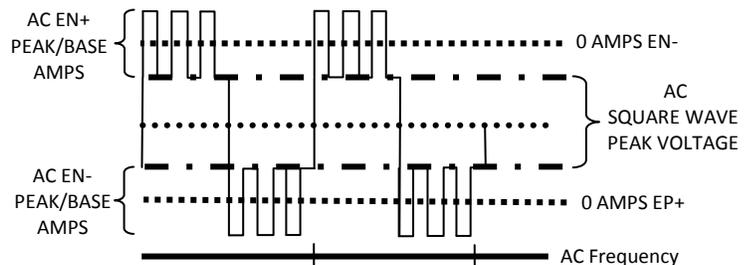
Pulse Peak: 100 amps, Pulse Base: 25%
DC Pulse Frequency: 3 Hz
Pulse Time On: 75%



EXAMPLE 4:

AC Square Wave superimposed with pulse.

(Diagram greatly simplified for non-technical demonstration purposes.)



50-75% Base Amp setting is typically used to help with timing the addition of filler metal to the weld puddle. A higher pulse frequency level with variations in Pulse Time On and a narrow/wider amp spread can be used to prevent burn through and speed up welding on thin materials. It can also help maintain a proper bead on a thin edge weld or prevent burn through on extremely thin metal. A fast pulse speed will make fine ripples in the weld while a slow pulse speed will give a much more coarse, but visually appealing result.

6. Arc Force Control. When stick welding, arc force is used to help improve weldability of certain metals and welding rods. The arc force boosts current flow to match the demands of arc length and position. As an arc is held shorter, voltage tends to drop so extra amps are introduced to help maintain a steady arc. Excellent for use with cellulose based rods such as the E6011 or E6010.

7. Foot Pedal . Select remote control on the rear panel and make sure 2T is selected on the front panel. Select maximum amp value desired on the panel. The foot pedal will only control amps up to the range governed on the front panel. If more amperage is needed raise the amp level on the panel. The foot pedal also controls both Peak Pulse Amps, and Base Amps through the ratio established by selecting the Base Amp % on the panel. AC Amplitude control is also managed in the same way. Always set the panel amps to about 10-25% more than what should be needed. Increasing the amps more than this margin on the panel will reduce the accuracy of the foot pedal by changing the resolution. The base amps and the AC EN (-) amps will be controlled in a proportional ratio throughout the foot pedal travel range. For more accurate and responsive control, Everlast offers a US made foot pedal available as an additional option.

8. Water-cooled torch. A water cooler is necessary for use with the stock EXT series torches. The units are equipped with either a WP 18 or WP 20 water-cooled torch. Using a water-cooled torch very long without water can seriously and permanently damage your torch. Torches used without water-coolers cannot be warranted unless cleared

by Everlast. Everlast carries water-coolers designed to cool the maximum amp capacity of the EXT units. If you are not able to provide a water cooler or have not purchased a water cooler, you will need to use an air cooled (gas cooled) torch such as a 17 or 26 series.

All consumables should be interchangeable with other brand torches with similar designations. Contact Everlast should you desire to purchase an air cooled torch that is ready for use out of the box

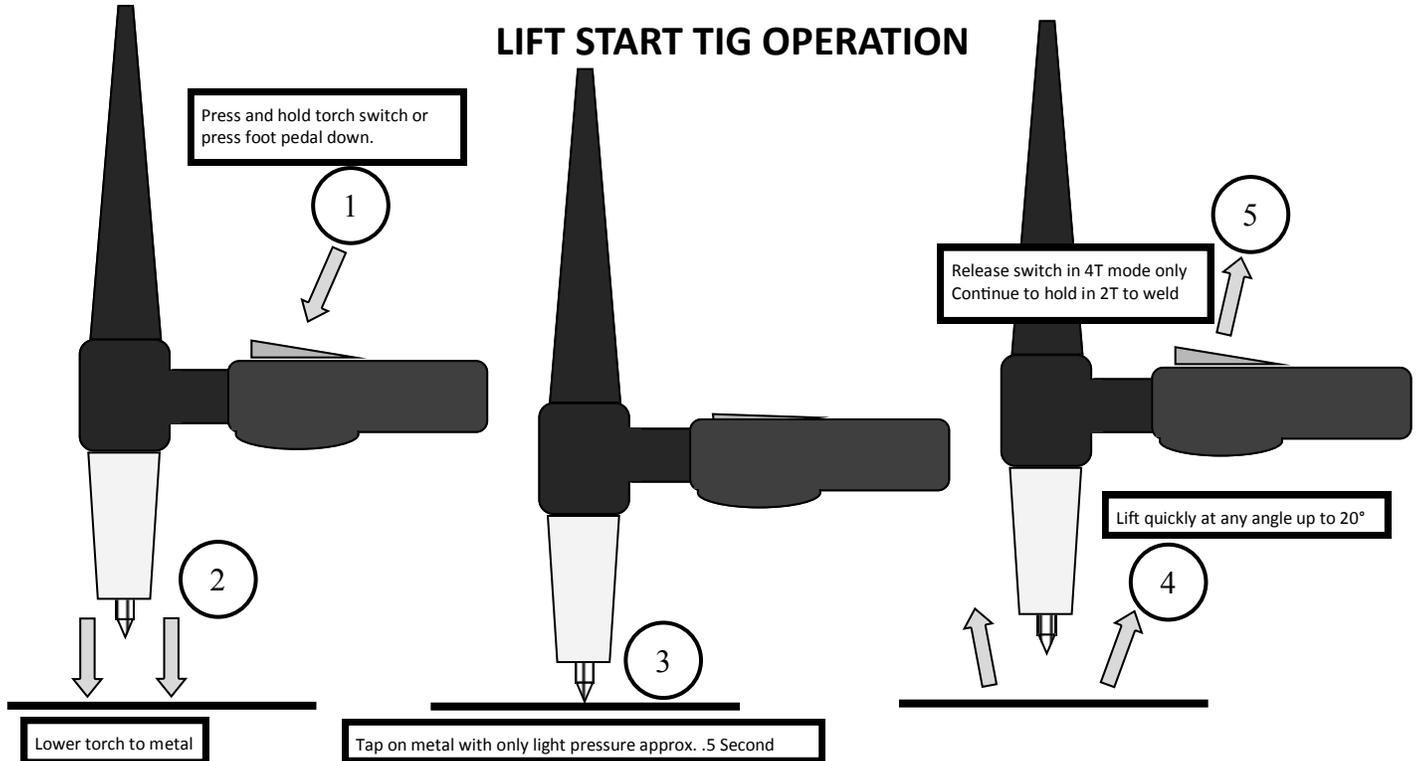
9. DINSE style connector. The EXT series uses a 35-75mm² connector for both negative and positive connectors, which is a standard connector within the welding industry. This is commonly known as a 1/2" DINSE style connector. The connector allows the use of almost any brand or style of TIG torch.

10. 7 pin remote/foot pedal connector. This 7 pin connector is available from Everlast should it become damaged.

11. Argon quick connect. This is a 9 mm size quick connect nipple. These are commonly available from Everlast or online sites which carry torches and fittings. Should you need a new one for your torch or damage yours, consult Everlast. Do not use a nipple that is scarred, bent or otherwise deformed. Damage to the female connector may result. Serious argon leaks may occur.

12. Low amp starts. The units have been configured to be able to operate at approximately 3 amps. However, for the most stable starts, a slightly higher amp setting may be required, or a smaller tungsten may be necessary. After the arc is started, amps may be reduced to a minimum level. This is accomplished with setting a higher start amp value (2T/4T) or by going further down on the foot pedal until the arc stabilizes, then backing the amps down slowly until the arc stabilizes at the minimum selected amps.

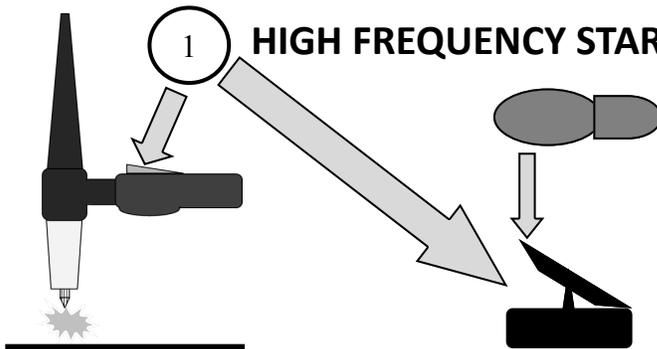
LIFT START TIG OPERATION



General Operation of Lift Start TIG

1. Turn unit on, allow time for power up cycle to complete its start up process.
2. Make sure the TIG Icon LED for either AC or DC is lit.
3. Select 4T or 2T mode with the selector button and select PANEL on rear panel of welder **OR** plug in foot pedal and select REMOTE on rear panel of welder Select LIFT on Rear of unit.
4. If using 4T mode, select down slope time by rotating the knob to increase/decrease default time.
5. Adjust amps with amp control knob.
6. Start arc as depicted above.
7. If using 2T, continue to hold the torch switch until you are ready to stop welding. Release switch then Arc will then cease. If using pedal raise foot fully off the pedal and arc will stop automatically.
8. If using 4T, release switch, after arc initiates. Continue to weld without holding the switch down.

HIGH FREQUENCY START TIG OPERATION

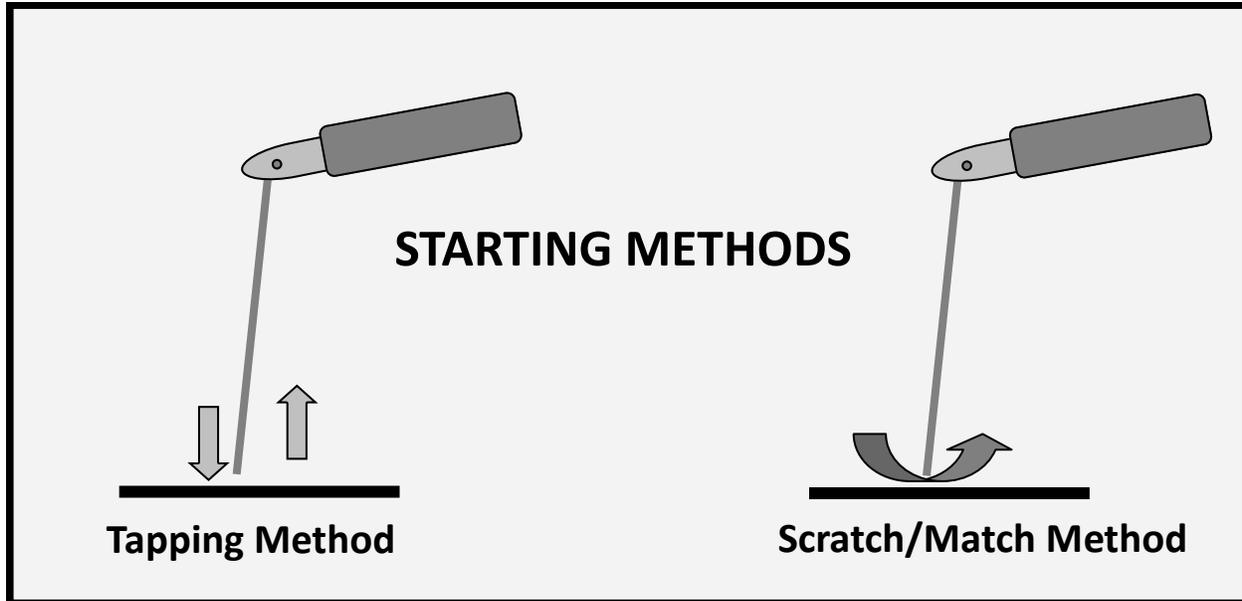


General Operation of HF Start TIG

1. Follow steps 1-5 above. Select High Frequency (HF) instead of LIFT on rear panel of welder.
2. Hold torch 1/8" or less of surface without touching metal.
3. Press trigger or step on foot pedal to start arc. A small HF spark may be seen.
4. Follow steps 7 and 8 above.

WARNING: Do not use HF start if you have a pacemaker until you consult with your doctor!

STICK OPERATION



1. Turn on unit. Allow unit to cycle through its start up program.
2. Select the Stick icon on the Process Selector.
3. Make sure electrode holder is in the Positive side and the work clamp is in the negative connector.
4. Select the Amp level desired. Use the electrode diameter selection chart on page 21 to determine approximate amps suitable for the rod size selected. Consult the welding electrode manufacturer's recommendation as well for proper amperage. No voltage adjustment is available.
5. Use the arc force control to select the desired arc characteristics, creating the desired arc characteristic and amp response needed to maintain the arc. Cellulose electrodes will require more arc force control than other rods, but each brand and size will weld a little differently. The arc force control setting will vary from person to person as well, with different rod angles, positions, and arc lengths all factoring into the arc force control performance.
6. Strike the arc with either the tapping method or the match strike method. Beginners usually find that the match strike method yields best results. Professionals tend to gravitate toward the tapping method because of its placement accuracy.

TABLE 1. SUGGESTED STICK (SMAW [MMA]) PARAMETERS

NOTE: Arc force adjustment should be increased above 50% if the length of the welding cable attached to the electrode holder is less than 40 M/ 125 ft. Where voltage drop is a concern over long lengths, (for cables over 125 ft) increase arc force adjustment to 70% or more to compensate.

METAL THICKNESS	ELECTRODE SIZE	WELDING AMPS
< 1 mm/.040"	1.5 mm/ 1/16"	20-40
2 mm/.080"	2 mm/3/32"	40-50
3 mm/ 1/8 "	3.2 mm/1/8"	90-110
4-5 mm/ 3/16"	3.2-4 mm/ 1/8"-3/16"	90-130
6-12 mm/ 1/4"-1/2"	4-5 mm/ 3/16"-5/32"	160-250
≥13 mm/ 1/2"	5-6 mm/ 5/32"-1/4"	250-400

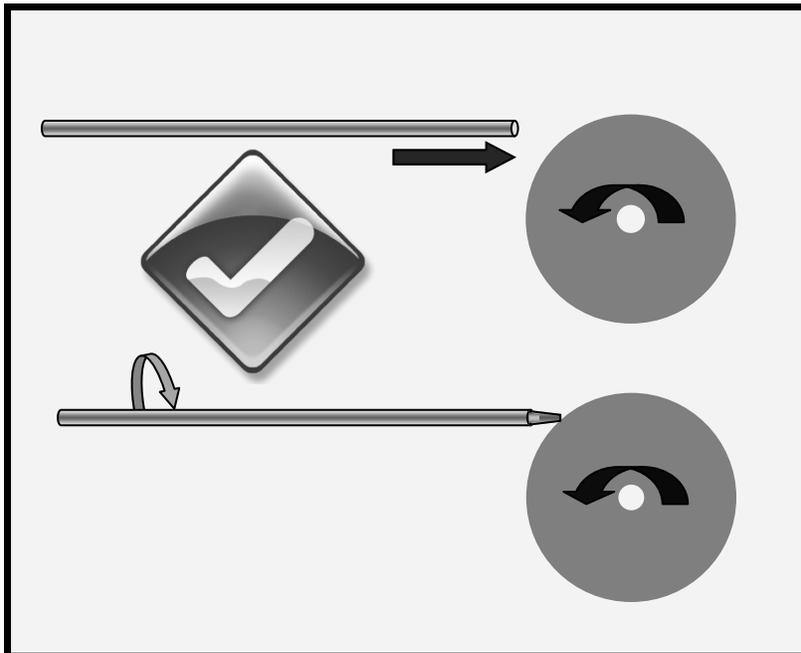
TABLE 2. SUGGESTED TIG (GTAW) PARAMETERS STEEL (ALUMINUM)

METAL THICKNESS	WELDING AMPS	TUNGSTEN DIA.	Ar FLOW RATE
1-3 mm/.040"-1/8"	40-80 (60-125)	1-2 mm/.040"-3/32"	4-6 lpm/ 8-12 CFH
3-6 mm/ 1/8"-3/16"	80-150 (125-200)	2-3 mm/ 3/32"-1/8"	7-10 lpm/ 14-25 CFH
6-9 mm/ 3/16"-3/8"	150-200 (200-315)	3-6 mm/ 1/8"-1/4"	10+ lpm/ 20+ CFH

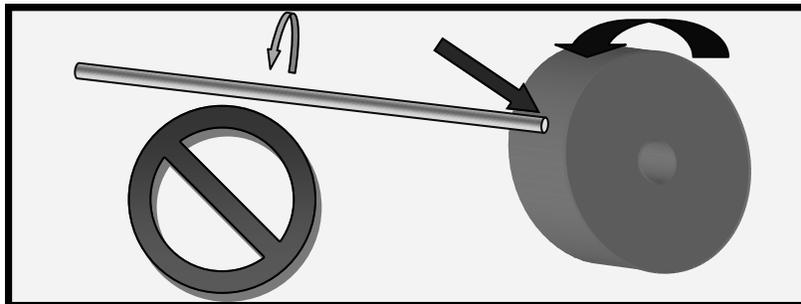
TABLE 3. TUNGSTEN RECOMMENDATION

TYPE	PERCENT	COLOR	PROCESS	RECOMMENDATION
Pure	100% Tungsten	Green	AC	NOT RECOMMENDED! Do not use in an inverter.
Thoriated (slightly radioactive)	2% Thorium	Red	AC/DC	YES. Great for all purpose welding. Most economical.
Ceriated	2% Ceria	Orange	AC/DC	YES. Good for low amp use.
Lanthanated	1.5% Lanthanum	Gold	AC/DC	YES. Best alternative to 2% Thoriated. Tough.
Lanthanated	2% Lanthanum	Blue	AC/DC	YES. Not much advantage over 1.5% Lanthanated.
Zirconiated	1% Zirconia	Brown	AC	NOT RECOMMENDED! Do not use in an inverter.

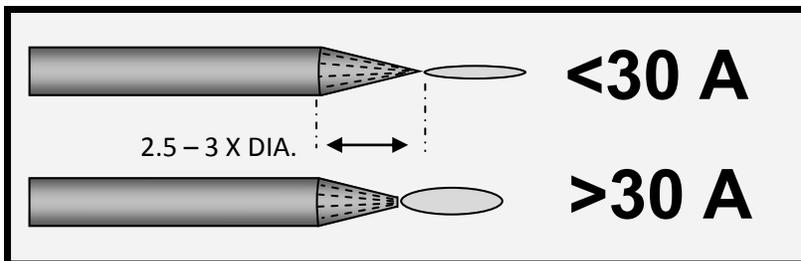
TUNGSTEN PREPARATION



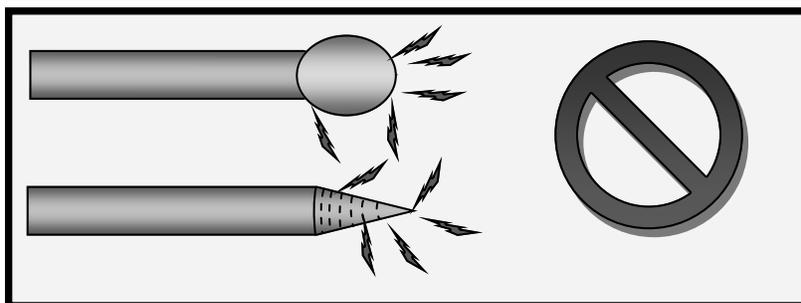
1. Use dedicated grinding wheel or contamination may result. Do not breath grinding dust! Wear eye protection and gloves.
2. Hold Tungsten firmly.
3. Grind perpendicular to grinding wheel face. Allow tungsten to grind away slowly, creating point.
4. Rotate tungsten quickly as it is being ground to keep point even.



DO NOT GRIND TUNGSTEN PARRALEL TO WHEEL FACE! 



Use a point for low amp use to help control arc. Create a slight truncation on the tip for higher amp use for best arc stability.
Grind tip 2.5- 3 times longer than the diameter of the tungsten.



DO NOT BALL TUNGSTEN FOR AC USE! ERRATIC ARC WILL RESULT. 

MAKE SURE GRINDING MARKS RUN PARRALEL TO TIP. CONCENTRIC MARKS WILL CAUSE ERRATIC ARC!

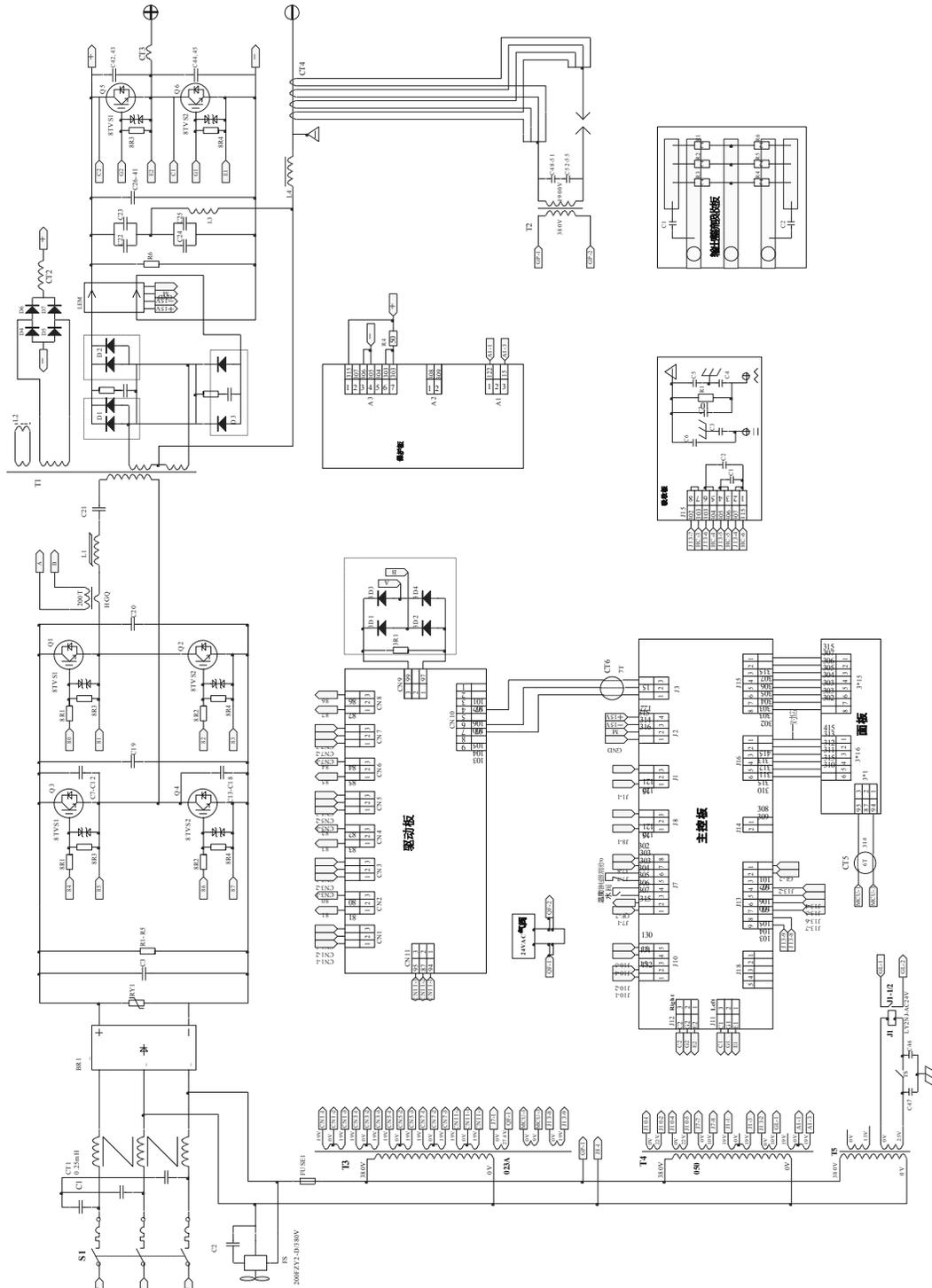
Maintenance Checklist

No.	CHECKLIST	ACTION	TIMING
01	Check Power Switch.	Check for secureness, and proper function. Check for excess dirt.	Monthly
02	Check for normal fan flow.	Listen for normal fan sound while welding, Clean with compressed air (use eye protection). Use a brush to clean fan blade.	Every 2 months
03	Check welding cable condition.	Check for breaks, abrasions, corrosions and fitting of cable in connectors. Replace if necessary to prevent electrocution	Daily
04	Check welding cable temperature.	Check connections. Check for exposed or bare wires. Check for corrosion. Check for water flow.	2 times daily/as needed
05	Check work clamp tightness.	Make sure good contact is being made with work piece.	Multiple times daily
06	Check Panel.	Use soft wipes to clean display. Do not wet. Use lens cleaning wipes.	Daily
07	Open unit and inspect.	Allow 10 minutes for capacitors to discharge. Open unit and clean lightly with compressed air.	Monthly

Trouble Shooting Guide

No.	Trouble /Code		Remedy
01	Power Indicator lamp does not come on	(1) Phase/Wiring incorrect (2) Main unit power switch is damaged (3) Fuse is broken (2A) (4) Transformer is broken (5) Power Control Board is broken	Check wiring with multi meter Replace switch Replace fuse (2A) Replace/service transformer Replace/service control board
02	Power Indicator is on but fan is not on	(1) Fan blade is locked (2) Fan Capacitor is damaged (3) Fan wires are broken (4) Fan is worn out	Clear obstruction Replace Replace Replace
03	Circuit breaker (Main Switch) trips while welding and will not reset	(1) Damaged IGBT module (2) Rectifier broken (3) Output diode module damaged	Replace
04	Error Code 801	IGBT module (secondary) damaged	Replace
05	Error Code 802, 803	(1) IGBT module (secondary) damaged (2) PCB is damaged	Replace
06	Error Code 804	(1) Overload (2) Overheat (3) Thermo safety switch is broken	Stop welding allow to cool. Replace switch
07	Error Code 805	(1) MIG Torch trigger is damaged (2) Wire control cable is broken/not connected (3) Control board is damaged	(1) Replace torch (2) Repair control cable (3) Replace
08	Error Code 806	Water solenoid malfunction (some models)	Press select button for 3 seconds to clear and stop operation until remedied.
09	No arc/ No power	(1) Power Switch is damaged (2) Unit is unplugged (3) Main breaker has tripped	Check and Replace
10	Arc Unstable, Hard to start. Unit is under powered	(1) Quick connector or output cable is loose or overheated/ Too small of input cable (2) A phase has been lost (3) Under Voltage input (4) HF Points out of adjustment	(1) Tighten (2) Allow to cool, increase size of cable. (3) Check voltage, remedy. (4) Adjust points to .045" to .065"

APPENDIX A: MAIN UNIT SCHEMATIC



NOTES: