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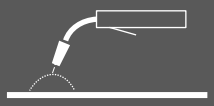

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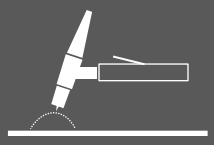

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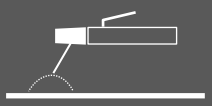

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EVERLAST
IGBT INVERTER TECHNOLOGY

Thunder 215

Safety, Setup and General Use Guide

FUNCTION: **MIG/ DC TIG with Pulse Function/ DC Stick**
PURCHASE DATE:
WELDER SERIAL NUMBER:
OPTIONAL ACCESSORY SERIAL NUMBER:

120/240V
1 Phase

Operator's Manual

www.everlastwelders.com
Need Parts? Need Technical Help? Call: 1-877-755-9353
380 Swift Ave. Unit 12 South San Francisco, CA 94080, USA

EVERLAST
IGBT INVERTER TECHNOLOGY
Welders, Plasma Cutters, Multi-Process

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IMPORTANT!

Before operating the welder, read this manual from beginning to end. A thorough read-through of this manual is important to help guide you in the safe and competent operation of the welder. This welder is a complex machine with many features that new owners or users may not understand or be familiar with. The manual is written in a way that builds knowledge upon previous information presented in the manual. If sections are randomly read through, details of important information will be missed. In certain sections, where details of operation may overlap, some information may be repeated from previous sections to highlight continuity between different functions and settings. *Though some general welding information is given to illustrate the parameters and functions of the welder, the manual is not meant to train or instruct in welding. The manual's scope and intent is to guide the professional user in safe use of the basic parameters and functions of the welder.* Any explicit setting or detail offered in this manual is intended as a general guide, or a starting point, and should not be construed to be a final setting to be applied in any or all circumstances.

NOTICE:

Product Specifications and features are subject to change without notice. While every attempt has been made to provide the most accurate and current information possible at the time of publication, this manual is intended to be a general guide and not intended to be exhaustive in its content regarding safety, welding, or the operation/maintenance of this unit. Due to multiple variables that exist in the welding field and the changing nature of it and of the Everlast product line itself, Everlast Power Equipment INC. does not guarantee the accuracy, completeness, authority or authenticity of the information contained within this manual or of any information offered during the course of conversation or business by any Everlast employee or subsidiary. The owner of this product assumes all liability for its use and maintenance. Everlast Power Equipment INC. does not warrant this product or this document for fitness for any particular purpose, for performance/accuracy or for suitability of application. Furthermore, Everlast Power Equipment INC. does not accept liability for injury or damages, consequential or incidental, resulting from the use of this product or resulting from the content found in this document or accept claims by a third party of such liability.

⚠ WARNING!

California Proposition 65 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/or Reproductive Harm

www.P65warnings.ca.gov

NOTICE:

The Thunder Series of welders are designed for use by professional welders in commercial settings. Commercial settings are equipped with industrial wiring and power supply. This welder requires a dedicated circuit and special welder outlets that are not typically found in home garages. The higher Amperage outlets and breakers required by this welder may not allow connection to a standard home panel box with out significant modification to meet national electric codes and the input requirements of the welder. (See specifications page of inrush and rated current.) Additionally, use in home settings may cause interference with electronics. **Besides a required dedicated circuit, this welder may also require additional grounding of all metal items and the welder by a commercial electrician to prevent undesirable operation if interference is observed.**

THANK YOU! We appreciate you as a valued customer and hope that you will enjoy years of use from your welder. We work to please the customer by providing a well supported, quality product. *To make sure that you receive the best quality ownership experience, please see below for important information and time sensitive details.*

What to do right now:

1. Print your receipt from your confirmation email that should have been sent to you after your purchase and put it up for safe keeping. If you do not have one, contact us at 1-877-755-9353 (US customers) or 1-905-570-1818 (Canadian Customers). You will need this if anything should ever happen for original owner verification (if bought as a gift, original receipt will still be needed, or explanation sent to Everlast).
2. Read this manual! A large number of tech and service calls are a result of not reading the manual from start to finish. Do not just scan or casually peruse this manual. There are different features and functions that you may not be familiar with, or that may operate differently than you expect. Even if you have expertise in the field of welding, you should not assume this unit operates like other brands or models you have used.
3. Carefully unpack and inspect all items immediately. Look for missing or damaged items. Please report any issues within 48 hours (72 hours on weekend or holidays) of receiving your product,. Take pictures if you are able and contact us at 1-877-755-9353, ext. 207 if any issue is discovered between 9 am and 5 pm Eastern Time M-F (US customers) or at 1-905-570-1818 (Canadian Customers) between 9am and 4 pm weekdays except on Fridays when hours are from 9 am to 12pm Eastern. If outside of the US or Canada, contact your in-country/or regional distributor direct at their service number.

What to do within the next 2-3 days:

1. Make sure your electrical system is up to date and capable of handling the inrush and rated current of the unit. Consult and use a licensed and knowledgeable electrician. If you have downloaded this manual in expectation of delivery, get started now.
2. Make sure this machine is plugged in, turned on, and tested with every process and major feature, checking for proper function. You have a 30 day period to test and thoroughly check out the operation of this unit under our 30 day satisfaction period. If something is wrong, this policy covers shipping on the unit (30 day satisfaction policy applies to the USA only for the 48 lower states and D.C., territories and provinces are excluded) or any incidental parts that may be needed to resolve any issue. After this 30 day period, if you find something wrong with the unit, you will not receive the benefit of free shipping back and forth to resolve this issue. Your unit is still covered under the 5 year parts/labor warranty, but shipping is covered by the customer after the 30 day period is over. The first 30 days of operation with any electronic item is the most critical and if any issue will happen, it will often happen during this time. This is why it is very important that you put this unit to work as soon as possible. Any issue should be reported within 48 hours (72 if on the weekend or holiday). Everlast will not be liable for any shipping after that time.

What to do within the next 30 days:

Visit our website (US customers). Go to www.everlastwelders.com. Navigate to the resources tab and to the "product registration" page to register your product. While keeping your receipt/proof of purpose is still required for verification of ownership, registering will help us keep your details straight and establish a chain of ownership. Don't worry, though, your warranty is still valid if you can't do this. Remember: Always keep your receipt even if you register. You may want to staple a copy to your manual.

What to do if you have a warranty issue or problem with the unit:

1. Unplug the unit. (Also do this before any maintenance or cleaning is done.)
2. Do not attempt a self-repair until authorized by an Everlast representative. This does not include performing routine maintenance such as point gap adjustments or regular internal cleaning. Any third party repairs are not covered under warranty, and can further damage your unit.
3. Within 24-48hours, (or by the next working business day) you must contact U.S. tech support at 1-877-755-9353 ext 207(U.S. hours are 9 am to 5pm Eastern for tech support and 9 am to 5 pm Pacific for the business/sales office). If you are in Canada contact 1-905-570-1818 (Canada hours are 9am to 4pm M-Th, 9am to 12pm Fri). Although phone contact is preferred to establish a warranty claim, you may send an email to tech@everlastwelders.com (US) or mike@everlastwelders.ca (Canada) along with your contact information and brief explanation of the issue and ask for a follow up call. If you contact us via phone, and you do not reach a live person, please leave a brief message with the nature of your problem and your contact information. You should expect a call back within 24 hours. It is also a good idea to follow up the message with an email.
4. Be prepared with as much information as possible when you talk with a tech advisor, including a details of the failure, settings, and application of the unit. *NOTE: A Proof-Of-Purchase (receipt) is required before returning the unit for warranty or before warranty parts can be sent to you.*
5. Keep in mind that, you may be asked to check a few basic things. Before you call, having a screwdriver and volt/ohm meter at hand is a good idea and will save time. Many issues can be resolved over the phone. If the issue cannot be resolved over the phone/email, you may be given an option to return the unit, or have a part shipped to you, at Everlast's discretion. Keep in mind, you may be asked questions that seem basic, or elementary to your knowledge base. These are not meant to question your knowledge, but rather to make sure nothing is overlooked. However the tech chooses to proceed, please cooperate with the process, even if you think you know what the cause or issue is. You may be asked to check something or open the unit during the diagnosis. This does not void the warranty! Opening the unit is a part of routine maintenance and cleaning. This is an important step. The willingness of the customer to work with tech support can save lots of time and accelerate the warranty process. For

warranty to be honored, you will need to make sure that you follow these guidelines. ***Units that are returned without an RMA (issued by the tech support department) may not be repaired under the warranty agreement and you may be charged for the repair and can result in a delayed repair as well.***

What to do if you need setup help, guidance, weld issue diagnosis or have general product compatibility questions.

Call us at 877-755-9353 ext. 204 for welding guidance and general welding issue diagnosis. Or email performance@everlastwelders.com with the basic issue you are having, along with your specific settings, and welding application.

Hey...wait, what is my warranty?

Warranties and service policies and procedures vary from country to country and are maintained and supported by the regional or in country distributor of Everlast welding equipment.

USA Customers Only: For full details on the 5 year parts and labor warranty, 30 day satisfaction policy, terms of sale, and how to proceed with a warranty claim, please visit: https://www.everlastgenerators.com/standard-warranty. Accessories are covered by a separate warranty and detailed information can also be found at the link above.

Canada Customers Only: For full details on the 3 year parts and labor warranty, terms of sale, and related policies and procedures, please visit: https://www.everlastwelders.ca/terms.php.

Who do I contact?

USA Technical Support:

Email: tech@everlastwelders.com
1-877-755-9353 ext. 207
9am-5pm Eastern (Closed holidays)
Monday-Friday

USA Welding Support and General Product Information:

Email: performance@everlastwelders.com
1-877-755-9353 ext 204
9am-6:30 pm Eastern (Closed holidays)
Monday-Friday

USA Sales and Main Office:

Email: sales@everlastwelders.com
1-877-755-9353 ext 201
9am-5pm Pacific (Closed holidays)
Monday-Friday

Canada Technical Support:

Email: mike@everlastwelders.ca
905-570-1818
9am-4pm Eastern Monday-Thursday
9am-12pm Eastern Friday

Canada Sales and Main Office:

Email: sales@everlastwelders.ca
905-570-1818
9am-4pm Eastern Monday-Thursday
9am-12pm Eastern Friday

Other Countries and Regions:

Visit the U.S. Website @ www.everlastwelders.com and click on the flag of the country or region represented that is closest to you. If your country or region is not found, call the U.S. office at 1-650-588-8588 between the hours of 9am to 5pm Pacific, Monday through Friday.

Safe operation and proper maintenance is your responsibility.

Everlast is dedicated to keeping safety a top priority. While we have compiled this operator's manual to instruct you in basic safe operation and maintenance of your Everlast product, it is no substitute for observing safe welding practices and behavior. Safe welding and related cutting operations require basic knowledge, experience and ultimately the exercise of common sense. **Welding does significant hazards to your health and life! Exercise extreme caution and care in all activities related to welding or cutting. Your safety, health and even life depends upon it.**

WARNING! If you do not have proper knowledge or capability to safely operate this machine, do not use this machine until proper training has been received!

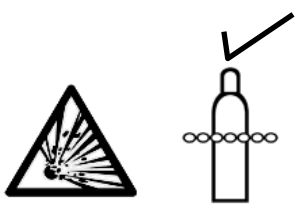
While accidents are never planned, preventing an accident requires careful planning. Stay alert!

Please carefully read this manual before you operate your Everlast unit.

The warranty does not cover damage or harm created by improper use. neglect of the machine or failure to follow safe operating practices.

NOTICE:	
	Welding and cutting operations may generate undesirable High Frequency (HF) and EMF energy. This can interfere with surrounding electronic equipment such as computers, routers, CNC equipment, televisions, radios, fluorescent lighting etc. If disturbance in surrounding electrical and electronic equipment is noted, consult a licensed electrician to help properly ground surrounding equipment to limit the interference. This machine may cause GCFI and ground fault outlets to malfunction. This unit is designed to be operated on a dedicated, properly grounded circuit.

Safety Warnings, Dangers, Cautions and Instructions

	**NOTICE.** This unit manual is intended for users with basic knowledge and skillset in welding. It is your responsibility to make certain that the use of this welder is restricted to persons who have read, understand and follow the warnings and instructions in this manual. If you or the operator needs further instruction, contact Everlast welding support at 1-877 755-9353 ext. 204 or seek qualified professional advice and training.
	**WARNING!** High Frequency (HF) energy can interfere with the operation of pacemakers and can damage pacemakers. Consult with your physician and pacemaker manufacturer *before* entering an area where welding and cutting equipment is in operation and *before* using this welder. Some pacemakers have limited shielding. Alert any users or customers of this potential problem.
	**WARNING!** Use approved safety glasses with wrap around shields and sides while welding and working in the weld area or serious eye damage or loss of vision may result. Use a grinding shield in addition to the safety glasses during chipping and grinding operations.
	**WARNING!** When welding always use an approved welding helmet or shielding device equipped with at least an equivalent of a shade 9 or greater. Increase the shade number rating as amperage increase over 100 amps. Inspect helmet for cracks in lenses and in the helmet. Keep lens covers in good condition and replace as necessary.
	**WARNING!** Welding/cutting operations carry inherent risks which include but not limited to possible cuts burns, electrical shocks, lung damage, eye damage and even death. Take all appropriate measures to use proper Personal Protective Equipment (PPE). Always use leather welding gloves, closed toe (preferably reinforced or steel toe leather shoes, and long-sleeved flame resistant clothing (i.e. denim). Do not wear Poly/Nylon blend materials.
	**DANGER!** Welding poses shock and electrocution risks. Keep this welding equipment dry. **Do not weld in the rain or where moisture accumulates.** Use dry, rubber soled shoes, gloves and clothing when welding. Do not rest or contact work clamp (ground) when welding. Keep all parts of the body insulated from the part being welded when possible. Do not touch both terminals or connections at the same time. Consider all welder parts to be "live" at all times even if no welding is being performed. Do not use frayed welding cables.
	**CAUTION!** Fires are possible but also preventable while welding. Always remove flammable rags, papers, and other materials from the weld area. Keep rags stored in an approved flame proof canister. Keep a fully charged fire extinguisher at hand. Remove any fuels, oils, paint, pressurized spray cans, and chemicals from the weld area. Make sure any smoke/fire detectors are function properly. Do not weld on tanks, drums or barrels, especially if pressurized or sealed. Do not weld on any container that previously held fuel or chemicals. Make sure the weld area is clear of flammable materials such as grass or wood shavings solvents and fuels. Do not wear frayed or loose clothing. Visually inspect and recheck the work area after welding looking for smoldering debris or flames.
	**WARNING!** Welding gas cylinders are under high pressure. Keep all gas cylinders upright and chained to a cart or held safely in a safety holding pen. Never transport gas cylinders in an enclosed car van or other vehicle. Transport gas cylinders securely. Keep all cylinders capped while not in use or during transport. Replace the cap on the cylinder when it is going to be more than 24 hours before use. Do not use or attempt to repair faulty regulators. Never weld on gas cylinders. Keep gas cylinders away from direct sparks.

Safety Warnings, Dangers, Cautions and Instructions

	**DANGER!** Welding and cutting operations pose serious inhalation hazards. Some of these hazards are immediate while others are cumulative in their effect. **Do not weld in enclosed spaces or in areas without adequate ventilation.** Fumes and gases released in the welding and cutting operations can be toxic. Use fans or respiration equipment to insure adequate ventilation if you are welding in a shop or garage area. **Do not weld on galvanized metal under any circumstance. You may develop metal fume fever. Symptoms are similar to lu-like symptoms. Seek medical advice and treatment if you are exposed to galvanized welding fumes.** **If you experience any eye burning, nose or throat irritation while welding, these are signs that you need more ventilation.** If you feel these symptoms: • Stop work immediately and relocate work area with better ventilation. • Wash and clean your face and hands. • Stop work completely and seek medical help if irritation persists
	**DANGER! Never use brake cleaner or any chlorinated solvent to clean or degrease metal scheduled to be welded or other related equipment in the area being welded.** The heating of this cleaner and its residue will create highly toxic phosgene gas. Small amounts of this vapor are harmful and can lead to organ failure and death. If degreasing of a part is necessary, use Acetone or an approved pre-weld cleaner. Use the proper personal protective equipment (PPE) when handling any cleaners/solvents.
	**DANGER! People with pacemakers should consult a physician and pacemaker manufacturer before welding. There is a potential for damage or serious malfunction resulting in death. High Frequency energy (HF)/Electromagnetic Fields generated during welding can interfere with pacemaker signals, even permanently damaging it. Some pacemakers offer some shielding, but restrictions regarding amperage and HF/HV starting of TIG arcs may be placed upon the individual. Warn all potential bystanders that they should exit the work area if they have a pacemaker or similar medical equipment before welding. Consult with a Physician if a pacemaker is expected to be implanted.**
	**DANGER!** Never defeat or modify any safety guards or shields. Keep all safety covers and shields in place. Never place your fingers in or near a fan shroud or insert any object into the fan(s).
	**WARNING**! The intense flashing and strobing effects that are common with welding processes, particularly when using the Pulse function may cause seizures in people with a history of photo-sensitive Epilepsy. Be mindful of others in the welding area who may have such sensitivities. Keep them clear of the area.

Safety Warnings, Dangers, Cautions and Instructions

	**CAUTION!** Trip Hazards exist around welders. Cords, cables, welding leads and hoses pose a trip hazard. Be aware of their location and inform others of their location. Tape and secure them so they will stay out of high traffic areas.
	**CAUTION!** Welded metal can stay hot long after welding is completed. Burns may occur. Always wear gloves or use tongs/pliers when handling welded or cut metal. Remember the heat from the metal may catch other material on fire. Always have a fire-proof area ready to place welded components until they fully cool. Use soap stone or a metal marking marker to label the metal as "HOT" to serve as a reminder to all present in the area.
	**CAUTION!** Welding and cutting operations generate high levels of ultraviolet (UV) radiation which can burn and damage skin and eyes. The intensity is so high that exposed skin and eyes can burn in a few minutes of exposure. Minimize direct skin and eye exposure to this intense form of radiation by using proper PPE and sun screen where appropriate.
	**CAUTION!** Do not allow bystanders. Do not allow others without proper Personal Protection Equipment (PPE) suitable for welding to stand in the welding area or to observe welding and welding related activities. If protection is not readily available, use a welding screen to separate the welding area from the rest of the area. If no protection or screen is available, physically exclude them from the welding area by a wall or other solid divider. Keep all pets and young children away from the welding area.
	**CAUTION!** Electromagnetic Fields can be generated by this welder and radiate into the work place. The effect of EMF is not fully known. Exercise caution when welding by: NOT draping welding leads (guns/cables) over your shoulders or arms, NOT coiling them around your body, NOT inserting yourself directly between the cables, and by NOT contacting the unit while welding. DO keep the work clamp connected as close as possible to the area of the weld and directly to the object being welded whenever possible.

**NOTICE:
If any electrical disturbance is noticed as a result of the High Frequency operation of this unit during arc starting, the HF service bolt located on the rear of this unit should be connected directly to a 12 gauge wire that is bonded directly to an outside copper ground rod driven into moist soil. (see location on rear panel page) Additionally, all metal items including any metal frame or sheeting of the building should be connected and grounded to separate copper ground rods driven into the ground at 10 foot intervals around the perimeter of the building. This includes items such as tables, carts, rack material, metal surrounds, etc. that may act as "antenna" to radiate/absorb HF energy. Additionally, all cords and welding leads should be twisted together and run directly to the work without coils or excess cabling.

Important Information: Operating this unit with a generator or other off-grid service.

This welder should only be operated on a generator certified by its manufacturer to produce clean power. Clean power is equivalent to the quality of household or shop/garage type power. This means the generator must have 5% or less total harmonic distortion (THD) of the Sine wave. If you are unsure of the power output type of the generator, contact the manufacturer of the generator for verification. *Do not operate on square wave or modified square wave generators or converters/inverters or damage or malfunction may occur. Damage caused by running this welder off of "dirty" power or modified sine waves may not be readily apparent and is usually cumulative in nature. However, damage may present itself immediately. The damage caused by running this welder on "dirty" power usually leaves internal tell-tale signs and damages specific parts.*

When operating on 240V 1 phase generator power, you will need a minimum size of 9500 Surge Watts. Ideally, it is recommended for use with 10,000 Surge Watt generators or larger. Operating the unit on under-powered generators and/or on generators not rated with 5% or less THD can damage your unit. *The generator manufacturer determines this rating, not Everlast.* Do not assume that a name brand generator, or a "new" generator provides clean power. Price paid does not guarantee a clean power output either. There are multiple brands at various price points capable of producing clean power. Investigate this before purchasing a generator. The manufacturer will usually state that a unit is clean power in the advertising information and will state actual THD. If the manufacturer does not state it, contact the manufacturer directly for actual THD.

NOTICE! Operation of this unit with a generator not stated to provide clean power (5% or less THD) by the manufacturer of the generator is prohibited and will void the warranty. Use only with generators/inverters/converters that produce an equivalent type of sine wave used in shops, homes and "shore" type systems. **Do not use with any off-grid power delivery system that produces more than 5% Total Harmonic Distortion (THD).**

WARNING! Do not start or stop the generator with the welder switched on. Never use the generator in ECO mode or an auto-idle mode. Even with a clean power rated generator, this action can damage the unit. *Turn on the welder only after full generator R.P.M. has been achieved and the engine is sufficiently warmed up.* Closely monitor generator fuel level so that the engine R.P.M doesn't drop or completely shut down with the welder plugged in. **For best practice: do not start or stop the generator with this welder plugged in, even if it is turned off. Unplug the welder before shutting down the generator.**

If using with a welder generator, make sure the manufacturer has determined that the generator portion produces a clean sine wave. Many older models do not. Some newer models use "divided" power between welding and generating and cannot supply the full power to the welder unless the fine current control knob is turned to maximum. Do not use this unit with such welder/generators unless the Power/fine current control is turned to 100%. Some welder generators do have a separate alternator for generating power. If this is the case, do not weld or load the generator on other circuits while this welder is in use.

WARNING! Always make sure any generator or welder generator is properly grounded, according to local code and manufacturer's instructions. Ground the machine per the generator manufacturers instructions to meet code. Improperly grounded generators may damage the machine and more importantly may cause severe injury or death. Damage resulting from improperly grounded generators is not covered under warranty.

Dual Voltage Single Phase 120/240V Operation:

This unit may be used with either single phase 120V or 240V output. Output will be reduced automatically when operating on 120V. However, for the higher voltage (since the standard of 240V is nominal and actual voltage may vary somewhat), the unit may be used with single phase 208V if the voltage does not drop below 205V. If using this unit on 208V, duty cycle and display accuracy may be affected. Rated and Inrush Amperage will rise proportionately as well. If you decide to use this machine on 208V, before installing permanently, have an licensed electrician monitor voltage fluctuations, particularly under load and during peak use times. If the voltage remains constant, and steady without dropping below the 205V threshold, this unit may be used. Damage caused by using on undervoltage power sources is not covered by the warranty. Always be aware of the voltage output and the quality of the power source being used.

Breaker Sizing and Wiring Requirements

Before installation of this unit in any facility, always consult a licensed local electrician familiar with the requirements of properly wiring a welder into the electrical supply. Refer to the National Electric Code (NEC) and local codes. If needed, refer the electrician to Article 630 of the NEC during consultation to determine proper application and wiring needs. Use the $I1_{MAX}$ and the $I1_{EFF}$ ratings listed above to determine the proper breaker and conductor (wire) sizing required. Everlast welders are designed around use in industrial wiring applications and are intended to be used with modern electrical systems. Household wiring may need to be upgraded before this welder may be installed.

NOTICE: The ratings for 120V and 240V are different. Please see information in this manual or use the data/specification information found printed on the side of the welder.

WARNING! Do not modify the welder wiring. This unit meets the standards for conductor sizing on the power cable and takes into account power cable length, duty cycle and rated current.

Specifications

Duty Cycle Information and Explanation

Duty Cycle is defined per North American Specifications as the amount of time out of a 10 minute period in which the unit can operate when tested at 40° C (104° F). For example, this unit has a stated duty cycle of 35% at maximum output. That means that the unit can be actively welding for at total of 3.5 minutes out of a 10 minute time period at the maximum output of the welder (215A MIG/TIG output and 175A Stick output). Everlast uses a maximum output rating to figure duty cycle on this unit. A duty cycle of 35% is considered to be a commercial duty cycle class welder and is suitable for daily commercial use for light to medium manufacturing and production welding. Reducing the output of the machine will increase the duty cycle if all environmental factors are equal. Lowering the ambient air temperature and relative humidity will also help to increase duty cycle somewhat.

The duty cycle rating of this welder is tested at an ambient temperature of 40°C (104° F) to ensure conformance to the North American Standard Standards . Operating the welder above this temperature point, or in extremely humid conditions, or while obstructing free flow of air in and around the unit may reduce the duty cycle of the welder. Additionally dirty units may suffer loss of duty cycle. As indicated previously, under normal conditions, the duty cycle will increase somewhat as ambient air temperature drops so long as the unit has access to clean, dry air.

The welder's duty cycle is not actually limited or controlled by a timer. Nor is it required to manually tabulate use time while welding. Rather than a timer, the welder is equipped with a heat sensor located on a heat sink near the critical power components of the welder. The sensor circuit is designed to interrupt the welding output of the welder if the unit overheats and exceeds the factory-set maximum operating temperature. If the operating temperature of the unit is exceeded, welding output will stop and an over-temperature warning light/error code will be displayed on the panel. The unit will continue to run the fans and act normally except no welding output will be allowed until it cools below the trigger threshold. **If a duty cycle event is registered, do not switch the unit off! Allow the welder to continue to run at idle for at least 10-15 minutes until the temperature has fallen enough to reset the sensor and over-temperature warning light**. *Even if the unit resets, allow the unit to cool for a full 15 minutes, or the duty cycle will be quickly triggered again since the unit resets just below the set temperature threshold.* After 15 minutes of cooling, you may switch the unit off if you are finished welding. If the unit does not automatically reset after 15 minutes, turn the unit off. Wait for 15 seconds before turning the machine back on. If the unit does not reset, contact technical support for further advice and assistance. As a best practice, when you have completed all welding activity and have been welding continuously for extended periods of time at moderate to high Amperages, keep the welder switched on for an additional 10 minutes without actively welding to allow it to cool.

The intentional and/or repeated triggering of the duty cycle protection feature on this unit will shorten the lifespan of the unit's electronics and can weaken internal components. The effect of overheating your unit repeatedly takes a cumulative toll on the welder. and can lead to early failure of internal components, guns and torches.

WARNING!

This unit is not designed for Air Carbon Arc Gouging or Cutting. Do not this unit for this application. It is not designed to sustain the high volt and long arc characteristics needed for Carbon-Arc use.

WARNING: Any Carbon-Arc use will instantly void the warranty! Do not be tempted to use Carbon-Arc Gouging or Cutting under any circumstances, regardless of the gouging electrode diameter that is intended for use.

NOTICE:

This manual has been written to guide the user in safe operation of the " Thunder" series MIG/TIG/Stick welder. Due to Everlast's continual effort to improve and advance the design of the Thunder series, units currently in production may have updated designs and programming improvements not found in earlier production models. Older models may not always be updateable without returning the units for major service (at customer's expense). Additionally, if an update is ruled to be possible, this is not considered to be a part of warranty work and is not eligible for return/exchange, unless it is an update designed to address and to correct a critical malfunction of the welder. *Some functions and specifications, not significantly affecting overall appearance or operation of the welder, may change from time to time without notice. Everlast holds no obligation and offers no promise, guaranty or any form of assurance to the customer or user to update older units to newer programming, features, accessories or styles found on subsequent model updates and releases, except those deemed by Everlast to be warrantable items related to welder malfunction or inadequate performance.*

Specifications

Product Specifications (Continued on next page)	
Welder Base Construction Type	Digital IGBT Inverter-Based Design with 4.4" HD (720) Screen. (Full Diagonal Measurement)
DC Processes	GMAW, FCAW, SMAW, GTAW-P (MIG, Gasless Flux-Cored, TIG, Stick)
Input Voltage/ Hertz/ Phase	Dual Voltage 120/240V (± 10%) 50/60 Hz 1 phase
$I1_{MAX}$ Current Rating (Inrush Amps)	**120V:** 33A / **240V:** 37A
$I1_{EFF}$ Current Rating (Effective Rated Amps)	**120V:** 20A / **240V:** 23A
OCV/ OCV with Voltage Reduction Device Selected	**MIG:** 85V / **TIG:** 85V / **Stick:** 85V (With VRD Selected <24V)
MIG Duty Cycle @ Rated Output (Rated a 40° C / 104° F)	**120V:** 35% @ 125A/ 20.2V 60% @ 100A/ 19V 100% @ 80A/18V **240V:** 35% @ 215A/ 24.7V 60% @160A/ 22V 100% @ 130A/ 20.5V
TIG Duty Cycle @ Rated Output (Rated at 40° C / 104° F)	**120V:** 35% @ 125A/ 15V 60% @ 100A/ 14V 100% @ 80A /13.2V **240V:** 35% @ 215A/ 18.5V 60% @ 160A/ 16.4V 100% @ 130A/15.2V
DC Stick Duty Cycle @ Rated Output (Rated at 40° C / 104° F)	**120V:** 35% @ 100A/ 24V 60% @ 80A/ 23.2V 100% @ 60A/ 22.4V **240V:** 35% @ 175A/ 27V 60%@ 130A/ 25.2V 100% @ 100A/ 24V
MIG Wire Feed Speed Range (WFS):	60-600 IPM /.5-15 M/M
MIG Drive Roll Sizes/ Types	Stock: .030"-.035" (.8-.9mm) V groove (solid steel and stainless wire)
MIG Output Range V/A (DC)	**120V:** 30-125A/ 15.5-20.2V **240V:** 30-215A/ 15.5-24.7V
TIG Output Range V/A (DC)	**120V:** 10-125A/ 10.4-15V **240V:** 10-215A/ 10.4-18.5V
Stick Output Range V/A (DC)	**120V:** 10-100A/ 20.4-24V **240V:** 10-175A/ 20.4-27V
TIG Start Type	Solid State HV (Simulated HF, No point gap), Lift with Remote, Live Lift
Pre Flow / Post Flow Gas Time	**MIG:** PREFLOW: 0-5 S; POSTFLOW: 0-15 S / **TIG:** PREFLOW: 0-5 S; POSTFLOW: 0-20 S
MIG Start/End Wire Feed Speed (WFS)	60-600 IPM/ .5-15 M/M
TIG Start Amps (Initial); End Amps, (Crater Fill)	**120V:** 10-125A; 10-125A **240V:** 10-210A; 10-210A
TIG Remote Functions	Pedal, 2T, 4T, 2T+A, 4T+A (+A denotes operation with special torch with separate switch and amp control)
MIG Remote Functions	2T, 4T
MIG Upslope/ Downslope (Ramp up/Ramp Down WFS)	UPSLOPE: 0-1.0 S DOWNSLOPE: 0-1.0 S
TIG Upslope/ Downslope (Ramp up/Ramp Down Amp)	UPSLOPE: 0-5.0 S DOWNSLOPE: 0-5.0 S
TIG Pulse Frequency Hz (No MIG Pulse on this model)	0-150Hz
DC TIG Pulse Wave Form Shape	Square only
TIG Pulse Time On (Pulse Duty Cycle)	5-95% of total pulse stage duration during one cycle (also called pulse "peak")
TIG Pulse Amps (Background Current)	10-90% of welding amperage
TIG/MIG Spot Timer (Arc on time for Spot welding)	.1-10.0 S (adjustable in Tenths) NOTICE: User must turn on Spot function to utilize stitch function.
TIG/MIG Stitch Timer (Arc off time between Spot welds)	0-10.0 S (adjustable in Tenths) Notice: User must set to 0 to turn off activity of the Stitch function.
Stick Arc Force Control	0-100% over set Amperage. Limited to the maximum available overhead current.
Stick Hot Start Amps (Intensity)	0-100% over set Amperage. Limited to the maximum available overhead current.
Stick Hot Start Time (Duration)	0-2.0 S (adjustable in Tenths)
Ant Stick Function (Stuck Rod)	Yes. Lowers current output when rod is stuck for easy removal.
Stick E6010 or EXX10 Capable (Cellulose Type)	Yes, with E6010 selected. (6011, 6013, 7018 rod selections also available for selection)
Memory Function	Save up to 30 Programs with lockable settings. Each program can be individually named.
Wire Jog function	Yes
Gas Purge Function	Yes
Standard MIG Gun Type/Length/Connector Type	North 24 series (Some models North 15 series) 10 ft (3m) with Euro Quick Connect
Standard TIG Torch Type/Length/ Connector Type	NOVA Rigid-Neck 26 Series Air Cooled, 12.5 ft. (4m) DINSE 35/50mm^2 (1/2" nominal lug diameter)
Optional MIG Guns Supported	15 (200A)and 24 (250A) series recommended. 10 ft (3m) is recommended with wires .030" and smaller in diameter. 10 ft (3m) also can be used with most aluminum wires. Use with longer guns with all aluminum wires and steel/stainless wires .30" and smaller may cause erratic feeding. May be used with steel liner (for steel) or optional Teflon liner (aluminum). 15 ft (5m)is permissible for steel wires .035" and greater.

Specifications

Product Specifications Continued	
Spool Gun/ Push Pull Gun Options	Spool Gun: Parker DSP360 Push/Pull Gun: North MPG 300A
Work Clamp with Cable Length	250A, 9.5 ft. (2m) DINSE 35/50mm^2 (1/2" nominal lug diameter)
Stick Electrode Holder Length	250A, 9.5 ft. (3m) DINSE 35/50mm^2 (1/2" nominal lug diameter)
Power Cable Length	6.5 ft. (2m)
Power Plug Type for Single Phase Operation	NEMA 6-50P (Standard 240V Welder Type, 3 Wire in North American Markets Only.)
Cooling Method and Type	Fan with full-time operation
PowerSet Mode (Synergic Assist for User Setup)	For MIG, TIG and Stick modes.
Rapid Adjustment Function	During parameter adjustment, press in on the adjustment knob responsible for adjusting/controlling the parameter value and the parameter will be adjusted in larger increments (Amps x 10, Seconds x 1.0, % x 10 etc.)
On-Screen/In Menu Unit System Selector	Display outputs all measurements in either the Metric (SI) system or in the Imperial System (English/US). **Select from the on screen menu MET (METRIC) or IMP (Imperial) to change units of measure.** All speed measurements, diameters and thicknesses will be changed and displayed in the user selected unit system.
Dimensions with Handles installed (installation optional)	17.8" H X 9.6" W X 27.5" L (453mm H X 244 W X 699mm L) Includes handles and fitting stickouts.
Weight (Bare Unit)	57 lbs. (25.9 Kg)
Ingress Protection Rating	IP21S
Operating Temperature Range	14-104°F/ -10-40°C (If operated higher than 104°F/40°C then duty cycle will be lowered significantly.
Recommended Welding Cart (Optional)	PowerCart 375

NOTICE:

This unit supplies DC output only for TIG. DC TIG is suitable for welding most metals except Aluminum and Magnesium. In MIG mode a spool gun or push pull gun or stock gun with a polymer liner and U groove drive rolls can be used to weld aluminum. However, the minimum thickness for this type of aluminum welding is typically 1/8" (3.2mm) or greater. Some results may be obtained down to 14 gauge, but burn through may be common.

NOTICE:

This unit is not shipped with any default settings or saved programs, with the exception of the preset PowerSet programming. Any saved programs or settings entered into the machine on initial startup should not be construed to be "factory settings". The settings and programs that may be entered into the unit are a result of a series of tests performed on the unit during final inspection. The unit is designed to automatically save the last setting used in each process. These units are both live and stand tested for quality control. Additionally the units go through a "burn in" period at which some functions may be activated or tested. The last test configurations performed may not allow the welder to create a useable weld.

Setup Guide

Getting Started

UNPACK THE UNIT.

Upon arrival, you will need to completely unpack your unit, and check things over. This is a time sensitive matter. Do not delay or hold the welder unopened in the box. First, make sure the unit is opened from the top. Be careful with using knives and sharp objects so you won't cut cords and cables inside the boxes. Lay all items out and inspect them.

You should have the following in your box:

1. Welder.
2. Wired NOVA Foot pedal 25 ft. (NOVA wireless pedal optional).
3. NOVA 26 Series air-cooled rigid neck torch 12.5 ft. (4m).

3a. 2T/4T Remote torch switch (maybe loose or attached to torch).

4. North 24 series MIG gun 10 ft. (3m).
5. 250A Stick electrode holder (approx. 9.5 ft with cable).
6. 250A Work clamp (approx. 9.5 ft with cable).
7. TIG Consumable starter kit (x2). Tungsten not included.
8. Argon regulator, floating ball type with hose.
9. *Installed, not pictured:* 6.5 foot power cord with NEMA 6-50 Plug.
10. 240V to 120V Pigtail adapter.
11. TIG consumable starter kit (Tungsten not included).

NOTICE:

The foot pedal may arrive with the top separated from the bottom. This is not damage. The top can easily be installed on the bottom, by aligning the pivot pins with the corresponding holes for the pins located in the top. The pins are spring loaded and can be squeezed so that the top slides down onto the pins. The pins will pop out into the holes and allow the top to pivot once the pins and holes are properly aligned. You may need to make sure the pressure return spring is flipped so that it pushes back against the pedal as it is assembled. Similarly, the foot pedal may be easily disassembled by pressing in on the ends of the pins on both sides to remove the top.

12. *Packed separately, not installed:* Front, rear and middle handles.

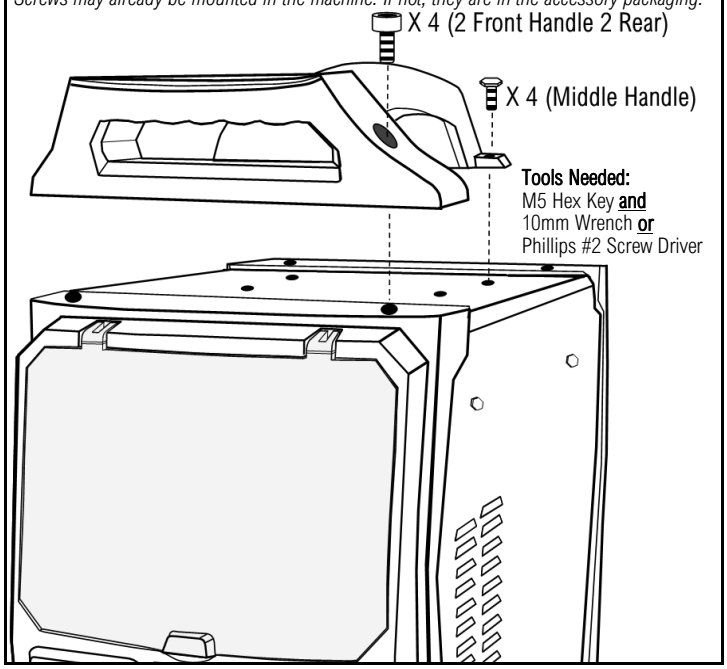
When you receive your package, inspect the unit for damage. Check for the presence of and the general condition of the accessories. Some slight rubbing or chaffing of some of the accessories may be present. This is considered normal. If any item is damaged or missing, please inform Everlast within 72 hours of product receipt. See pages 4 and 5 for more details. Check all packaging, box corners and flaps for small items.

ASSEMBLE AND READY THE UNIT.

Assemble the front, middle and rear handles with the supplied screws. Do not overtighten. *Screws are usually found pre-mounted in the case.* Remove the factory shipped plastic over the screen. Install cut-to-fit screen protector (not included, customer supplied) on the screen, if desired, before use.

Assemble the Handles

Screws may already be mounted in the machine. If not, they are in the accessory packaging.



POWER UP AND TEST THE UNIT.

You will need to fully test the unit as soon as possible. Within 72 hours after delivery of the unit, be sure to have every thing you need at hand to test the unit. Make sure the correct input power, wiring, and plug configuration is being used. Then, power up your machine without any accessories installed. Allow the unit to idle for 15 minutes. Check and observe operation of knobs, controls and keys, cycling through each as required. *Make sure the fan is operating via the control panel menu setting.* After the test is completed, turn the unit off, connect the accessories, and shielding gas (customer supplied) to conduct live testing. Test all of the functions and features of the machine. For testing and welding, make sure the work clamp is connected directly to the part being welded (the work). Check for arc starting and stability. If problems are observed, contact Everlast for further guidance. See page 5 for more information.

NOTICE: *Cosmetic damage claims made after 30 days will not be accepted, unless Everlast is contacted and informed of such delay and reason for such a required delay (i.e. Overseas deployment or sudden disability).*

CHECK FOR GAS LEAKS.

This unit has two gas connections on the rear. Each connection should be tested. Be sure to check for gas leaks before attempting to weld. You can best test this by first installing each torch separately.

For TIG: Install both back caps into the TIG torch head (from both sides). Next, remove the gas plug on the rear (save for storage use) and install the regulator. Tighten fittings on both cylinder and unit (see section on

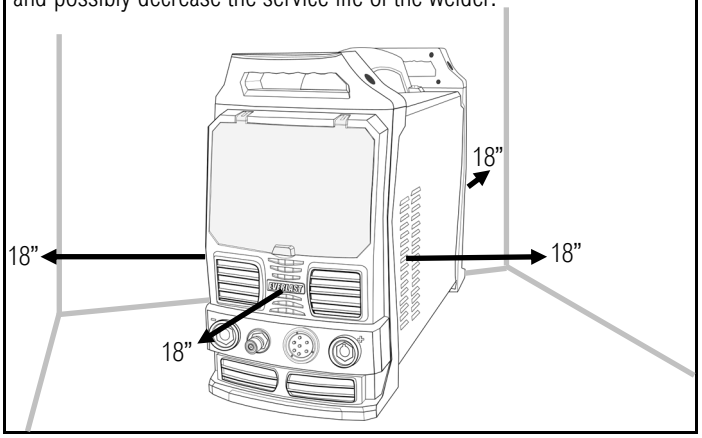
Getting Started

regulator installation). After the regulator is secured, set post flow time to maximum. Trigger a false start with either the foot pedal or torch switch by tapping and releasing so that post flow can flow. Observe the ball on the regulator. It will briefly float before settling back down. If the ball continues to flow, or if you hear or suspect leaks, use warm, soapy water (or a dedicated leak testing solution available from welding suppliers) and spray on all connections, including the TIG torch connections at the head, and back cap. Don't forget to check the connections underneath the torch handle. If any leaks are present, bubbles will form around the area of the leak. Tighten any clamps or fittings found to be leaking. If the problem cannot be remedied, contact Everlast.

For MIG: The process of testing MIG is similar except the MIG gun should be installed securely into the Euro-Quick connect base on the unit. The hand nut on the gun connector should be tightened and the gun connector should be gently wiggled and pushed in at the same time to check for secure seating. Retighten the hand nut on the connector. **Do not use tools. Hand tighten the connection only.** Check all connections and use the same technique used to check for TIG leaks.

Allow Air Flow Space of at least 18"

Keep a distance of 18" from all sides to promote cooling and preserve duty cycle. Less air space will reduce duty cycle, accelerate overheating and possibly decrease the service life of the welder.



DISTANCE YOUR WELDER FROM YOUR WORK.

As a best practice technique, be sure to locate the welder away from the immediate welding area. The fan found in your unit is powerful enough to create strong air turbulence in the weld area. When the fan cycles on, it can disrupt the smooth, even flow of shielding gas around your weld creating unstable arcs and porous welds, resulting in dull finished weld. If possible, the welder should be located at least 6 feet away from the weld area and should be placed on a different level to prevent weld porosity and defects being created by the welder's fan system. Keep in mind that air flow exits from both the front and the sides of the welder.

GIVE YOUR WELDER SPACE TO COOL.

The welder needs room to cool itself. Place the unit in a place that will allow 18" from all sides to allow for proper cooling. The welder pulls air in from the rear, and pushes it through the unit's heat sinks to cool the electronics. The air is then exhausted through the front panel and side louvers of the unit. If any side is blocked or restricted, the duty cycle will be reduced, leading to possible damage from chronic overheating. The recommended Everlast/ NOVA Cart 375 LF has ample room for cooling built into the design of the cart. Never attempt to restrict air flow by attaching filters to the vents or altering the vents in any way. *Home-built carts need to allow free flow of air on all sides. Dividers and blocking plates should be avoided. Never place multiple machines side by side unless the proper air space is observed.*

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CONNECT THE WELDER TO THE OUTLET.

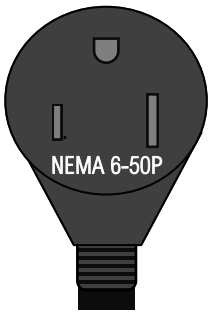
NOTICE:

There are special rules centered around wiring an outlet for service with a welding machine. The National Electric Code under Article 630 has developed specific regulations for wiring electrical service for welding equipment. These are different than for other types of service such as a stove or dryer in a household or even in a commercial application. You need to consult and/or employ a locally licensed electrician before installing this unit to make sure all national and local codes are followed. If you are not qualified to make these connections, do not try to make them. Everlast is in no way liable for any damages caused by improper connection of your welder. Your welder should be on a dedicated branch circuit not far from an electrical disconnect box. It is very important that the welder not share circuits with other shop or household items. Do not attempt to adapt existing household circuits because conductor wire colors are different for welders. Additionally, only 3 wires are used for single phase welders. No neutral is used in a welder circuit. The white and black wires are used as conductors in a single phase welder service. A red wire is not used. *The input power cable and plug conforms to North American standards for size, length, with consideration given to inrush amperage, rated amperage and duty cycle. Do not modify, or attempt to rewire your unit. This will void your warranty.*

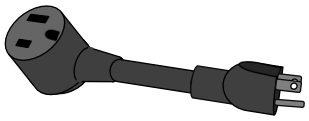
Your unit has been shipped with a NEMA 6-50P plug and 6.5 ft. (2m) cable installed on the unit. This is the standard type plug used for 240V 1 phase welders in North America. For single phase 240V connection, select a NEMA 6-50 Receptacle for operation with this unit. (Other regions/ countries vary). A neutral is not used. In a dedicated circuit, the wire wires supplying power (the conductors and ground) are black, white and green. A red wire, which is traditionally used as a "hot" leg (power conducting wire) of power is not present in a three-wire 240V wire circuit of a plasma cutter. From the panel box, the Black wire serves as L1(Hot), White serves as L2 (Hot) and Green serves as G (Ground). No neutral wire is needed, so white is used as a "hot" conductor wire in this instance. It is recommended to either install a receptacle as close to the main panel as possible or install a subpanel cutoff as close to the outlet and welder as possible. Always follow local codes when making these connections. **Do not share or piggy-back another device with this unit.**

When 120V operation is required, simply connect the supplied 240V to 120V pig tail adapter. This adapts the unit from the NEMA 6-50 Plug to the NEMA 5-15 Plug to allow the unit to be used with 120V input without further modification of the welder. No wiring or buss bar changes are required. Once the unit is plugged in, it will automatically detect the new power and boot up in 120V mode. To verify 120V mode, the display screen will reflect the power input mode with one of the center tree information boxes displaying "120V". To change back to 240V input, shut the machine down, unplug the adapter, and reconnect to the 240V power supply. Turn the welder back on to reboot the unit back to 240V operation.

Standard Plug Configuration 1 Phase 240V



240V to 120V Pigtail Adapter (Supplied)



Pigtail Power Adapter
(NEMA 6-50R to 5-15P)

Selecting A Breaker and Wire Size

Select a breaker based off of the I_{1MAX} rating of this unit. This is the maximum inrush current of the unit. The inrush is not a sustained current. The I_{1EFF} rating of the unit is the maximum "rated" current of the machine. When combined with the length of the run from the main panel, this determines the conductor size needed to supply the welder, Refer your electrician to Article 630 and the specification page of this manual (or the specification grid printed on your unit) when selecting the correct breaker and wire size. Use a delayed trip breaker, or slow blow fuse.

Using with 208V 1 Phase

This unit may be operated with 208V service 1 phase service. However voltage should be checked under load before allowing permanent installation. Voltage should not fall below 200V or damage may occur to the unit. Most modern 208V service runs several volts above 208V and is not usually a concern. Older installations where service wiring may be degraded or not up to code may produce sub standard or low voltage not suitable for use with this unit.

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Getting Started

CONNECT YOUR UNIT TO SHIELDING GAS.

Always wear safety glasses when changing a cylinder. Before installing the regulator, stand to the side of the cylinder valve, away from the discharge, and give a quick blast of Argon gas by slightly opening and closing the valve rapidly. This will dislodge any dirt or particles stuck in the valve or the threads. This will help reduce the chance of dirt particles making its way into the solenoid valve, causing future sticking and failure issues.

This unit is equipped with two 5/8" CGA rear gas connections, one for MIG shielding gas(es) and one for TIG shielding gas. This allows both cylinders to be connected at the same time. These connectors are clearly marked on the rear of the welder. When connecting be sure to match the gas to the correct gas connector.

The welder is supplied with a single regulator, which must be swapped from one cylinder to the other unless another regulator is purchased. If only one connecter is connected, be sure to keep one of the red plastic plug (supplied during shipping) inserted into the vacant gas fitting. Both plugs should be kept inserted when the machine is disconnected from service or stored to prevent debris and insects from entering the connector opening.

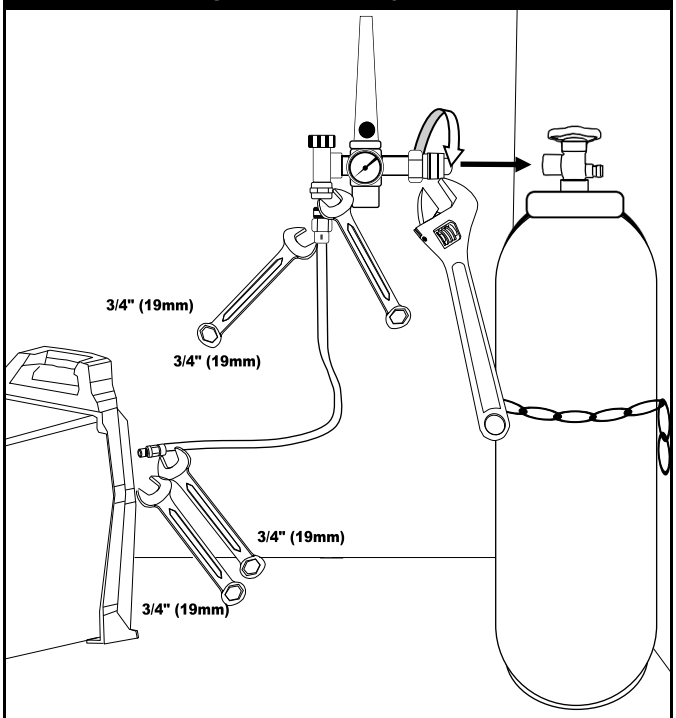
Connecting the cylinder will require a cylinder wrench (1 $^{1/16"}$) to connect the regulator to the cylinder (North American Cylinders with CGA 580 valve). If you do not have a cylinder wrench, a large, adjustable wrench will work. However, make sure it is properly adjusted to prevent rounding of the shoulders of the fitting. Do not use pliers, or a serrated jaw wrench such as a pipe wrench to tighten the fitting.

Connect the regulator tubing to the regulator. The regulator tubing may have either a hose barb connection (Non-North American Markets) or a threaded connection (North American markets). If the regulator supplied has a hose barb, make sure the hose barb fitting is tight on the regulator. Tighten with a 3/4" (19mm) wrench. **If it is a threaded connection, use two 3/4" (19mm) wrenches to hold both the regulator and the tubing connection at the same time.** Hold counter pressure on the regulator connector while tightening the hose fitting to prevent damage to the regulator and to ensure maximum sealing. After connecting the tubing to the regulator, connect the other end of the tubing to the 5/8" CGA fitting on the unit. **Hold the fitting on the unit with one 3/4" (19mm) wrench firmly while tightening the hose fitting with another 3/4"(19mm) wrench.** Other markets outside of North America may feature a hose barb connection in the rear.

IMPORTANT: This is a compression fitting! Do not use thread tape or pipe sealant on any cylinder, regulator or other unit connection. The residue and debris may get into the gas solenoid and cause operational issues. It is recommended that NPT 90° elbow fittings not be used in conjunction with these fittings to reroute the angle of the connection. Use only CGA 5/8" elbow fittings if rerouting of gas line is required.

REMEMBER: *Do not tighten the rear unit connection without holding the female fitting on the unit side with another wrench. If you fail to do so, damage is likely occur to the bezel and the female fitting as the fitting may turn in the plastic housing. Overtightening will cause the fitting to snap-off in the solenoid housing or crack down the threads.*

Connect Regulator To Cylinder And Unit.



Note: In some regions, regulators may have a hose barb connection fitting on the regulator.

CAUTION!

Do not tighten the rear unit connection without holding the female 5/8 CGA fitting located on the unit with a wrench, or damage may occur to the bezel and the fitting as the fitting may turn in the housing while the hose fitting is being turned.

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What Shielding Gas Should Be Used?

The Thunder 215 is a synergic unit which incorporates on screen recommendations for the type of gas needed for each process. The MIG gas recommended may change due to the settings of the unit. This recommendation change occurs when the wire settings cross over into the spray arc range when C25 (Steel) is selected on the panel. This is not an absolute guide. But it is based off of general accepted standards and thresholds. When this change occurs, the numbers will also change to yellow to reflect the process limit has been reached and to achieve best performance the gas should be changed. *If the gas is not changed, performance will begin to become erratic as the spray threshold is reached and surpassed. Even with the proper gas selected welding performance may become erratic as the limit of the wire to handle the volt and amps applied to it is exceeded.*

The following gases should be used with this unit:

MIG

Steel: 75%/25% Ar/CO_2 (75/25 or C25) (for Short Circuit Transfer)
90%/10% Ar/CO_2 (90/10 or C10) (for Spray Transfer)
100% CO_2 (C100) (for Short Circuit Transfer only)

Stainless (Inox): 98%/2% Ar/CO_2 (98/2)
Aluminum: 100% Ar (Argon)

TIG

Steel: 100% Ar (Argon)

For MIG, Steel has a two steel settings on the panel, C25 and C100. *In the North American Market, 75/25 is the standard gas choice for short circuit MIG*. If 75/25 gas mix is not available for use, and 80/20 is an option, then this gas may be used in place of 75/25. Doing so may require more tuning in power set mode to achieve best performance.. The C100 setting is more economical, but will produce more spatter while welding.

This unit is designed to be used with 98/2 Ar/CO_2 blend when welding Stainless Steel. While, there are other gas choices, such as "Tri-mix", 98/2 is typically the most widely available and economical gas for welding Stainless Steel (Inox). It can be used to short circuit or spray arc and works best with the PowerSet setting. Tri-mix may be used but it does not offer spray capability and will require more adjustment in PowerSet mode.

Aluminum will always require the use of pure Argon (100% Ar) shielding gas while welding in MIG mode. This is a widely available and a standard gas throughout the world. Aluminum is designed to only be welded in a spray transfer setting. Short circuit should only be used for thin, non structural applications. Regardless, only pure Argon should be used.

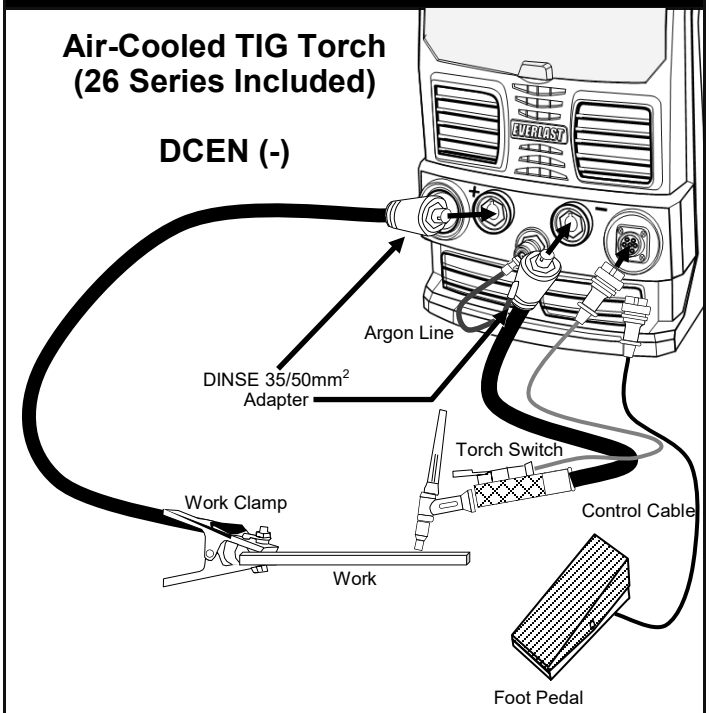
For TIG, gas selection is simple. There is only one gas used. 100% pure Argon. No other gas will be needed for this unit when welding in TIG

SELECT THE PROPER TIG POLARITY AND CONNECTIONS.

Selecting the correct polarity for TIG is quite simple. Whether you are TIG welding in AC or DC, the TIG torch will always be connected to the negative (-) output terminal located on the right side of the welder. Once the TIG torch is in the negative terminal, it will never change as long as you are TIG welding. If you select the wrong TIG polarity (Positive +), the Tungsten will be rapidly consumed. It will ball up and draw back to the collet body after only a few seconds when the arc is initiated. Also, because the HV/HF connection is connected to the negative terminal, the arc will typically be hard to start, since the HV/HF starting energy would be flowing the wrong way through the work clamp and torch. Of course, if the TIG torch is correctly connected, the work clamp will be connected to the positive (+) terminal located on the left side of the welder.

The TIG torch switch or the Foot Pedal is connected to the 7 pin control connector. This allows you to select 2T or 4T control with the torch switch OR foot pedal control.

Where Do I Connect The TIG Torch?



NOTICE: Choose between the torch switch operation (2T/4T) or the foot pedal operation. Only one can be connected at the same time.

SELECT THE PROPER STICK POLARITY.

The electrode holder, or stick torch (also commonly called a "Stinger") will almost always be connected to the left positive terminal of the machine when welding in DC Mode. By default, the work clamp will then be connected to the negative terminal on the right side. This is known as DCEP (Direct Current, Electrode Positive) or "reverse polarity", Although "reverse

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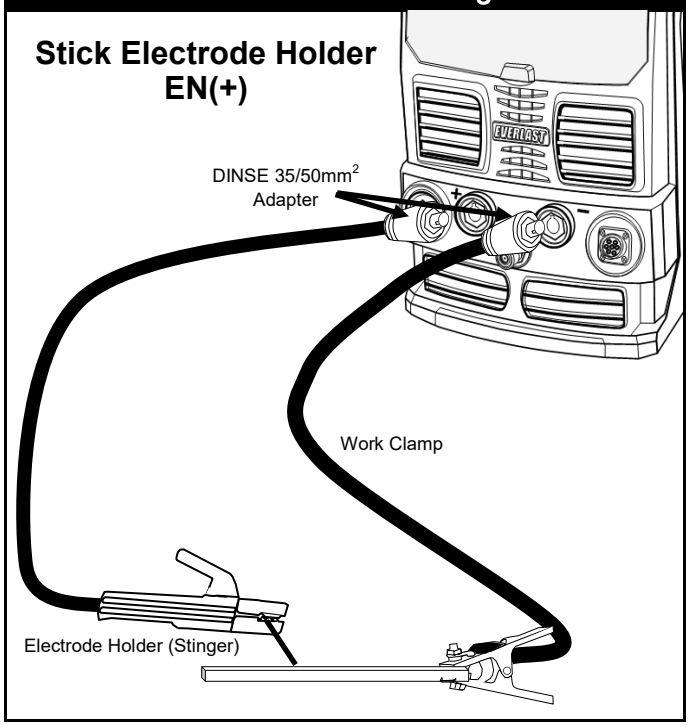
polarity" is an older term, this is still used to refer to Stick torch polarity as is DCEP. Most all welding electrodes (rods) weld primarily in DCEP. There are a few rods like E6011 which can operate well with either polarity. Even so, the preferred polarity is DCEP. Reasons for welding with DCEN are usually to provide a softer arc or to reduce burn through with aggressive rods which produce a driving, harsh arc. Switching to straight polarity (DCEN) in stick mode will not harm the welder, but it may not produce reliable or sound welds.

SELECT THE CORRECT MIG AND FLUX-CORED POLARITY.

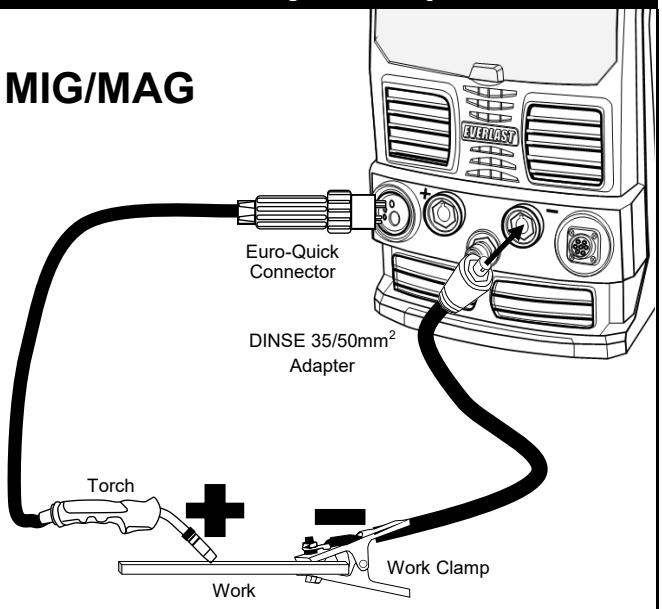
Where Do I Connect the Stinger for DC?



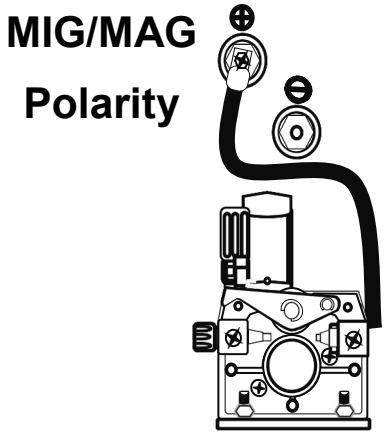
Even though similar in concept, MIG/MAG (GMAW) and Gas-less Flux-Cored (FCAW) welding require a polarity change when transitioning between the two. The unit will remind you with an on-screen prompt to change polarity when you change between the processes, but this is an often over-looked issue, even when reminded by the machine. Failure to change polarity will result in erratic operation, bird's nesting of the wire, poor fusion and excess spatter.

The Flux-Cored setting on this unit is a gasless type of flux core wire. This setting is not meant for dual-shielded flux cored wire that uses shielding gas as another component of shielding while welding. Using dual shielded flux-cored wire will cause inaccurate output of the machine and higher voltage readings than set and typically designed to be used with the machine (at higher settings). This can lead to overheating and damage to the machine. Gasless Flux-cored wire is also a different polarity than most dual shielded flux-cored wires. Gas flow will not be controlled while welding with gasless flux cored wire. No pre or post flow control is used. This applies to the PowerSet settings as well.

How Do I Change Polarity For MIG?



The MIG gun must also be correct in polarity. Drop open the cover on the left side of the MIG to access the wire spool and feeder. Just above the feeder, the are two terminal lugs. The upper is Positive, and the lower is negative. If there are no positive (+) or negative (-) symbols, there may also be a label that says "Gas MIG" and "Gasless". Regardless, the top terminal is positive and the bottom terminal is negative. For MIG, the wire feeder cable should be connected to the top, positive (+) terminal with via the provided screw. See below.



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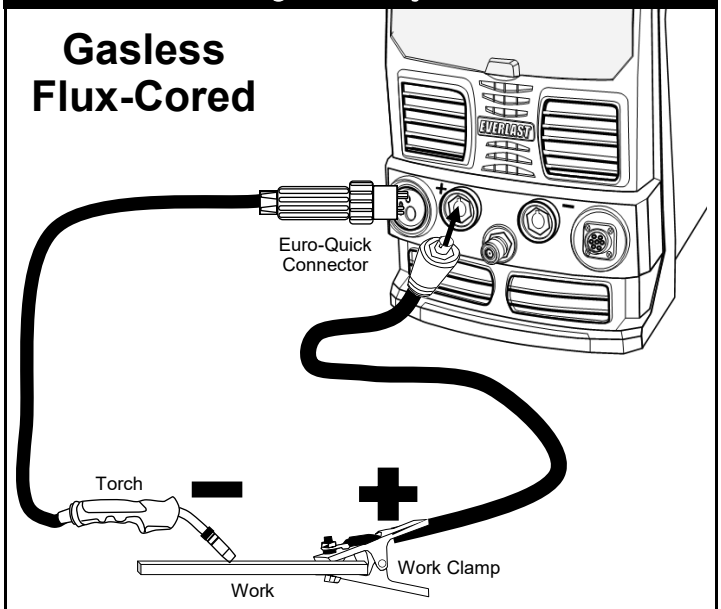
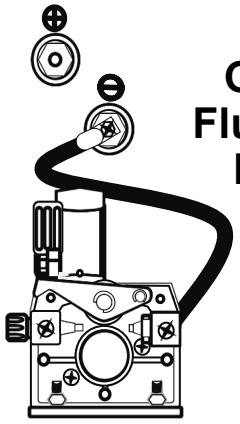
How Do I Change Polarity For Flux-Cored?



When welding most all flux-cored wires, polarity will be negative. There are a small number of exceptions. However, if the manufacturer doesn't state the polarity, assume it is negative. Drop open the cover on the left side of the MIG to access the wire spool and feeder. Just above the feeder, the are two terminal lugs. The upper terminal is Positive polarity, and the lower terminal is Negative polarity. If there are no positive (+) or negative (-) symbols, there will be a label that says "Gas MIG" and "Gasless" or similar terminology. Connect the wire feeder cable to the bottom terminal lug via the provided screw.



Gasless Flux-Cored Polarity

NOTICE: *While the standard gun is able to weld for short periods of time with Gasless Flux Cored wire, it is not meant for full time or long term use and will overheat in heavy or long term use.. For dedicated Flux-Cored use or for extended periods of use, a Flux-Cored gun. Flux-Cored guns are available from after-market sources. Everlast does not provide Flux-Cored guns as optional equipment.*

INSTALL THE OPTIONAL SPOOL AND PUSH-PULL GUN.

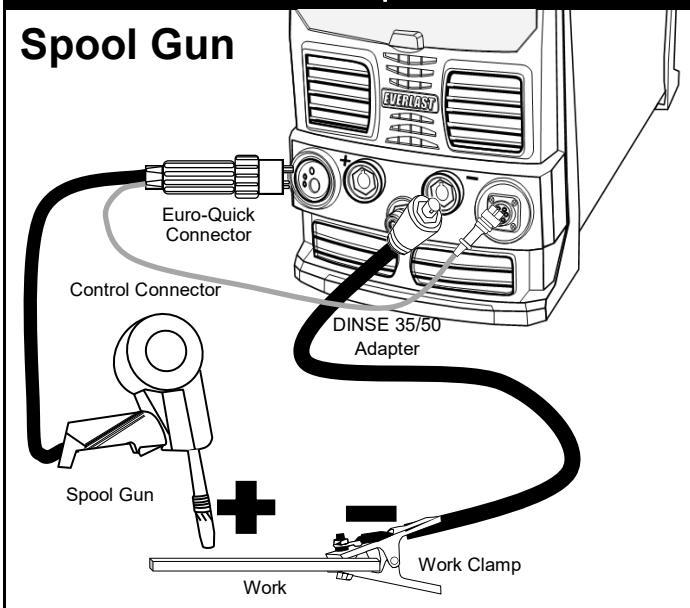
Although this welder can be used with U groove drive rolls and a polymer liner installed in the standard 10 ft (3m) gun for welding aluminum and achieve excellent results, this unit can also be used with both a spool gun and a push-pull gun for softer alloyed aluminum wires and longer distance aluminum welding requirements.

For spool gun applications, the optional Parker DSP 360 gun is recommended for this unit. The optional Everlast/North SM200N-MTS gun can also be used but may overheat due to a lower Amp and duty cycle rating.

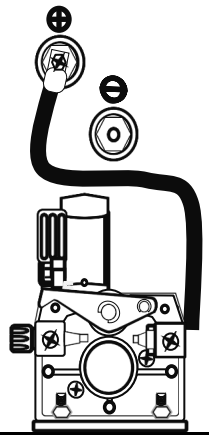
The Everlast/North MPG300A Push-Pull gun recommended for this unit is the "snake-head" type which is an "inline" gun style. Although slightly heavier than a conventional MIG gun, this gun looks and feels more like conventional type MIG gun. The Parker SGP 360 Push-Pull can also be used. This is a pistol grip style.

Make sure to use Electrode positive polarity for the spool and push-pull guns, which is the same for standard MIG welding. *It is possible that some specialty wires may vary from these recommendations. Always consider the wire manufacturer's recommendations as the final authority on polarity.*

Where Do I Install The Spool/Push Pull Gun?



Spool/Push-Pull Gun Polarity



NOTICE: Spool guns and push-pull guns connect the same and use the same connections and polarity.

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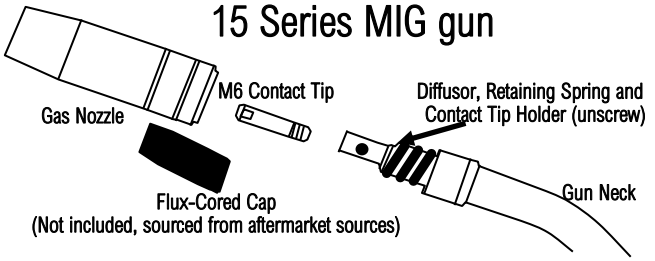
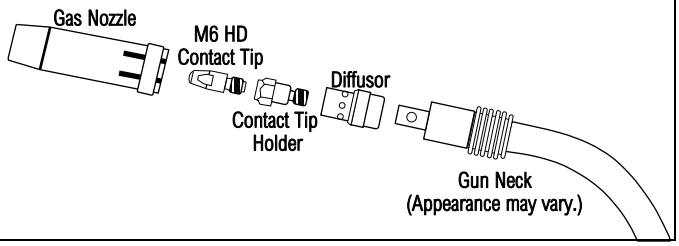
How Do I Disassemble the MIG Gun?

15 Series MIG gun



Always remove and install the 15 series gas nozzle by twisting clockwise.

24 Series MIG gun



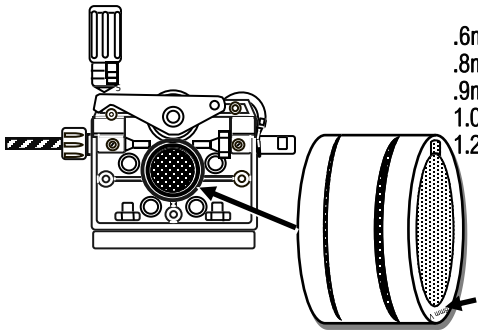
CHECK AND CHANGE YOUR DRIVE ROLL.

The unit comes equipped with .030" and .035" drive rolls. **NOTICE:** *For most purposes up to 3/16" thick material you will likely want to use .030" wire in this unit since it covers the greatest range of metal thicknesses and amperages within the capability of this unit. .030" wire is able to handle up to about 160A before it transitions to globular transfer.* For upper range use and materials 3/16" and over, .035" is advisable. Remember, if you change wire size or type, you will need to either flip the lower drive roll over or completely change the drive roll to the correct size and type.

The top drive roll is actually an idler roll used to hold tension and keep the wire in the groove and is not changeable. Only the bottom drive roll needs to be changed. The bottom drive roll has two small grooves that are sized for .030" (.8mm) and .035" (.9mm) solid wire. Additional sizes and types of drive rolls are available as options. The standard installed drive roll is meant to feed hard (solid) steel wire. The groove on this drive roll has a "V" shape designed for the solid wire. A Flux-Cored drive roll has a serrated edge to the groove, which grips the softer, cored wire. Viewing a flux -core drive roll from the top, you will see a "zipper" like pattern. This should never be used to feed hard steel, stainless or aluminum wire. This will result in damage to the wire, metal flaking and possible plugging of the MIG gun liner. To determine the exact size of wire and type you have, look at the side of the drive roll. The size of the drive roll groove is stamped on the side of the drive roll closest to the corresponding groove. The type of the drive roll will also be stamped with a V if it is for solid, hard wire. If it is stamped with an "U", this is a special drive roll for feeding aluminum wire. Aluminum wire is best fed with a spool gun. The stamped side will face the inside of the machine.

The drive roll is held in place by a black thumbscrew. Remove the screw to expose and change the drive roll. The drive roll is mounted on a bushing. The bushing should be held in place with one finger of one hand while the other hand removes the drive roll. This will prevent both bushing and drive roll from being removed from the wire feeder drive shaft. When removing make sure that the square locating key is not dismounted. If the key falls out of the keyway, replace it before replacing the drive roll..

Drive Roll Size and Location Info

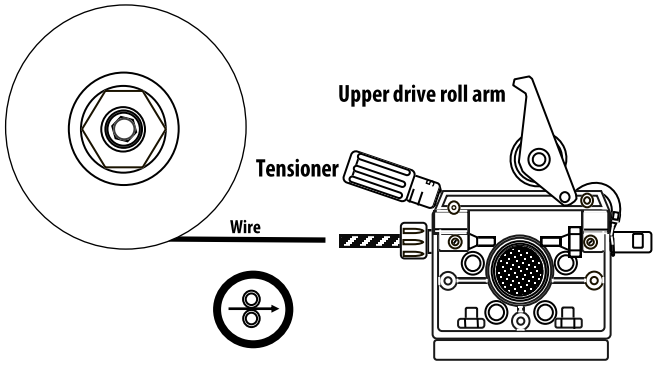


Drive rolls consist come in 3 groove types. Each type is designated by a letter stamped after the size.
"V" mark is a V Groove: For Solid Steel and Stainless Steel wires.
"U" mark is a U Groove: For all Aluminum wires.

INSTALLING THE WIRE SPOOL.

Once the wire spool has been installed, flip the tensioner lever down and raise the top drive roll to the upper position. See the illustration below. Gently guide the wire from the spool over through the wire feeder and into the front section of the gun at least 6 inches. Make sure the wire lays neatly in the groove. Hold it with your finger if necessary as you lower the top drive roll down and raise the tensioning lever with your other hand. When complete the wire should look like the illustration on the previous page. *Hint: The wire on the spool is usually bent and threaded through a small hole in the side of the spool to lock it in place and prevent de-spooling of the wire. Keep one hand on the wire spool to prevent despoiling and cut the wire loose with a pair of wire cutters. Trim the wire to make sure the end of the wire is straight and able to be threaded through the wire feeder mechanism and gun.* After the tensioner is raised back to the vertical

Installing the MIG Wire



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position, confirm the wire is still in the groove and is not riding up on the shoulders of the drive roll.

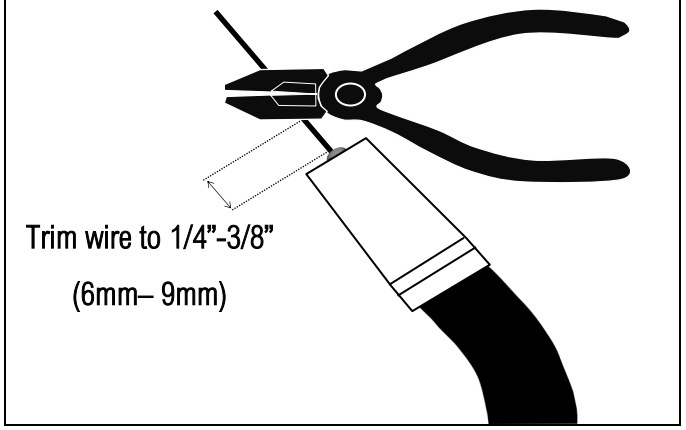
Next, turn the welder on and set to a desired MIG or Flux-Cored mode. **NOTE: This unit can be used with either the 24 series MIG gun or 15 series MIG gun. If using the 15 series gun, remove the gas nozzle by twisting it *clockwise* and pull. Never turn the nozzle counter clockwise!** Unscrew the contact tip as shown in the illustration "How Do I Disassemble the MIG Gun?". Both guns are illustrated. Hold the gun cable and gun straight as possible. Press and hold the wire jog button. The wire should slowly begin feed through the gun cable and on through to the gun tip. As the wire exits the gun, allow 3 to 4 extra inches of wire to be fed out past the diffusor. Release the wire jog button. Re-install the contact tip over the wire and screw it in clockwise until it is tight, but not to the point of stripping. Install the gas nozzle.

If using the 24 series gun, make sure that the ceramic diffusor is carefully handled. Tipping the gun upside down with the contact tip holder removed may cause the diffusor to drop out and break on the floor. Ordinarily, the diffusor has a long life and is durable. But dropping the gun while hot or while the gun is nozzle is removed, may cause the diffusor to crack or shatter. The diffusor design provides superior gas coverage over the weld and allows a cleaner weld to be produced, and will last a long time if these precautions are observed.(A minor chip will not require a new diffusor.)

TRIM THE WIRE AFTER INSTALLATION.

Trim the wire sticking out of the nozzle to 1/4" to 3/8" (6mm to 9mm) in length with wire cutters. See the illustration below. The gun is now ready for welding. *Hint: Always make sure that you re-trim the wire before beginning a new weld if the wire is not already trimmed to this length. This will help to improve arc restarts.*

Trim Wire Before Starting a Weld

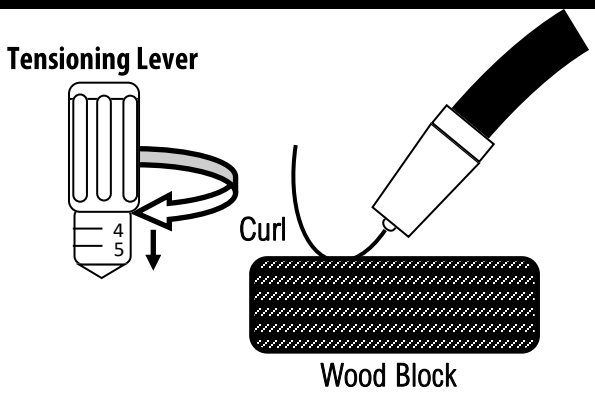


PROPERLY TENSION THE WIRE FEEDER.

To feed properly, the wire needs to be tensioned before you begin welding. The tensioning lever has numbers on the dial. To increase tension, rotate the tension lever clock-wise. Different types of wires require different tensions. There is no exact tension that works for all wire types. However, for steel wire, you will generally tension to at least 4 on the dial. For flux-cored wire, it may be only two or three. Wire diameter also plays a small part in the amount of required tension that is needed. Regardless of the wire type or wire diameter, follow the process below and refer to the following illustration. Turn the unit on and pull the trigger so that the wire extends approximately 1" beyond the gas nozzle.

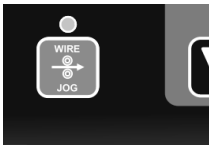
- Find a small block of wood, such as a two by four, and secure it to the welding table or other solid object. **Do not test this on metal or arcing may occur!**
- Hold the gun approximately 2 inches off the wood. Aim the gun at the block of wood so that the nozzle is at a 30 degree angle.
- Pull the trigger and allow the wire to contact the block.
- Increase wire tension so that the wire contacts the block of wood and is forced to curl up. Continue holding the trigger so that two or three full spirals are made.
- If the wire stops, or stutters during this process, let go of the trigger immediately and increase tension.
- Adjust the wire until the stuttering or jerking disappears.
- Do not over-tighten the tensioner or use more tension than necessary. When the wire begins to curl without any stoppage, the tension is enough.

Test Wire Tension Before Welding



What is the Wire Jog?

The wire jog button is used to feed wire when setting up the unit with a new spool of wire, or for feeding wire into a new gun without having to press the trigger.



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SELECTING A PROPER MIG WIRE SIZE AND TYPE.

As previously covered, this unit has been equipped with a 2 roll MIG wire feeder. While the welder's programming and design offers more than these two sizes and metals, this unit has shipped with a V groove drive roll that accommodates the two most common sizes of solid steel wires for this class of welder: .030 and .035" (.8 and .9). Smaller or larger drive rolls can be purchased as optional items.

To cover the entire range of wire sizes and metal types that the unit supports, the purchase of additional drive rolls, guns and or gun liners will be required. This unit provides a wide range of voltage and wire feed speed. That does not necessarily mean that the smallest wire can be forced to weld the thickest materials or that the largest gun and wire supplied is best for welding the thinnest metals with the thinnest wires. The following general recommendations are intended to help guide the user through the thought process of wire type and size selection. However, user knowledge and skill will ultimately determine what wire size choice is best to use and the appropriate settings to use.

For Steel/Stainless Wire (V groove):

040" (1.0mm) is the largest wire size recommended for this machine and is the largest size for steel allowed. This is because the maximum wire speed of this unit will not support the amperage output of the machine with larger wires. Even with .035", the wire speed will exceed the Amp output capability of this machine. The reason it is recommended is that the he short circuit limit of .035" wire is a little under 200A before it enters globular/ spray transfer mode. Keep in mind that .023-.025" (.6mm) wire is used for lighter gauge material but only offers about a 7 Amp advantage on the low end of settings over .030". It will also reach a useful service limit of about 90A. Feeding and results will become erratic at higher settings. .030" wire can service up to about 150A in short circuit transfer before it begins to enter globular transfer range.

Even though .023" Stainless wire is supported, it may not be available in all markets and will experience feeding difficulty in the standard gun. In this case the spool gun is the best option. Also even with .030" stainless wire there may also some difficulty feeding wire, especially with smaller 2 lb. rolls when used in the main feeder.

For Aluminum Wire (U groove drive roll required with polymer liner installed or use spool/push pull gun):

Even though smaller drive rolls exist, to achieve best results, .035" wire should be the smallest wire used with this unit (not to be used with 4043 due to the softness of the wire) in the main gun, although the wire speed will be nearly maxed out for most applications. .035" aluminum wire also provides a very narrow range of welding of 1/8" to 3/16".

For better results, .040" or .045" is recommended is used since it can weld a broader range of material from 1/8 to 1/4" and can also be used with 4043 wire. The optional spool and push pull guns are also equipped with either a .040" (1.0) or .045"/.047" /3/64" drive rolls, but smaller sized drive rolls are available as an option. Overall, MIG welding aluminum is not a delicate process and is typically recommended for use on 1/8" materials and thicker, though some success can be achieved in skilled hands down to 14 gauge with .030" wires used in a spool gun.

For Gasless Flux-Cored (Zippered, or serrated drive roll):

This unit is designed to support only gasless flux-cored use and should not be used with Dual-Shield, which is typically reserved for structural use and use din over 200A heavy applications for long periods of time. In general, no smaller than .035" flux-cored wire should be used. In general .045" wire is considered the best. Flux-Cored wire in general is a heavier penetrating wire and is not meant for light gauge work. Typically Flux-Cored wire is used on 14 gauge and heavier materials. Since the nature of Flux-Cored wire carries less amperage per inch of wire delivered to the weld puddle, a larger wire may be used to deliver lower amperage. However, even though available, smaller flux cored wires than recommended above suffer from weakness and the column strength of the wire is low and cannot feed longer distances. If considering using this unit for flux-cored use, to save money on shielding gas,

NOTICE: Although the maximum selectable size offered in the welder's programming for solid steel wires is .040" (1.0mm), for the US and North American market, it is recommended to use .035" (.9mm) as the maximum wire size for this unit for use solid steel wires. This is because .035" (.9mm) is the largest size commonly available for up to 200A welding range. Although technically available in North America, .040" (1.0mm) wire is more common in other regions of the world. For welding with Aluminum and gasless flux-cored wires larger size selections are available.

GUN AND LINER SELECTION.

This welder uses a common Euro Style Connection for the MIG gun. This allows any Everlast gun or any after market gun with the same connection to be connected to this unit. To match the 215A maximum output of this welder at the 35% duty cycle specified, this unit is equipped with a 24 series gun (some regions or versions may use the 15 series gun). This gun is a larger gun suitable for welding up to 250A. This gun is a medium sized gun suitable for all types of commercial fabrication and maintenance. However, if lighter work is required, such as welding body panels, the smaller 15 series gun is recommended as an optional purchase. It is smaller and is a good choice for welding up to 180A for longer periods of time and up to 200A for brief periods of time.

Because of the range of output of this welder, no single gun is ideal for every situation. Additionally each gun can be equipped with different sized liners to match the wire size used. The liners, both steel liners and polymer liners for aluminum, are color coded for wire diameter sizes:

Blue Liner: .023"-.035" (.6-.9mm)
Red Liner: .040"-.045/ .047/ 3/64" (1.0-1.2mm)
Yellow Liner: .045"-.062"/ 1/16" (1.2mm– 1.6mm)
NOTICE: Push-Pull Guns typically use special graphene type black/gray

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liners are sized for .045" and larger for Aluminum use.

It is also important to check and change the contact tips as well to match the wire diameter. In the case of Aluminum, order one size larger regular tips, or order special Aluminum tips that are slightly oversized. These tips will use the standard size, but typically are followed by an "A" to designate these are designed for use with Aluminum.

INSTALLING / REPLACING THE MIG LINER.

The liner of the gun is critical to proper wire feeding and welding performance. A liner is responsible for securely carrying the wire into the gun head from the machine connection. An undersized liner may be difficult to load or feed without bird nesting in the cabinet. An over sized liner will cause spatter and irregular behavior. While burn-back control can eliminate some of this excess wire , the best solution is to use the correct sized liner for the wire.

A steel liner should only be used with steel or stainless wire. If steel wire is used with a polymer liner, the liner will wear extremely fast. A polymer PTFE type liner or graphene type liner (or other similar smooth plastic type liner) should be used with Aluminum or soft natured wires. Liners designed for Steel use and Aluminum use look different but install the same way. Each must be cut to fit because they are always slightly longer than needed. This is done to custom fit liners in guns that may have stretched from use over time.

Liners do wear and are sometimes kinked from rolling or wrapping the gun cable too tight during storage or bending the gun in too tight of a radius at the base of the handle. More commonly, it can be caused running over or stepping on the gun cable. This will necessitate liner replacement. Also with an oversized liner, the wire may appear to jump or feed out extra wire after wire feeding is terminated. It can even cause bird nesting in the liner, making wire removal almost impossible. In this case, the liner will almost always need to be replaced due to the damage it causes as the wire is removed.

If a liner needs to be removed and it is difficult to remove this is almost always an indication of a damaged liner. Sometimes a damaged liner may also cause damage to the gun head or outer conduit when it is removed. If so, the whole gun may need to be replaced if the damage is severe enough. Usually this is not the case and a worn liner or a damaged liner can be replaced fairly quickly.

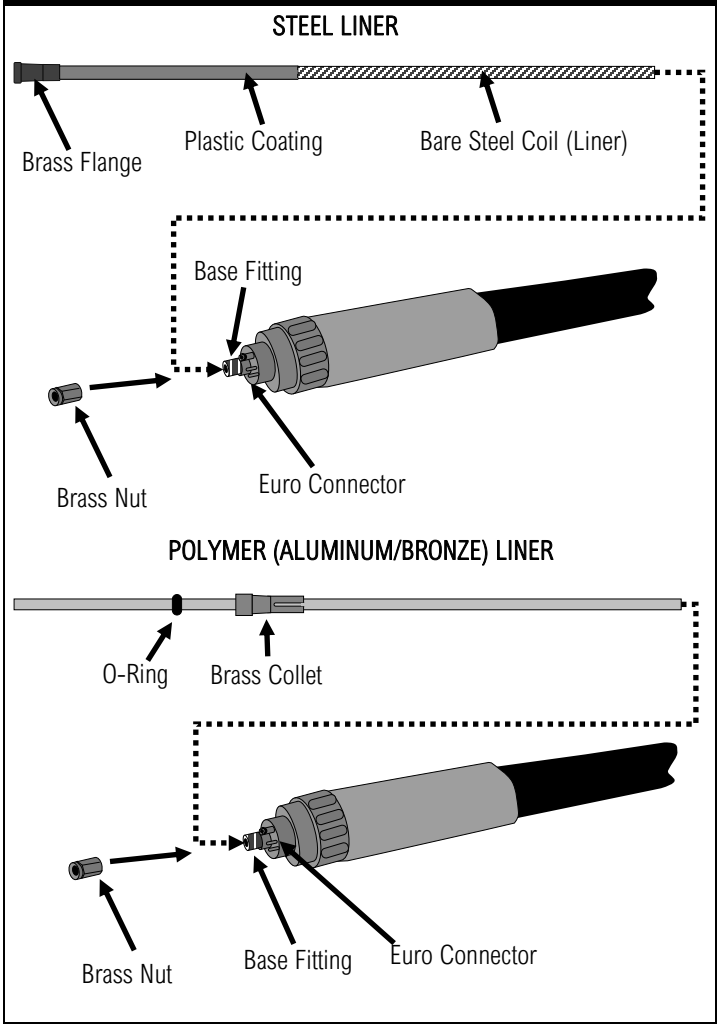
A damaged liner should be checked and replaced as soon as any damage is suspected.

A steel liner is a tightly coiled hardened wire similar to a lawn mower or automobile choke cable. The bottom half of the liner will be plasticized and color coded. The top part of the liner will typically be bare steel. The bottom of the liner will have a brass flange crimped to the liner.

The Aluminum liner will be smooth and will be composed of three pieces, the liner tube, brass collet and o-ring.

Both liners are installed from the rear of the gun and not from the top of the gun. See the information below.

Liner Installation



IMPORTANT! Read these instructions carefully before attempting to remove the old liner or before trimming the new one. It is better to have to retrim a new liner than to cut too much off.

Steel Liner Removal and Installation.

1. Remove the brass nut from the base fitting on Euro Connector. Hold the base fitting while using a wrench to do this. Do not allow the base fitting to unscrew. If the fitting unscrews, it must be reinstalled before proceeding.
2. Grab the brass flange of the liner that was originally held in place by the brass nut. Pull on the flange to remove the old liner completely. Once removed, set aside. (If the liner is stuck, carefully work it back and forth, and twist slightly to remove. The liner can break or stretch

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if the liner is badly damaged inside the outer cable conduit.

3. Make sure the gun and gun cable is held straight. Install the new liner as far as it will go. (Do not cut the liner yet.) Make sure the liner isinserted into the base of contact tip holder. Typically the liner will be visible with the contact tip holder installed. If the liner is not visible, remove the contact tip hold to check for visibility (some guns the contact tip hold is part of the gun neck and cannot be removed). If the liner is still not visible and/or does not appear to be inserted into the end of the contact tip holder manipulate the liner gently until it is visible and in position to mate with the contact tip holder once it is re -inserted. It may be necessary to move the gun handle around gently until the liner slides home.
4. With the liner inserted fully home, measure and record the distance from the top of the threaded base fitting to the flange (measure to the base fitting side of the flange). This is the amount that will need to be cut off. Double check that the liner is still seating and that the gun is held perfectly straight. **IMPORTANT: Do not cut the liner on the flange side. This is only for measuring the amount needing to be cut off the other end (Gun side of the liner).**
5. Remove the new liner.
6. From the gun end of the liner (the end that contacts the contact tip), measure and mark the length to be removed. Mark it with a metal marking pen or small file. Carefully cut the steel liner to length with pair of lineman's pliers or a similar sharp cutting tool. Make a clean flat cut. A small cut off wheel may also be used if a suitable cutter cannot be found. Carefully dress the end of the liner and chamber end with a small file removing any burrs. Do not use dull cutters or the liner may collapse.
7. Reinsert the new liner and test fit. The brass flange should fit flush against the base fitting and it should fit fully home in the contact tip.
8. Reinstall the brass nut to hold the liner in place.
9. Reassemble the gun if it has not already been reassembled.

Polymer (Aluminum) Liner Removal and Installation.

1. Remove the brass nut from the base fitting on Euro Connector. Hold the base fitting while using a wrench to do this. Do not allow the base fitting to unscrew. If the fitting unscrews, it must be reinstalled before proceeding.
2. Grab the brass flange of the liner that was originally held in place by the brass nut. Pull on the flange to remove the old liner completely. Once removed, set aside. (If the liner is stuck, carefully work it back and forth, and twist slightly to remove. The liner can break or stretch if the liner is badly damaged inside the outer cable conduit.
3. Make sure the gun and gun cable is held straight. Install the new liner as far as it will go. (Do not cut the liner yet.) Make sure the liner isinserted into the base of contact tip holder. Typically the liner will be visible with the contact tip holder installed. If the liner is not visible, remove the contact tip hold to check for visibility (some guns the contact tip hold is part of the gun neck and cannot be removed). If the liner is still not visible and/or does not appear to be inserted into the end of the contact tip holder manipulate the liner gently until it is visible and in position to mate with the contact tip holder once it is re -inserted. It may be necessary to move the gun handle around gently until the liner slides home.
4. Once the liner is fully inserted, install the collet over the liner and slide the collet down the liner until it is fully seated into the base fitting. (Depending upon the manufacturer, the collet may be more like a ferrule)
5. Slide the O-ring down until it contacts the collet.
6. Slide the brass retaining nut down over the liner and screw the nut down until the collet slightly compresses the liner and holds it in place.
7. Trim excess liner flush with the end of the brass nut.

Setup Guide

Getting Started

SELECT THE PROPER TUNGSTEN TYPE FOR TIG.

What Type of Tungsten Do I Use?

Selecting the correct tungsten for your welder is important. Modern inverters no longer use pure (green band) Tungsten for welding AC. In fact pure Tungsten used with an inverter can create problems with arc stability, arc starting and excessive balling. While Thoriated 2% Tungsten can be used in an inverter for DC welding, it is falling out of favor in the industry due to the slightly radioactive nature of it.

For TIG welding consider the following types.

- Lanthanated 2% (blue band). Overall this is one of the best choices for TIG welding. It has great arc starting characteristics, with excellent point holding capability.
- Ceriated 2% (gray band or orange band, depending upon brand and country of origin). This is a good choice for welding with this unit. However, it doesn't hold up as well and starts to erode faster than Lanthanated at higher amperages. Arc start quality is excellent.
- Lanthanated 1.5% (gold band). Holds up nearly as well as Lanthanated 2% and can be used with this unit. In some tests it has rivaled the performance of Lanthanated 2%.
- Tri-Mix/Rare Earth (purple, turquois or other color band). While still relatively new, it is being marketed as a replacement for Thoriated 2%. Overall, it does perform fairly well and even excels in many circumstances. But some problems have been seen with quality control and inconsistency in performance. The primary metal oxide used is lanthanum 1.5%. Usually it also includes a small percent of Zirconium and Cerium to complete the mix. Some use Yttrium. But the balance of the components in the blend are usually stated to be around .06 to .08%, but can be allowed to vary up or down from .04% to .9%, making the blend prone to inconsistency in quality control.
- Thoriated 2% (red band) Still considered the best for DC TIG power like this unit provides but has been banned in many markets outside the US due to a small radiation risk posed as an alpha emitter.

Do not use the following types of Tungsten.

- Pure Tungsten (green band). This will create arc instability. The tungsten will not stand up well to the more intense arc created by an inverter welder. This is only for AC transformer welders.
- Zirconiated Tungsten (white band). This was created as an alternative for pure Tungsten for transformer welders. Similar issues welding issues are presented as with pure Tungsten.

Purchasing Tungsten can be difficult. Local suppliers tend to put a premium price on Tungsten, and may be three times an online price direct from a distributor. In many areas, the choice of tungsten may be limited. However, many local welding suppliers are stepping up and offering competitive prices and range of selection, so don't rule them out until you have checked. Also, there are some companies that may send you free samples to test, so be sure to investigate their product, and give them a chance as well.

GRIND THE TUNGSTEN CORRECTLY.

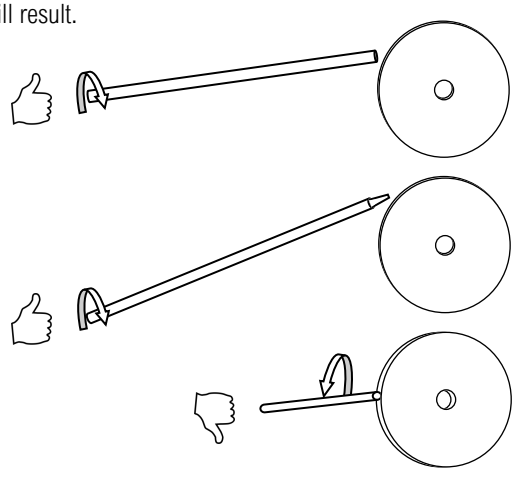
An improperly ground point on tungsten is a cause of many issues with arc stability, arc directability, and penetration. A bench grinder and a fine-grit stone dedicated for tungsten sharpening is all you need to sharpen Tungsten and is the age old standard. There are special hand held grinders that feature diamond stones with slotted guides, designed to hold the tungsten at the exact desired angles. A dry chemical sharpener "dip" is available and is inexpensive. When properly swirled, it does an excellent job in seconds. With practice, it can deliver a superior result. As a bonus feature, chemical sharpening can be done without getting up from the bench-top and without removing the tungsten from the cup. Please note: the Tungsten has to be red hot before being dipped and swirled in the chemical.

⚠ WARNING!

Wear safety glasses and leather gloves while grinding tungsten or serious injury may occur. On occasion tungsten may split or shatter. Do not breathe or inhale tungsten dust. **Do not use a angle grinder to grind!**

How Do I Grind My Tungsten On a Wheel?

- Grip the Tungsten firmly. Grind with the Tungsten secured.
- Grind the Tungsten perpendicular to the wheel face. Allow tungsten to grind slowly without much pressure.
- Rotate the Tungsten quickly as it is being ground to keep the point even and symmetrical.
- Do not grind the Tungsten parallel to the wheel face or an unstable arc will result.



Setup Guide

Getting Started

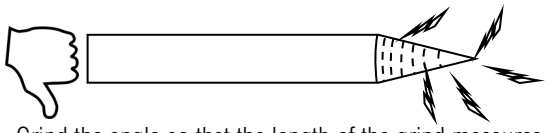
Choosing the proper grind angle is important to achieving the weld penetration, bead appearance, and arc-cone width that you desire. While there is no true one-size-fits-all angle, there are some general rules of thumb to observe and follow:

- Always grind in-line with the length of the tungsten. Never make a radial grind that leaves marks on the tungsten in the direction of the grind. Radial marks will cause arc instability. Never grind with the tungsten held parallel to the stone edge face.
- For most applications, grind a point that is 2 –2.5 times greater in length than the tungsten is wide. This will create an angle of about 30° to 35°.
- For higher amperages, you will want to put a slightly truncated tip on the tungsten. This prevents the tip from dropping into the metal.
- Grip the tungsten firmly. Slowly rotate it while grinding.

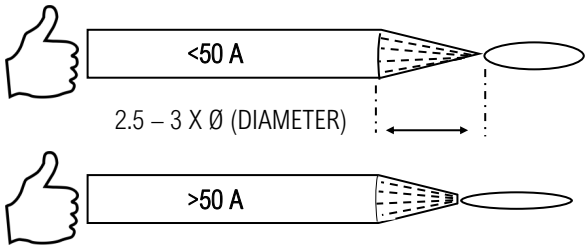
Depending upon what arc properties you are looking for, you may periodically want to regrind your tungsten to maintain optimal arc characteristics.

What Type of Grind Works Best?

- Never use a radial grind pattern. This can be caused by grinding at the wrong angle, or spinning the tungsten too fast while grinding at the proper angle. The arc will be unstable.



- Grind the angle so that the length of the grind measures 2 to 2.5 times the wide of the tungsten (For general purpose use this should form about a 30° to 35° angle.) A slightly blunted end (truncated) may be used if the amperage is over 50A to prevent the tungsten from breaking off into the metal while welding.



What Size Tungsten Do I Use?

Everlast uses a HV start system on this unit. This system is able to handle several different sizes of Tungsten. Clean arc starts are related to the size of Tungsten. But clean arc starts are not solely dependent upon the size of the Tungsten. The tungsten type, tip angle and grind preparation will ultimately affect the arc starting capability of the tungsten. Amperage carrying capability is also size dependent. Each type of Tungsten blend will slightly vary in amperage handling capability and range of Amperage that is best for use. However, overall, the ranges will greatly overlap between different types of Tungsten. The differences will be seen on the extreme edges of the range.

In general, consider the information below for selecting tungsten diameter. The list below is not the absolute maximum range of the Tungsten, but a reliable recommended range. It is a good practice when you approach the maximum limit of the Tungsten's capability in terms of amperage, that you switch to the next size up for best point retention and arc characteristics. 2-15A: .020" (.5mm)

- 10-70A: 1/16" (1.6mm)
- 15-200A: 3/32" (2.4mm)
- 30-215 A 1/8" (3.2mm)

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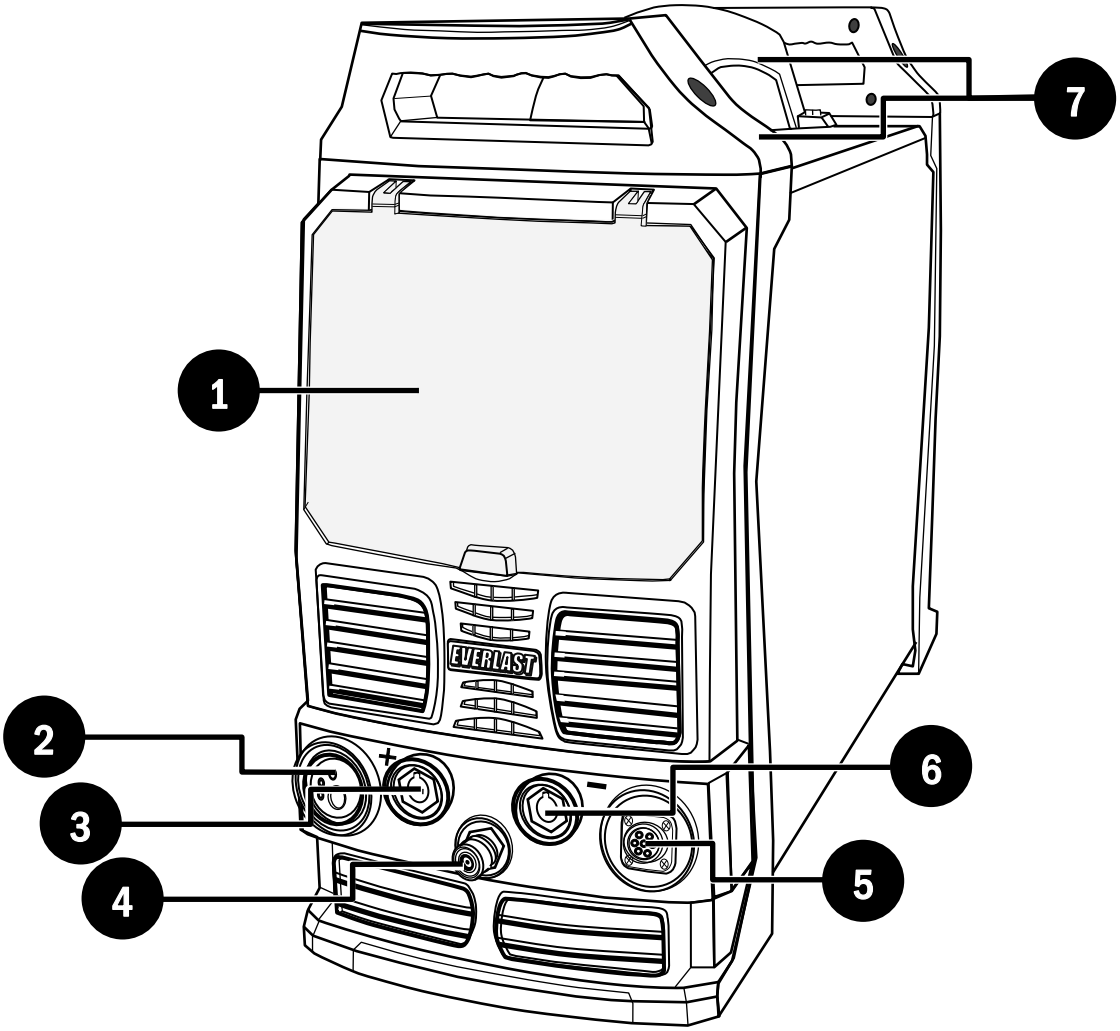
Component Identification and Explanation

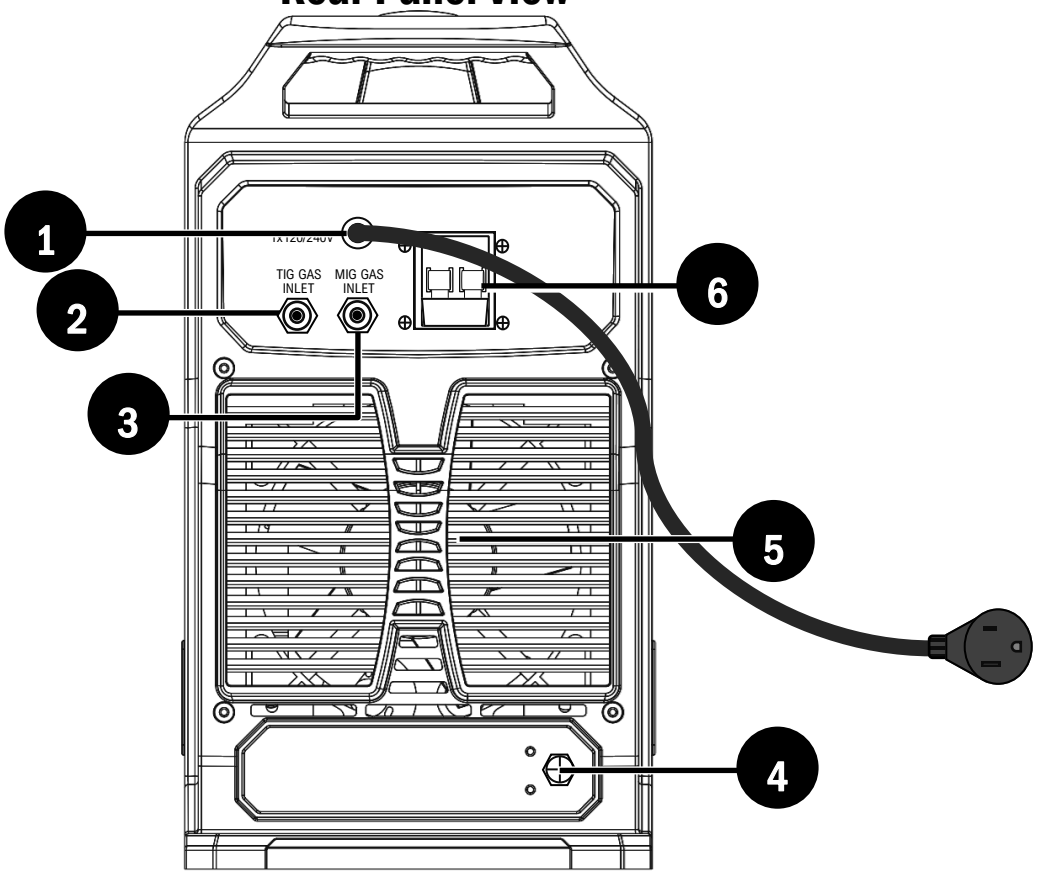
Front Panel View



#	Component Identification	Function/Component Note
1.	Protective Cover	Keep cover down and in place during welding activities and while in storage.
2.	Euro-Style Quick MIG Connector (Only one gun may be connected at a time.)	Connect the MIG gun to this connector. Connect the Spool Gun to this connector. Connect the Push-Pull Gun to this connector.
3.	Positive Terminal (+) (DINSE 35/50mm^2 Type, 1/2" nominal dia.)	Connect the work clamp to this terminal for TIG welding. Connect the work clamp to this terminal for Gasless Flux-Cored Welding. Connect the Stick electrode holder to this terminal for most DC Stick Welding.
4.	TIG Torch Shielding Gas Connection (Quick Connect, 9mm tube Type 21)	The gas line from the TIG torch is connected to the quick coupler. The sleeve/collar of the coupler is normally held back until the male torch fitting is inserted until it clicks in place. The coupler should slide forward to capture and hold the connector. To release the torch fitting, manually slide the outer collar/sleeve back. **Ref. EV-9MM-B-QUICK CONNECT-STDSET or 21KATS09MPX**
5.	7 Pin Control Connector (5/8" Type GX16-7)	All torch switch and foot pedal connections attach at this point. (One at a time.) **Ref. EV-PANA7-625-PLUG**
6.	Negative Terminal (-) (DINSE 35/50mm^2 Type, 1/2" nominal dia.)	Connect the work clamp to this terminal for MIG operation. (Not for Gasless Flux-Cored use.) Connect the TIG torch to this terminal for all TIG welding applications including AC. Connect the work clamp to this terminal for most DC Stick welding applications.
7.	Handles	The handles are packed separately in the box and are not installed. Installation is recommended, but the handles are designed to be removeable for low clearance or for some permanent mount applications. Be sure to reinstall screws in the cover and panel if the handles are to be removed or not installed.

Component Identification and Explanation

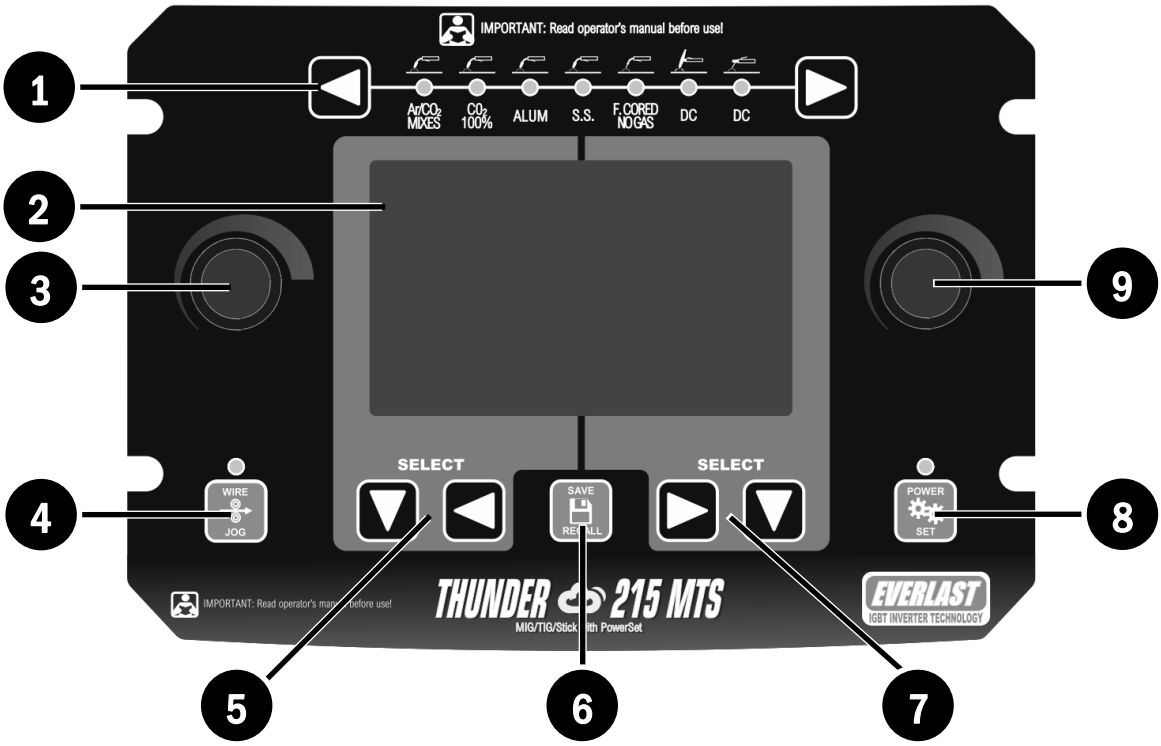
Rear Panel View



#	Component Identification	Function/Component Note
1.	Input Cable 6.5 ft. with NEMA 6-50P Plug NOTICE: *Always consult national codes and employ a locally licensed electrician before connecting this welder to any new or old service.*	***North America only:*** The unit may be operated on either 120V or 240V 1 phase power. The unit is equipped with a 3-wire NEMA 6-50P plug. This is the standard welder plug used by all companies for 240V 1 phase welder use. The plug should not be changed or adapter for any other plug except the pigtail adapter provided. North American codes and standards dictate that only 3 wires are used for 240V 1 phase operation of welders. A neutral wire is not used nor recommended. For use with 120V use, the pigtail adapter should be used. This will safely adapt the unit to 120V input power. The unit automatically will sense the voltage change and reconfigure the unit for 120V use when the power is switched on. There may be a slight delay in boot up when chan
2.	TIG Shielding Gas Inflow Connector	*North America:* 5/8" CGA R.H. connector. Standard Argon/Inert gas type. *Other Markets:* Hose barb connection.
3.	MIG Shielding Gas Inflow Connector	*North America:* 5/8" CGA R.H. connector. Standard Argon/Inert gas type. *Other Markets:* Hose barb connection.
4.	HF Ground Service Bolt	This is to be used only if needed to mitigate any electrical interference that may be caused by the HF start or general operation of this unit. If disturbance in nearby electrical items such as lights and electronics is observed, this may be required. A 12 gauge copper wire should be connected to this terminal, and routed direct via the shortest route possible to a dedicated copper rod driven into moist ground outside the weld area. All metal items in the shop must be grounded to the outside at regular, multiple intervals, including any metal building panels. Consult a local licensed electrician to perform this connection if needed. If interference persists, after professional connection, or if your electrician has questions, contact Everlast Technical Support for further help.
5.	Fan	Periodically check for proper fan function and cleanliness. Carefully remove all debris accumulated on blades to prevent unbalanced running and failure.
6.	Breaker/Power Switch	This switch doubles as the main power switch and disconnect switch. If this switch trips and the welder power turns off, a significant internal event or failure of the switch *may* have occurred. If this occurs, immediately remove from service and mark and tag as out-of-service according to required work regulations and contact Everlast Tech Support for further diagnosis and/or repair options.

Component Identification and Explanation

Control Panel Layout



# Component Identification	Function/Component Note
1. Welding Process Selector	Press left or right arrow key connected to the process selector LEDs to navigate back and forth to select the desired weld process. The LED will light to indicate which weld process has been selected. See Quick Setup Section.
2. 4.3" 720HD TFT Color Display	This display is designed to be clear and bright. It will provide long life if proper care is taken. Keep the flip down cover in place when welding and when not in use. Remove temporary, original protective film on the screen surface upon delivery. Use cut-to-fit screen protectors as a replacement for future use. Do not use harsh cleaners. Use only screen type cleaners sprayed onto a damp, lint free rag to clean. Remove dust with short bursts of dry compressed air. Notice: The operation of the screen is divided into left half and right half sides. The left and right half are divided by a green line running down the middle of the screen on all adjustable pages of the menu. The left and right half are also highlighted further by the black extended line in the middle of the green surrounded area of the screen that groups right and left side controls.
3. Left Adjustment Knob	This control knob controls all the parameter values found on left-half side of the LCD screen. It is used to increase and decrease the value. *Helpful Hint: Press in and turn to increase the parameter value in larger increments to save time.*
4. Wire Jog	The wire jog function is designed to feed wire without pressing the trigger. This speeds up wire delivery when changing the wire spools out or loading the gun with wire. It prevents waste of gas while wire is feeding during this change process.
5. Left-Half Side Navigation Keys	The left side down and left arrow keys are used to navigate and select the left side parameters for adjustment.
6. Program Save Key	Use this key to both access the program save menu, lock/unlock a program recall a program. See Quick Setup Section. A short press will bring up the recall menu. A long 3 second press will bring up the save menu.
7. Right-Half Side Navigation Keys	The right side down and right arrow keys are used to navigate and select the right side parameters for adjustment.
8. PowerSet Key	The PowerSet key is used to activate the synergic programming of any welding mode. The LED will light to both confirm and remind the user that the PowerSet Mode is activated. Also used to lock or unlock a program in the save mode
9. Right Adjustment Knob	This control knob controls all the parameter values found on the right side of the LCD screen. It is used to increase and decrease the value. It is also used to select and navigate the pop up on-screen keyboard when naming the program or selecting a program in the recall mode.

Component Identification and Explanation

Starting-up the Welder

WHAT TO EXPECT ON START UP.

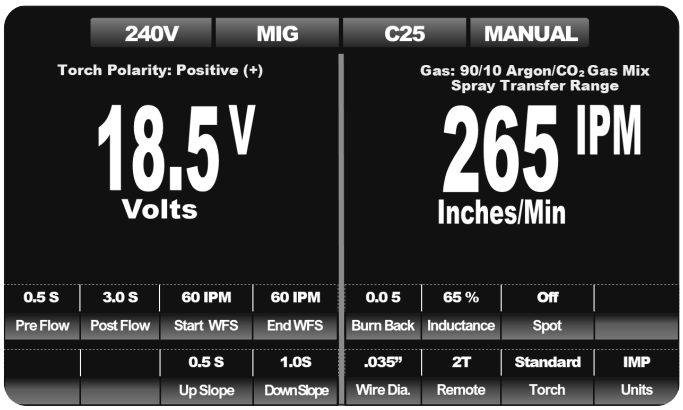
Before the first start and use of the machine, check all your connections. Make sure all fittings are tight and that your gas cylinder valve is fully open. Put on proper safety equipment (PPE) and fire resistant clothing. Make sure all accessories are uncoiled and properly connected. Inspect the accessories and ensure that they are in good working order.

WARNING! *Accidental arc flashes and burns could be possible if the foot pedal or torch switch is depressed at the time of start up. Uncoiling accessories and dismounting them from the cart is important to prevent accidental triggering, arc flashing, welder damage and possible injury.*

When the welder is switched on at the rear of the unit and the start-up process begins, the welder will greet you with the start-up screen while it is booting up. All LED lights on the front panel will light up on the front to allow you to inspect their functionality. The boot-up will take up to 5 or 6 seconds as the machine re-adjusts for the voltage input and recalls the last settings used. *The boot up screen will look similar to this:*

During the boot-up process you may hear a series of slight clicks, thuds, or thumps as the machine switches relays and solenoids. This is normal. IIt is important to note that similar thuds or clicks that are heard on start up can also be heard as the machine swaps processes or when certain functions are selected. This is normal and should not be of concern.

When fully booted up, the screen arrangement should look similar to this, depending upon the actual process and functions selected:



It is recommended that all functions be checked for proper operation every few months so that any malfunction can be noted and reported before it is needed. If any malfunction of the control screen or the welder is observed, contact Everlast Tech Support.

TAKE CARE OF THE LCD SCREEN.

The screen is a high resolution 4.3" TFT color LCD screen. It is important to take care of it. Keep the cover shut when welding or when not in use. *Additionally, cut-to-fit screen protectors can be used with the screen (and it is recommended to do so) to offer a second layer of protection and keep the screen in like new conditions. These are customer-supplied and available at local stores that sell electronic items such as computers or mobile phones.* These should be periodically removed and replaced. Lightly clean the screen only when needed with standard screen cleaning solution and lint free cloth designed for cleaning screens or lenses. Do not use harsh detergents or alcohol. The front protective cover is plastic and may get scratched if it is wiped dry. If heavy dust has accumulated, use dry compressed air to blow off the screen. Do not try to dry wipe with dirty rags, sleeves or gloves or the screen may become scratched or unreadable.

Functions vs. Parameters vs. Status

This manual makes frequent use of the words "mode", "settings" "functions", "parameters", "values" and "status". In some cases it may seem that some words are interchangeable. And in a number of cases, there may be indeed some limited interchangeability in the terms since a function may also double (when turned on) as an adjustable parameter or could indicate a mode. To clear up the confusion between the terms, here is a brief explanation of Settings, Functions, Parameters, Values and Status and the general intended use of these words in this manual.

A **mode** can refer to the selection of a particular function, or a welding process. The welder has several different processes. Each process can also be considered a mode. For example, you may select "DC TIG Mode" to weld. But you can also select the Spool Gun mode from the torch function on the screen. The term mode is broadly used.

Settings is a broad term inclusive of both functions and parameters. When the term settings is used it is meant to refer to both generally and can also refer to status or value.

Functions are features and modes of the machine. Functions will dictate the way the welder behaves and what parameters are offered for adjustment to the user. A function can indicate a mode of operation, such as 2T torch switch operation as opposed to Foot Pedal operation. A function will typically be associated with words like On or OFF, or even indicate a gun type or mode.

A **parameter** is an adjustable feature of the machine. Pre-Flow, Post-Flow, Up-Slope, Down-Slope, Welding Amps, Pulse Time On, etc. are all examples of parameters.

A parameter is defined by its **value**. The value can be expressed in Seconds, Amps, Wire Feed Speed, or Percent. Values are expressed in numbers. Each parameter has a range of values.

Status indicates the *condition* of a function (On, Off, etc.). It can also indicate the static operating condition or welding mode of the welder on the status bar at the top of the menu screen.

Component Identification and Explanation

GENERAL INFORMATION ON SETUP AND USE.

Selecting the Process.

At the top of the panel (1) use the process selector buttons to select the desired welding or cutting process. Use either the right or left arrow directional (◄ ►) buttons to advance to the next process. Pressing the left or right arrow button too quickly multiple times in succession may cause the LED to appear to skip a process. Advance through the processes at a moderate, deliberate pace. If desired welding process is accidentally passed or skipped over, instead of cycling back through all the processes, use the opposite directional arrow button to scroll back to the desired process rather than scrolling all the way through again.

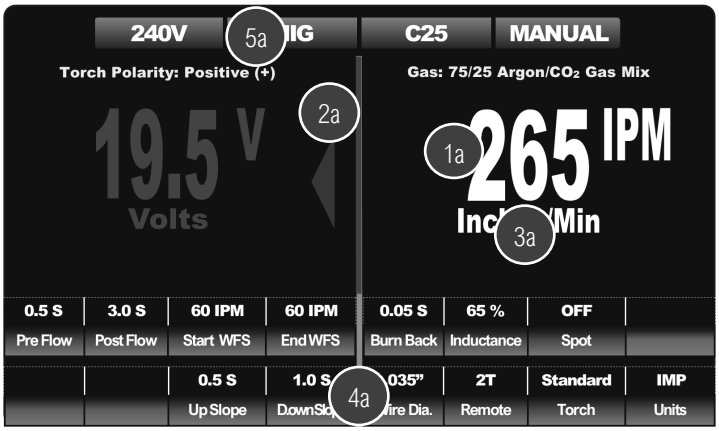
Navigating the On-Screen Menu.

The LCD screen is divided visually into a right and left half (2) by a vertical green bar on screen and black line above and below the screen. The left half side is controlled by the left side panel controls. The right half is controlled by the right side panel controls. The left side left (3) left pointing and down pointing arrows (◄ ▼) are used to navigate the left half of the screen and the right side (4) right pointing and down pointing arrows (► ▼) are used to navigate the right half of the screen. The left and right control knobs (5,6) are used to increase or decrease the selected parameter value of that side or to change the status of a function of the related side. The menu is also divided horizontally into 2 functional areas. 1) The top tier, or main display/default parameter display area, and the two lower tiered rows of parameters and functions.

There are two types of information located on-screen in the two lower tiered rows (7,8) of the on-screen menu: Parameters and Functions. *Functions are menu items that may change in status, such as ON/OFF, or Gun Selection. Parameters are menu items that change in value throughout a range such as pre-flow time or inductance percent.* Some selectable items on the menu screen serve both as functions and parameters. For example, the Spot weld function can be set to "OFF". That indicates the status of the function. But when selected and the control knob is rotated, and the status is changed to "ON", the function automatically changes to represent the parameter value and displays the seconds.

Understanding the Anatomy of the Menu Screen.

Quick Steps to Setting-Up the Welder.



1. The main display in the upper area serves to display the status, or value of a function or parameter. (1a)

- After startup, while welding or when the unit is not in the adjustment mode, Voltage is displayed on the left side of the menu screen and the Wire Feed Speed (IPM or M/M) or Amps on the right side of the menu screen. These are the default parameters displayed unless the unit is in adjustment mode and other parameters or functions are selected for adjustment. These default parameters can be adjusted simply by turning the relevant side control knob. The display will turn red to indicate adjustment

- After adjustment is finished and no further adjustment or changes are made, the unit will re-enter the default mode within approximately 5 seconds and display the Voltage and Wire Feed Speed/Amps.

2. Entering adjustment mode allows the user to make changes to all functions statuses and parameter values.

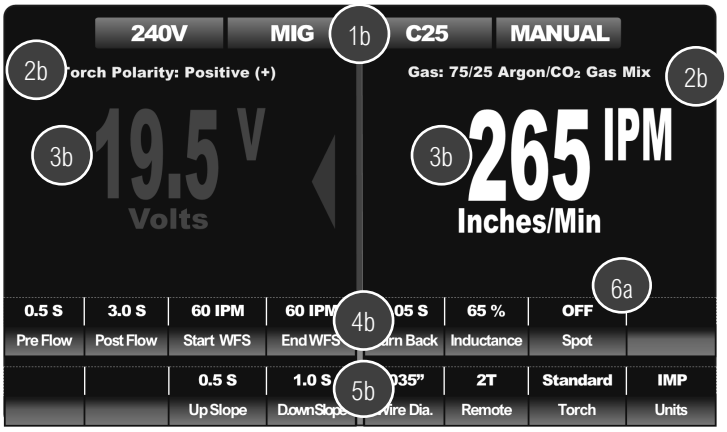
- To enter the adjustment mode, press once on the down arrow key (▼) on either the right or left side, depending upon which side the desired function or parameter is located on. This will turn the main display on that side red in color, the middle vertical line will turn red and either a left or right red arrow (◄ or ►)will appear to indicate which side is ready for adjustment. (2a) *Alternatively, to enter the adjustment mode, a slight turn of the control knob will enter the welder into the adjustment mode unless the default displayed is non adjustable and displayed in green (TIG/Stick modes).*

- Continue to use the down arrow key (▼) to navigate vertically down to the desired row.

- In TIG and Stick modes, a single press on the down arrow on the left side will automatically navigate to the first lower row.

- Use the left or right arrow button (◄ or ►) to navigate over to the desired parameter or function to highlight for adjustment.

Component Identification and Explanation



- The middle red line will extend to the row and over to the desired parameter and the selected parameter will be highlighted in red.

3. The control knobs are used to increase or decrease a selected parameter value, or make a status change in a selected function.

- Use the control knob on the side closest to the desired function or parameter to make changes to status or value.
- When making large changes in value to a parameter, press in on the control knob while continuing to turn it to make larger increment changes in value. This will speed up the adjustment process.

Detailed Menu Information and What to Expect During Adjustment

The menu screen utilizes a combination of symbols, words, numbers, colors and graphical indicators to assist the user in making adjustments. It is designed to create a fluid, intuitive and easy to understand interface for the user.

The menu is divided into several basic areas and conveys useful information to the user.

1. Top Information Bar. (1B) This area conveys information to the user about basic process selection, operating mode, and input voltage.
2. Torch Polarity and Gas Selection Information (2b). This row is in yellow lettering for contrast. This is area is designed to serve as a important reminder to the user to check and confirm both gas type and torch/gun polarity. The gas selection information may change in Steel MIG mode (C25) depending upon the settings of the unit. At higher volts and wire speed settings the gas recommendation may change from 75/25 Ar/CO_2 (C25) to 90/10 Ar/CO_2 (C10).
3. The main display area, or top tiered row (3b). This area on both left and right sides of the machine will display default Volt and Wire Feed Speed/ Amp settings unless the adjustment mode is entered into. During active welding, it will also display the actual measured Volt and Amp output of the machine. During adjustment, the display will reflect the chosen parameters and values of the parameters. During adjustment, the main display area values and parameters will change color to red. Appoximately 5 seconds after adjustments are completed the main display area will revert to the default setting and colors.
4. The lower parameter rows/tiers. (4b and 5b) This area displays all the information related to adjustable parameters and selectable functions of the unit. *In the PowerSet mode, only one line may be displayed due to the simplified input design.*

When a parameter or a function is selected, the screen will display the value or status of the function in two places:

1) At the top of the screen in the main display area.
2) Just above the selected parameter in the lower rows

The value-based parameters are also accompanied at the top of screen by the parameter's unit of measure in an abbreviated exponent form such as V, S, or % to as a reminder of the value being adjusted. Underneath the parameter value or function status, the actual name of the selected function or parameter appears. This redundant arrangement makes the display easier to read during adjustment and helps to eliminate bottle necks in navigation.

After adjusting is completed, the machine will default back to the main adjustment value (Volts, Amps or Inches per Minute) after approximately 5 seconds if no further input is made. The purpose of displaying the value or status of the lower tiered rows and the upper default value is to provide an at-a-glance view of all parameters simultaneously on the single screen at any time during operation. This eliminates the need for pop up menus and bottle necks in setup while promoting operator awareness of settings.

The screen makes use of colors to indicate condition, mode and status and serves to aid the user in general in interpreting the on screen information.

1. Green:

- The green color (4b, 5b) of the two lower rows/tiers of boxes indicates normal operation or that the unit is ready for use. The two lower tiered rows of boxes are normally green, unless the parameter of the box has been selected for adjustment by the user. Green is used to indicate a set function status or relay a parameter value to the user.
- Green is used at the top information bar to communicate basic status information. It is used to confirm the mode and basic operating information. *If the Voltage box in the information bar turns yellow, this indicates the unit is operating on 120V. This is to serve as a reminder that output is limited in 120V and some settings may not have a full range of adjustment or selection.*
- When the large numbers turn green in the top, main display area, this indicates the value cannot be adjusted. However, it is communicating an important measured value, such as TIG or Stick welding Voltage and OCV.

2. Gray:

- Gray, blank areas in the lower rows of boxes are non-selectable areas. These emptied boxes can be ignored and no function is assigned to them in the current menu configuration or process.

Component Identification and Explanation

- In some cases a gray area will become an adjustable area if certain functions like Spot weld is selected for use. If so, the area(s) will turn from gray to green and will display additional parameters related to the function. When the items are green and the blank areas filled by additional parameter information, they are then adjustable. The grayed -out areas help eliminate confusion over what needs to be adjusted. Some gray areas have no func tion and may only be a place holder and will not change status or offer adjustment. Due to the nature of each process, some areas will have more gray areas than others. In a couple of instances where a function is selected that limits the ability of other necessary functions, and the restricted function remains active, the area will remain green, but will not be adjustable.

3. Red.

- Red indicates the machine has entered the adjustment mode. The numbers/words at top of the screen, the middle vertical line, middle line extension and any parameter box on a row that turns red indicates that the machine is in adjustment mode.
- If a parameter box is highlighted in red, the main display area will display of the chosen function status or parameter value.

4. White.

- White letters or numbers in the main display area indicates that the unit is displaying the default setting and is not being adjusted.
- In any wire feed process, when both upper numbers are in white the unit is displaying welding volts (left side) and welding wire speed feed rate (right side).
- When the main display area is white this indicates the unit is not in adjustment mode and is ready to weld.
- In TIG and Stick modes, only the right Amp box will be displayed in white. The other box will be in green to indicate a non adjustable voltage value. When the white appears in only the Amp box, and the other side is in green, the unit has exited the adjustment mode.

5. Yellow.

- Yellow is used to convey important basic information.
- Yellow can also be used to alert the user to a change in status or warn of an unwise setting (PowerSet mode).
- In manual mode for steel the colors of the numbers may change when a wire begins to reach its short circuit limit and transitions to globular transfer and into axial spray transfer. The on screen recommendations for shielding gas will also change from 75/25 to 90/10. The information just above the main display area reminds the user to observe the indicated polarity and the gas type to use.
- The voltage input reading found in top information bar will change to yellow when the unit is operating on 120V input power.

Why Are Some Settings Limited or Blank?

There are two basic reasons some settings are limited in adjustment or completely blank. The first reason is that the unit is being used on 120V and output is limited. With limited output, the machine must limit certain range of adjustments to protect itself from malfunction. In PowerSet mode this is obvious by the limit on selecting electrode /wire or thickness sizes. The second reason is that a function is not active or has been set to "OFF". When functions such as spot weld or pulse are set to "ON", the unit will add additional settings and allow adjustment of those functions or parameters.

Component Identification and Explanation

USING THE PROGRAM MENUS AND MEMORY FUNCTION.

The memory function on this machine allows the user to save and name up to 30 different programs. (There are 30 programs but only 10 programs per page.) Not only can the programs be saved, they can also be locked to prevent unwanted or accidental tampering for WPS work requirements. The process to save and recall the memory is relatively simple. However, there are some differences in the way the machine is controlled from the main menu screens. There are no longer any left or right division of control in this mode. Only the right side control knob and Save/Recall Program button will be used for navigation and selecting. The PowerSet button is used for selecting or deselecting the lock function. Most programs will say "Empty" until they are filled by a program. But if there are some form of program stored, these were stored during factory testing and not intended to be functional settings. These programs can be saved over, after being unlocked. Any recalled program can be fine tuned or adjusted, but the new settings or changes made to the machine will not be kept.

NOTICE: There are no useful pre-stored programs on this machine.

IMPORTANT: It is advised not to use any programs designed for 240V input with 120V input. However, if saving in 120V mode and 240V mode is expected, be sure to include the voltage in the program name .

Navigating and Using the Recall Screen.

The program function consists of two screens: the recall screen and the save screen. Both look alike except at the top information bar location, the words "Recall" or "Save" are used. Be sure to notice which word is at the top so that the unit is in the correct screen to perform the action desired. The recall screen is used to "recall" or bring up a desired program for use.

The recall mode does not allow any saving or any permanent modification of the programming. A recalled program will allow adjustments to be made, but the base program cannot be modified unless it is unlocked in the save mode and completely resaved or saved over. Recall mode will always be a safe mode to use for any user since programming cannot be saved over in this mode.

1. To recall any program, quickly press and release the save program button (1). This may be done from any process, even if the desired process is not selected at the top of the selector. (The selected program will override the process selector and display the saved program and process.)
2. The Recall menu screen will appear and will be confirmed by the green "Recall" bar (2) at the top of the screen.
3. Navigate to the desired program by rotating the right side adjustment knob (3). A green bar will highlight the line chosen.
4. Press the right side adjustment knob (3) to select and enter and open the program. The screen will display the program and settings like a normal screen, but it will not allow it to be overwritten. The programming will allow the user to make adjustments, but these will not be permanent to the program.

NOTICE: If the recall mode is not being actively used, and no choice has been selected/entered by pressing the right adjustment knob, the machine will return back to the previous setting. It will not recall (bring up on screen) the program, even if it has been highlighted.

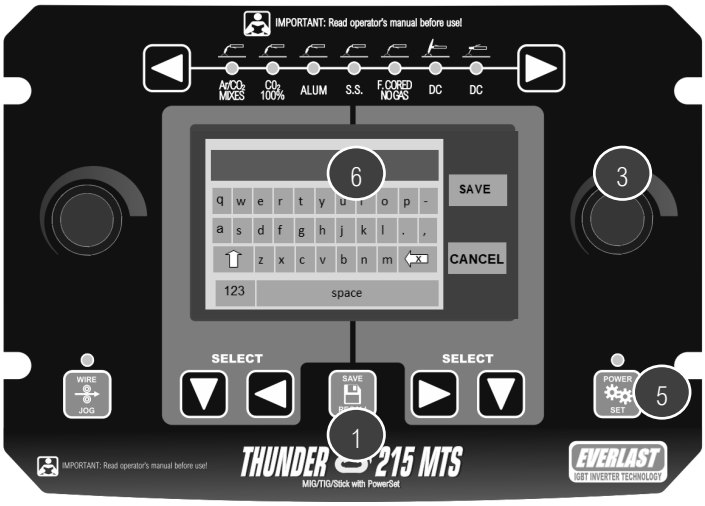
Navigating and Using the Save Screen.

The Recall and Save screen are similar but the Save screen allows programs to be stored and features the lock/unlock ( ) function which will allow a new program to be saved in the old memory slot.

1. To save, complete all normal setup for the process desiring to be saved. Make sure all settings are correct before proceeding to step 2.
2. To access the save menu screen, press and hold the save/recall button (1) for at least three seconds before releasing.
3. When the button is released the Save screen will appear and the green "Save" bar at the top of the screen will confirm the selection.
4. Navigate to the desired line by rotating the right side adjustment knob (3). Each line will highlight in green as the adjustment knob is rotated.
5. Each line will have either a lock symbol or unlock symbol ( )

Component Identification and Explanation

located on each line on the right side (4). This indicates whether or not the selected line is available for a new program to be saved. If the unlock symbol is displayed, this line will allow a new program to be saved. If a locked symbol is displayed, this line must be unlocked before saving. To unlock a line, quickly press and release the PowerSet button (5). The symbol will change to the unlocked status. **WARNING! If a line is purposefully unlocked, or left unlocked after saving a new program, this program will be subject to permanent change or over-writing without an extra layer of protection.** If available, always save in an "Empty" space. If a new program must be saved over an old one, make sure that it has no value or future use or write down the settings so that the values can be re-entered in the future.



6. Press the right side adjustment knob (3) to select the line and access the 'QWERTY" Popup key pad (6). Rotate the adjustment knob (3) to highlight a letter or a command (save or cancel). Press the adjustment knob (3) to enter the letter or number desired. Continue until the program name is complete or until the maximum character limit has been reached. *The maximum number of letters, numbers and other characters that can be entered to name a program is a total of 15 in any combination. The keypad will not hold more than a 15 total character program and will block more from being entered once the maximum is reached. To eliminate future confusion over which programs are which, be sure that program names are carefully chosen to be distinctive without exceeding the character limit.*

7. Once the program has been entered, rotate the adjustment knob (3)to save selection or press cancel to exit the screen. *If cancel is selected the program will not be saved on that line and the name or status of the line will not be changed.*

8. After selecting "save" on the popup key pad, the program screen will reappear with the newly named program. As an extra layer of security, and to prevent unwanted or otherwise accidentally tampering with the program, press the PowerSet button (5) to lock the program as soon as the program returns from the keypad menu screen. *It is always a good idea to keep all programs locked for program integrity.*

9. If no further input is made (i.e. locking or selecting another line) after saving the program, the menu will default back to the welding mode after approximately 5 seconds. Instead of waiting for the 5 seconds to expire, quickly press and release the "Save/Recall" button (1) once all programming is complete and saved. This will quickly exit and return to the menu normal welding/adjustment mode.

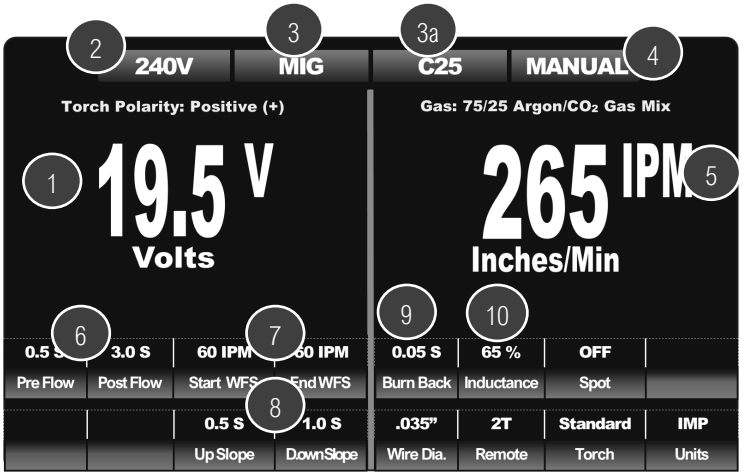
Component Identification and Explanation

USING THE MANUAL MENUS

Each process menu operates in the basic same way. Navigation is similar between all the functions. See the below menus and notes about navigation of each of the following menus.

MIG/Flux-Cored Manual Menu:

The MIG manual menu is essentially the same between all MIG process selections, whether selecting C25, C100, Aluminum, or Stainless Steel.



1. **Main Left Display, Default Voltage Display.** Adjust the voltage with left adjustment knob. To adjust other parameters or functions, enter the adjustment mode with left down arrow key to navigate to the desired parameter to highlight and enable adjustment. When a parameter or function is selected for adjustment, the numbers will turn from white to red. Voltage is the default setting of the left side. After 5 seconds of no input or adjustment of other parameters or functions, the selected setting will default back to the Voltage setting and exit adjustment mode.

2. **Voltage Input Confirmation.** This confirms which voltage the machine is being supplied. This also serves as a diagnostic tool. If the machine shows 120V, while operating on 240V input, then the power supply to the welder is likely faulty. **With 120V output, the bar will turn yellow to remind that the welding output is limited. NOTE**: Maximum output of the machine is governed by the input voltage. Some selections may not be possible on reduced input power.

3. **Process and Gas Reminders.** When viewed together, both 3 and 3a reminds the user which process has been selected. In one of the MIG process modes MIG will always display with either C25 (75/25 Ar/CO2 for Steel), C100 (100% CO2 for Steel), Mix Gas (98/2 Ar CO2 for Stainless/Inox), Ar Gas (100% Argon for Aluminum), or No Gas (For Flux-Cored on Steel) in wire feeding modes.

4. **Manual/PowerSet Mode**. This indicates which mode the machine is operating in, whether in full manual mode or in PowerSet mode which is a synergic, more automated mode. In PowerSet mode, many functions may not be available for adjustment and will be preset. (See the MIG PowerSet section).

5. **Main Right Display, Default Wire Feed Speed Display.** Adjust the wire feed speed (WFS) with right adjustment knob. This display can indicate the wire feed speed in either Inches Per Minute (IPM) or in Meters Per Minute) M/Min. This is the default setting of the right side. Other parameters and functions will be represented in the display when in adjustment mode. When the Wire Feed Speed or other parameter is selected for adjustment the display will turn red in color. After 5 seconds of no input or adjustment of any parameter or function, the selected setting will default back to the Wire Speed setting and return to white. *While actively welding, the display function will change to read actual measured amperage output.*

6. **Pre-Flow/Post Flow Timers.** Pre and Post Flow provide adjustable shielding gas flow time before and after the weld. This is important to reducing contamination in the weld. The arc start and wire feed will be delayed slightly by the amount of pre-flow time used but helps provide a gas envelope around the weld. Post flow helps cool the torch and provides shielding around the weld after the arc is terminated. This helps prevent oxidation of the weld. **NOTICE: In gasless Flux -Cored mode, Pre and Post Flow will be unavailable for adjustment and the space will be blank.** Typically a setting of about 0.5 seconds for Pre-flow and 3-5 seconds for Post Flow are used.

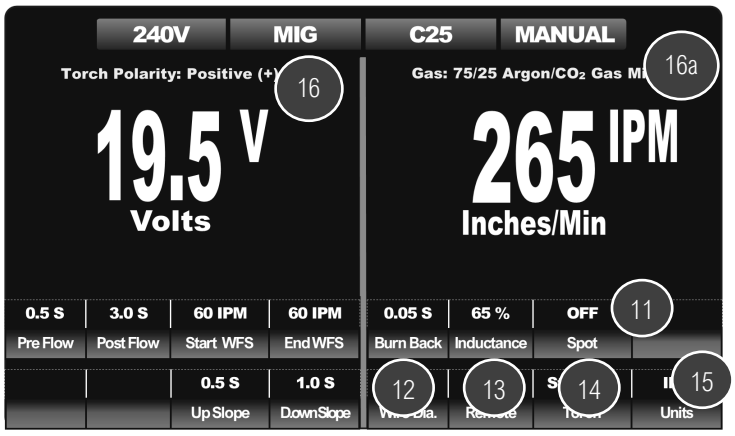
7. **Start/End WFS.** The starting wire feed speed helps the unit start cleanly and smoothly. It can be used with up-slope to helps to improve the quality of the start and transition into the welding amperage. This provides a type of "soft start" which is similar to a hot start setting. The end wire feed speed is used as finishing wire speed feed, and is used to fill the crater left at the end of the weld at arc termination. To reduce the impact of this function, set to 60 IPM (.5 M/M) and set up and down-slope to 0.0 Seconds.

8. **Up/Downslope Timers.** The slope is used to ramp wire speed up or down, at the start of the weld or at weld termination. Up-slope is used with Start Amps to increase wire speed (or decrease it, depending upon the setting desired) from the starting wire feed speed. Down-slope is used to decrease wire speed from welding wire feed speed to the end wire speed. This provides the time necessary to complete the crater fill process at the end of the weld. Either Up or Down Slope can be set to "0.0" if the function is not desired.

9. **Burn Back.** This is the amount of time the arc stays on after the wire stops feeding. It is used to help prevent the wire from sticking in the weld and to reduce the need for constant trimming of the wire before restarting. Use a setting of .1 to .3 seconds to begin with for most applications. Smaller diameter wires need less burn back time

10. **Inductance.** This improves the wet-in of the weld. A low setting will result in a very poor arc, with a high pitch. The result will be a raised ridge in the middle and poor wet-in. Excess spatter may be observed. The result of too high of a setting will result in a very fluid, flat pud-

Component Identification and Explanation



dle. The pitch will be raspy and not smooth. Starts will not be as smooth. Generally, a setting of 65 to 75% is a good starting point on Steel with C25. With Steel and C100, 70 to 80% is a good starting point. Generally, pure CO2 is not very smooth on many welders, but with inductance control, high quality welds can be achieved. Stainless requires the highest inductance with 90% or greater. Aluminum can range depending upon the wire from 60 to 80% or so. Flux-Cored behaves a little differently with a 40 to 50% starting point. Of course, different weld positions, joint designs and thicknesses of metal can affect the inductance requirement slightly. NOTICE: The units will ship with the last settings used in performance testing. Often Inductance will be set to 0% after testing the range of function. If the unit is used with 0% Inductance, bad arc quality will result.

11. **Spot and Stitch Timers.** *The Spot timer must be turned on for the Stitch function to appear. When Spot is turned off as shown in the picture above, the Stitch function is no longer selectable.* The Spot function is a timer that sets a defined "Arc on" time. The timer allows the arc to stay energized for the period set. After the time has expired the arc will automatically stop, if the trigger is still held down. While it can be used with 4T, the spot function is best used in 2T mode, especially for relatively short tack welds. **NOTE:** Keep in mind that If the spot timer is turned on accidently, the wire feed will stop suddenly soon after the trigger is pressed. In fact it may barely feed and just seem to quit if the time is set low. This is normal, but often a source of tech support calls. If your wire feeder stops feeding unexpectedly after the trigger is pressed, check this function first. Stitch is defined as "Arc-off" time. This function is dependent upon the use of the Spot weld function. While the Spot function may be used independently with the Stitch timer set to "0.0", the use of the Stitch is predicated on the use of the Spot Timer. Using the spot timer together with the stitch timer creates an endless "On and Off" cycle of the arc for as long as the trigger is held. The Spot Timer sets an "arc-off" interval between a series of spot welds as the trigger is continued to be held down. This is useful for tacking up long seams on thin sheet metal such as body panels. It helps to provide regular spacing between the weld as long as the forward travel speed provided by the user remains fairly consistent. **IMPORTANT: If the spot is accidentally engaged, the user will experience a short cycle of the arc. This typically happens with new or inexperienced users or after another user has made adjustments. If the arc suddenly dies after the arc is started or starts/stops starts, check and make sure the Spot timer is set to "OFF".**

12. **Wire Dimeter.** The input of the wire diameter helps to put limits around output for the wire and make suggestions in gas selection when the wire approaches the short-circuit limits and begins to transition to globular/spray transfer.

13. **Remote/Torch Trigger Function.** This controls how the welder reacts to the torch trigger. In 2T, the trigger is pressed and held to weld. In 4T, the trigger is pressed briefly to start the arc, then released to continue to weld. The weld is continued without the torch trigger being held down. The trigger is once again pressed, held and then released to terminate the arc. See more detailed 2T/4T Remote information and explanation found later in this manual.

14. **Torch Type**. Select between the main MIG gun or Spool Gun function.

15. **Units.** Everlast recognizes that there is a need to provide different units of measures to different industries and regions of the world. This unit is equipped to read in Standard Imperial (US or English) units such as inches per minute or decimal inch equivalents. The unit is also equipped to read in Metric (SI) units such as Meters/ Minute and millimeters. Choose between MET (Metric) or IMP (Imperial) on the screen to convert all relevant measurements to the desired or required units.

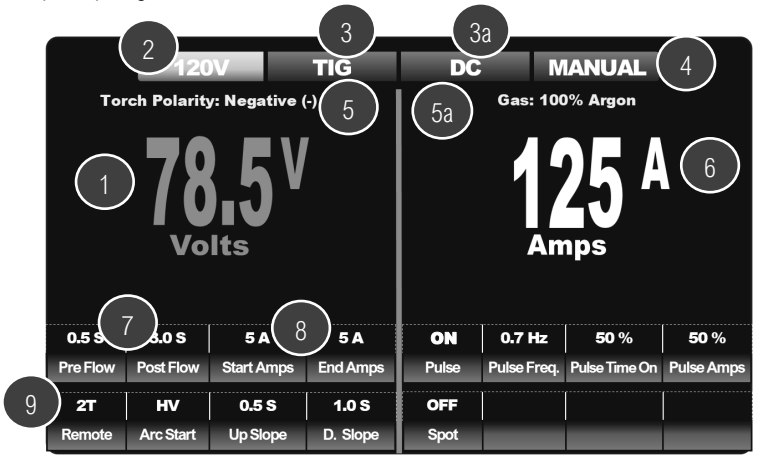
16. **Reminder/ Information Areas.** This informs the user about which torch polarity (16) to use and which gas to use (16a). Both the Torch polarity and gas recommendations are subject to change according to the process used and the actual output of the machine. If improper operation is observed, check this area and the information it is displaying and confirm the polarity and gas mix being used. These areas are not selectable or adjustable.

Component Identification and Explanation

Control Panel Operation and Navigation

DC TIG Manual Menu:

The TIG manual menu is arranged similarly to the MIG menu and some of the features and parameters overlap. But the information below deals completely within the context of TIG operation. This unit is a DC TIG. It should not be used for welding aluminum. For aluminum welding a spool gun or push pull gun should be used.



1. Main Left Display, Default Voltage Display. The voltage displayed in the Main display in TIG mode is a measured reading of output. It is not adjustable. The voltage will always be displayed in green color to remind the user that the voltage is non adjustable. The left control knob will not be able to adjust voltage. While adjusting other parameters, the voltage will change function and display the selected parameter. It will also turn red indicate that it is in the adjustment mode.

2. Voltage Input Confirmation. This confirms which voltage the machine is being supplied. This also serves as a diagnostic tool. If the machine reads 120V, while operating on 240V, then the power supply to the welder is likely faulty. As demonstrated above, during when 120V input is supplied, the voltage bar will turn yellow to remind the user that the welding output is limited. NOTE: Maximum output of the machine is governed by the input voltage. Some selections may not be possible and some ranges will be reduced on 120V input power.

3. Process Reminders. When viewed together, both 3 and 3a reminds the user which process has been selected. For TIG, DC will also be highlighted on this machine to remind the user that this unit is DC, and not AC mode. (This TIG supplies DC output only for TIG. It is not suitable for welding Aluminum or Magnesium.)

4. Manual/PowerSet Mode. This indicates which mode the machine is operating in, whether in full manual mode or in PowerSet mode which is a synergic, more automated mode. In PowerSet mode, many functions may not be available for adjustment and will be preset. (See the TIG PowerSet section).

5. Reminder/Information Area. The area in yellow is designed to inform or remind the user to check or change polarity and to confirm which shielding gas (5a) should be used. For TIG, this area will remain unchanged. Torch polarity in TIG mode will always be negative (-). The recommended shielding gas will always be 100% Argon.

6. Main Right Display, Default Amp Display. Adjust with right adjustment knob. By default this display area indicates the Amperage. In adjustment mode, the function or parameter selected will display and the display numbers/letters will turn red to indicate adjustment mode. After 5 seconds of no input or adjustment of any parameter or function, the selected setting will default back to the amperage reading and return to the default white color. *While actively welding, the display function will change to read actual measured amperage output.*

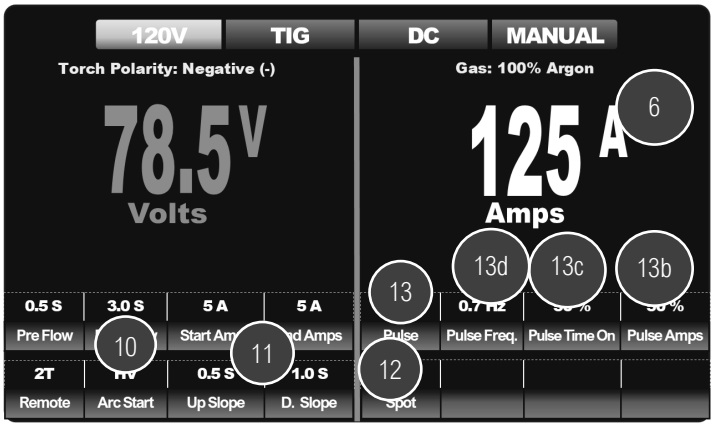
7. Pre/Post Flow Timers. The setting provides shielding gas flow before and after the weld. While only a small amount is needed, pre-flow is important to the TIG process. This provides a gas envelope around the weld area so the arc can be cleanly started and oxidation of the metal and consumption of tungsten will be eliminated. Post flow aids in weld cooling and protection to help prevent oxidation of the weld and consumption of the electrode. Always use around .3 to 1.0 seconds of preflow (more is needed for longer torches). Post flow should be set according to the amperage being used. Always use a minimum of 3 seconds for welding. Ideally, use 1 second for every 10 to 20 Amps used, with 3 seconds being the minimum setting regardless of the amperage.

8. Start/End Amps. This controls be beginning and ending amperage of the weld cycle. The Start Amp setting provides a starting amperage for the welding arc. The minimum used should be adjusted according to the tungsten size used. This setting is adjustable with all remote modes. While typically used at a relatively low setting (<40A) the Start Amps can be used to provide a "Hot Start" as well. However, if the Tungsten is blasted with too much starting amperage during the start, the Tungsten tip may deteriorate rapidly. End Amps provide a crater fill amperage and assists the user in terminating the arc cleanly. It provide the user an opportunity to fill the crater at a lower amperage and to cool the weld puddle slightly before terminating the arc. Typically, with the foot pedal, this is set less than 20A for a clean tailout of the arc. With the torch switch, this is typically less than 40A, however it can be higher depending upon the desired effect.

9. Remote/ Torch Trigger/Pedal Function. The Remote function settings that are offered are 2T, 4T, Pedal, 2T+A, and 4T+A. These settings dictate how the welder's amperage and screen programming are controlled. Depending upon the remote selection choice, the Remote function also controls which other functions and parameters are available for adjustment. For example, the pedal eliminates Up and Down Slope functions because they are not needed since slope is controlled through the pedal manually. 2T and 4T are used with the torch switch only. The amperage, slope and all functions related to the weld cycle are available. The torch switch does not control welding amperage or increase or decrease of amperage directly. The programming on the panel controls this. But the cycling of the torch

Component Identification and Explanation

Control Panel Operation and Navigation



switch does affect when this happens. The 2T+A and 4T+A, though similar to standard 2T and 4T and work with a type of TIG torch equipped with a separate amp control and switch. This allows the user to use the welder programming for start and end amperage, up and down slope but still be able to fine tune the max amperage on the torch while welding without a foot pedal. See more detailed 2T/4T Remote information and explanation found later in this manual.

10. Arc Start. The TIG welding arc can be initiated in two basic ways. The arc can be started without contacting the metal or can be touched to the metal and lifted up to create the arc.

- *HV Start.* For contactless starting, which is usually preferred for most applications, the unit features an electronic form of HF starting called HV. This type start is very similar to the old HF contactless start, but is now generated electronically without the use of adjustable points. HV/HF starting may be restricted in some environments where this may cause electronic interference such as hospitals.

- *Lift Start.* The other method of starting is called Lift Start. This is where the tungsten is briefly touched to the metal and lifted up to start the arc. There are two types of Lift start. The first is the Live lift. This lift start means the tungsten is always live. Touching down to the metal, the contact is sensed and the output is reduced until the tungsten is lifted up and the arc is started. This is preferred by pipe welders and job site fabricators because it eliminates pedals and wires. This type start also disallows all adjustment except Post Flow. Gas automatically starts flowing when the tungsten is touched. The second type of lift start is activated by the switch or foot pedal. The tungsten stays "dead" until the switch is activated. In this mode, the torch is touched to the work and the switch or pedal is pressed and held and the torch is then lifted up and the arc is struck. This method is safer and is often used where HF/HV use is restricted.

11. Up/Down Slope Timers. Up slope is used to ramp the amperage up from the starting amperage up to the pre-set welding amperage by setting a defined ramp up time. Down slope is used to ramp the amperage up from the pre-set welding amperage down to the end (crater fill) amperage by setting a defined ramp up time.

12. Spot/Stitch Timer. *The Spot timer must be turned on for the Stitch function to appear to the right of the Spot Timer function. When Spot is turned off as shown in the picture above, the Stitch function is no longer selectable and the space will turn gray and will remain blank.* The Spot function is a timer that sets a defined "Arc on" time. The timer allows the arc to stay energized for the period set. After the time has expired the arc will automatically stop, if the trigger is still held down. The spot function is best used in 2T mode, especially for relatively short tack welds. NOTICE: While the Spot function may be used independently with the Stitch timer set to "0.0", the use of the Stitch is predicated on the use of the Spot Timer. Using the spot timer together with the stitch timer creates an endless "On and Off" cycle of the arc for as long as the trigger is held. The Spot Timer sets an "arc-off" interval between a series of spot welds as the trigger is continued to be held down. This is useful for tacking up long seams on thin sheet metal such as body panels. It helps to provide regular spacing between the weld as long as the forward travel speed provided by the user remains fairly consistent. **IMPORTANT: If the Spot function is accidentally engaged, the user will experience a short cycle of the arc. This typically happens with new or inexperienced users or after another user has made adjustments. If the arc suddenly dies after the arc is started or starts/stops starts, check and make sure the Spot timer is set to "OFF". The use of spot eliminates the use of Pulse. However, it should not be confused with Pulse. In Pulse mode the arc never extinguishes and there are more adjustments.**

13. Pulse. The pulse is used to help control heat input and warping by creating a lower average Amperage by cycling between levels of amperage. It can also be used at slower pulse frequency settings to improve the weld appearance and the "stacking" of the weld. When turned on, the Pulse selection will be expanded with three additional selections on the line that are pulse functions. When the pulse is turned off, the three boxes to the right of the function will be gray. Additionally, when the Spot timer is turned on, Pulse will not be available. Even though on the line, there are three additional settings, in total the Pulse has four adjustable components on this welder:

- (6) The *Peak stage*, or the Welding Amp stage represents the maximum set amperage of the pulse. This is represented on the machine by the default Amp setting.

- (13b) The *Base stage* represents the minimum set amperage of the pulse. This is represented on the machine by the Pulse Amp setting. The represents a drop in the amperage, not a rise in amperage.

- (13c) The *Pulse Time-On*, or the pulse duty cycle of represents the adjustable balance of the pulse between the Peak and Base pulse

- (13d) The *Frequency* is the number of times per second the pulse cycles. It is represented in Hz, but Hertz can also be thought of a Pulses per second (PPS). Frequency determines how fast or slow

Component Identification and Explanation

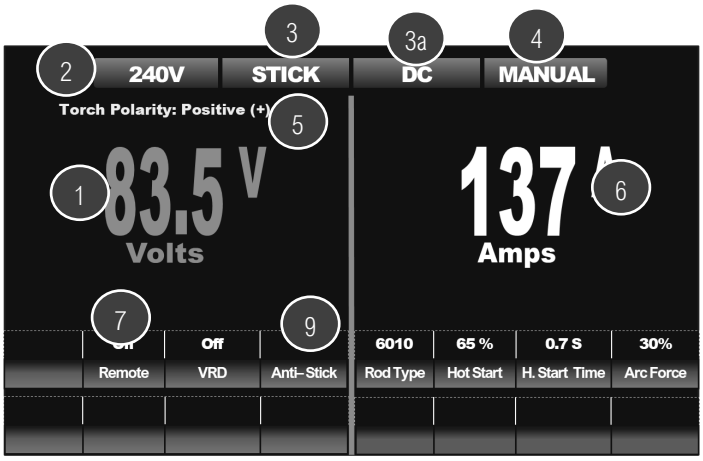
Control Panel Operation and Navigation

the pulse is cycling every second.

NOTICE: Pulse is only used in TIG mode and is not a function of MIG on this machine. It is not available when using the Spot Timer.

DC Stick Manual Menu:

The stick manual menu is simplest menu of all the manual menus. However, there are a few functions that the user should take note of. Ignoring these setting and not providing a setting for them, may make arc starting difficult or may make maintaining a satisfactory arc impossible.



1. Main Left Display, Default Voltage Display. The voltage displayed in the Main display in Stick mode is a measured reading of output. It is not adjustable. The voltage will always be displayed in green color to remind the user that the voltage is non adjustable. The left control knob will not be able to adjust voltage. While adjusting other parameters, the voltage will change function and will display the selected parameter. It will also turn red to indicate it has entered the adjustment mode.

2. Voltage Input Confirmation. This confirms which voltage the machine is being supplied. This also serves as a diagnostic tool. If the machine reads 120V, while operating on 240V, then the power supply to the welder is likely faulty. As demonstrated above, during when 120V input is supplied, the voltage bar will turn yellow to remind the user that the welding output is limited. NOTICE: Maximum output of the machine is governed by the input voltage. Some selections may not be possible and some ranges will be reduced on 120V input power. Notably, Amp output will be limited and may not always provide a satisfactory result with electrodes over 3/32. In some cases, depending upon the type of rod selected, 3/32" size rods may not perform as well either.

3. Process Reminders. When viewed together, both 3 and 3a reminds the user which process has been selected. For Stick, DC will also be highlighted on this machine to remind the user that this unit is DC, and not AC mode. (This welder supplies DC output only for Stick)

4. Manual/PowerSet Mode. This indicates which mode the machine is operating in, whether in full manual mode or in PowerSet mode which is a synergic, more automated mode. In PowerSet mode, some functions may not be available for adjustment and will be preset. (See the Stick PowerSet section).

5. Reminder/Information Area. The area in yellow is designed to inform or remind the user to check or change polarity and to confirm which shielding gas (5a) should be used. For Stick, this area will remain unchanged. Torch polarity in Stick mode will always be positive (+). Some rods that may allow use on electrode negative, but those are typically not considered standard types or preferred polarity in most cases.

6. Main Right Display, Default Amp Display. Adjust with Right adjustment knob. By default this display area indicates the Amperage. In adjustment mode, the function or parameter selected will display and the display numbers/letters will turn red to indicate adjustment mode. After 5 seconds of no input or adjustment of any parameter or function, the selected setting will default back to the amperage reading and return to the default white color. *While actively welding, the display function will change to read actual measured amperage output.*

7. Remote. The remote function allows the stick function to be used with an adjustable remote to control amperage at the electrode holder.

8. Voltage Reduction Device (VRD). The VRD acts as a safety device by lowering the OCV while the unit is not welding to below 24V. This helps prevent accidental shock and electrocution.

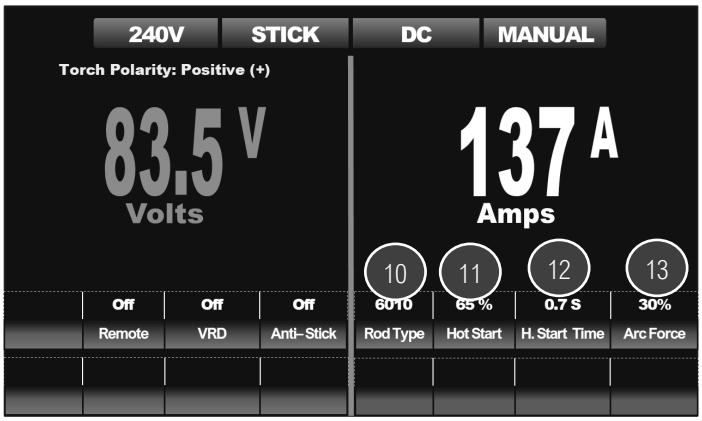
9. Anti-Stick. The anti-stick helps prevent the rod from sticking fast in the weld puddle by reducing the output when it is shorted accidentally while welding. This makes the stuck rod easier to remove. It will not actually prevent the rod from sticking, but it will help prevent it from sticking fast in the weld and flaming up.

10. Rod Type. This feature helps improve overall rod performance and provides a base for the machine to fine tune parameters.

11. Hot Start. This is a rush of amperage over the set amount that is provided to help improve the starting of the rod. NOTICE: Hot Start may be limited and seem to be muted due to the amount of amperage available left over to operate the hot start. The closer to the maximum amperage the machine is set, the impact of the hot start will be softened. Typically iron powder and titania fluxed rods require less than cellulose. For iron powder/titania fluxed rods, 40-50% is typical. For cellulose 70-90% may be required. Low-Hydrogen rods that are not properly stored or used and are considered "wet" (open, non heated storage of greater than 4 to 8 hours), may require higher settings similar to cellulose to keep the rod burning properly. But fresh rods or rods stored in rod ovens will use the lower settings.

Component Identification and Explanation

Control Panel Operation and Navigation



12. Hot Start Time. This is the duration of the Hot Start This keeps the hot start active and helps heat up the puddle.

13. Arc Force. As the rod is held closer, the arc voltage will drop and the total wattage will fall. In some cases this may cause the rod to stick in the puddle. The Arc Force offsets this by supplying additional amperage (over the amount set) to help maintain welding wattage. This allows the user to use a tight arc, to prevent impurities from entering the weld. The Arc Force will be triggered when welding voltage falls below approximately 20V. Adding Arc Force will improve the feel and wet in of the puddle. Typically iron powder and titania fluxed rods require less than cellulose. For iron powder/titania fluxed rods, 20 to 40% is typical. For cellulose 60-85% may be required. Low-Hydrogen rods that are not properly stored or used and are considered "wet" (open, non heated storage of greater than 4 to 8 hours), may require higher settings to keep the rod burning properly. But fresh rods or rods stored in rod ovens will use the lower settings.

Using the PowerSet Menus.

The PowerSet function is a synergic function designed to provide the user with a simplified set up process. It provides the user with a recommended setting while simultaneously allowing a workable range of settings based off of industry accepted norms. It can be used as a general guide for set-up and eliminates the need for complicated charts and user guides.

To use the PowerSet menu properly, the user must input basic operating parameters, such as wire type (selected by the process), wire diameter and material thickness to provide useable results. These are all the same type settings you'd have to reference in a user setup chart. Although the settings provided to the user are based off of industry accepted "norms," the provided settings may not work for every user in every application. The programming is designed to provide a target, or recommended setting, but the unit also provides a range of adjustment both higher and lower than the recommended setting to allow fine tuning to accommodate differences of joint design, user welding style and weld position. Although the range of adjustment is fairly generous, there are limits set by the machine's programming to attempt to keep the unit from going too far off track. The programming will block further adjustment after the limits of the range are reached. The PowerSet is also equipped with visual graphical aids to help the user see and visualize the settings. The settings will have a tapered graphic is also color coded to indicate a normal range of a setting and guide the user further in fine tuning. As the setting is fine-tuned, away from the recommended settings and toward the setting limits, the graphic will eventually change from green to yellow, and finally to red to indicate the general "safeness" of a permitted adjustment.

Keep in mind that synergic settings cannot take into account every variable and allows the user independent control to manually correct the provided settings to accommodate differences in welding environment, user experience and skill. Also, weld position, joint fit-up, and cleanliness all are "hidden variables" that can make a difference in the accuracy and effectiveness of the PowerSet settings. There is no perfect synergic system for every eventuality. The settings provided are given based off of in-position welding, good fit-up/joint design and assumes at least an intermediate level of understanding and skill of the operator. The PowerSet function has been tested for acceptable function under industry recommended operating conditions and parameters.

It should also be noted that welds greater than 3/16" with the unit are generally performed in multiple passes for best results for short circuit welding. The unit does offer higher settings and may recommend a gas change as the wire speed and voltage enter the Globular and Spray transfer range to perform single pass welds (MIG C25 process selection). If the user is not informed on the differences between the types of MIG wire transfers and does not understand the requirements and expectations and limits of different forms of wire transfer and observe the recommendations given, the unit may not perform satisfactorily.

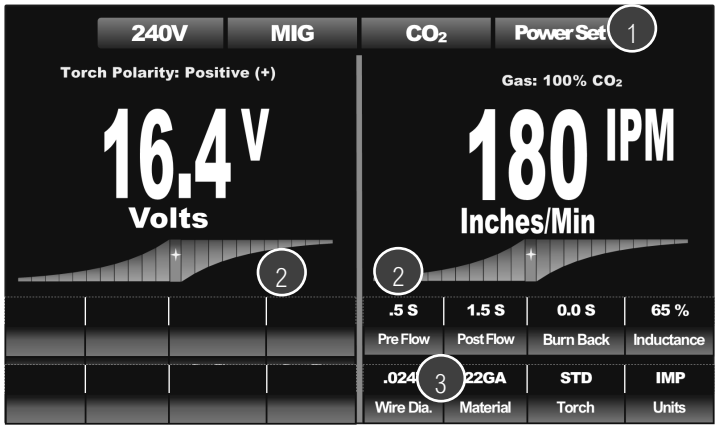
NOTICE: To prevent completely unworkable mismatches in wire, tungsten or electrode capability, selection choices of inputs or parameter adjustments may be limited or completely blocked, even if further adjustment is represented graphically on the screen (such as metal thickness if MIG wire diameter is too small). This is intended to remind the user that there are physical limits to choices of wire, tungsten or electrode (welding rod) can support. Even with these limits, it does not always mean that performance will be perfect or desirable. Near or at the physical limits of wire or electrodes (or input voltage), spatter may increase and weld performance or arc stability will decrease. **The limitation of adjustment with some settings or combination of user inputs is not a malfunction of the unit.**

All PowerSet Menus.

In comparison to the Manual Menus, the PowerSet Menus are simplified in regards to the amount of controls and functions needed for proper adjustment. The menu is reduced to more basic functions, but still allows all critical adjustments to be made. The rest are preset by the factory or all together eliminated. The basic layout, operational information provided on screen and method of navigation/adjustment are mostly unchanged from the manual mode, so the information will not be repeated, unless there is a difference in function or process of setup.

Component Identification and Explanation

Control Panel Operation and Navigation



1. When the PowerSet mode button is activated, this box will change from Manual to PowerSet to confirm the setting.
2. The adjustment range graphic is designed to aid the user a visually by indicating how the adjustment is affecting the setting. Depending upon the parameter being adjusted, the graphic may change in appearance. For Volts, Amps and Wire Feed Speed, the graphic appears as shown above in the picture. As the user makes progresses further away from the recommended adjustment, the graphic will also change color, turning from green to yellow and finally to red. The red and yellow areas indicate that the adjustment is not recommended and serves as a general warning that performance may not be optimal, even if it is allowed. For other adjustable parameters or input functions the graphics will change in appearance to better illustrate the. **Input functions such as Wire Diameter or Material thickness have no target or recommended value and simply relay the chosen input value in the form of a graphic as a visual aid.** Other basic parameters such as torch or pre/post flow have no recommendation so there is no adjustment graphic for those. For specific parameters, such as inductance, the graphic indicates the recommended preset and allows the user to make adjustments, but indicates settings that may not be ideal as the graphic slopes up or down, away from the center setting. Other types of graphic representations are:

- Material Thickness: 

- MIG Inductance or Stick Arc Force: 
- Diameter (wire, tungsten or electrode): 

3. PowerSet requires user defined input parameters.

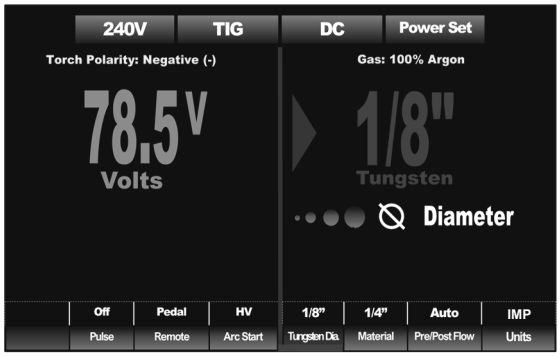
- For MIG, the required input parameters, after selecting the correct process (for wire feed processes, the correct wire and gas type are assumed by the selection of the wire process) are the input of the wire diameter and material thickness.
- For TIG, the required user input parameters are Tungsten Diameter, and Material Thickness.
- For Stick, the required user input parameters are Rod type (Electrode Selection, Rod Diameter and Material Thickness.

MIG,TIG and Stick process specific PowerSet information.

MIG/Flux-Cored:

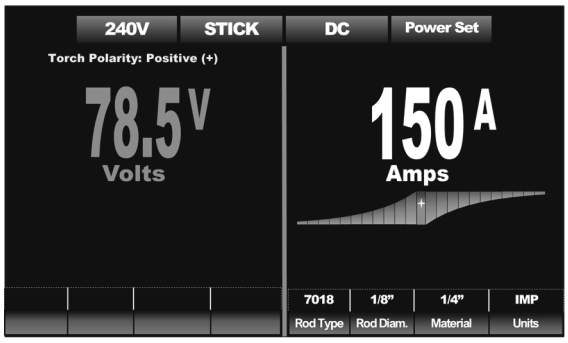
The range of inductance is limited to the range that will produce the most acceptable results. The center target setting for inductance will vary based off the wire feed process selection. This range will not always be symmetrical from the center target. The maximum wire diameter and material thickness selection will be limited while operating on 120V input.

DC TIG:



The TIG PowerSet version of DC Pulse is greatly simplified. Pulse is limited to only the Pulse Frequency (Hz) adjustment. The other parameters of Pulse Time On and Pulse Amps have been optimized for general purpose use and have been preset to simplify setup. Users may find that changes in pulse frequency may require adjustment to the recommended Amp settings to maintain the desired wet-in effects. Tungsten Diameter and Material Thickness selection will be limited while operating on 120V input.

DC Stick:



Stick performance relies upon the proper selection of the rod type/class to work well. However not all possible welding rods are listed. If a rod is not listed, pick the selection with properties nearest the rod type listed. This may not work in every case. For any cellulose rod not listed, pick E6010. For E7014 try either 6013 or 7018 and use the one that provides best results..

Component Identification and Explanation

NOTICE:

The following sections cover MIG, TIG, and Stick terms, definitions, and basic operation. Some of the terms overlap from process to process and serve essentially the same functions. Take note that some terms will repeat from process to process, but will be described in a way that is specific to the process being used. In some cases where function is identical or so similar to the same function found relating to another process it may not be repeated or redefined. For example, the 2T/4T torch switch function applies to both MIG and TIG, and it behaves similarly for each. However, there are slight differences to what it controls The general description under MIG and TIG will describe it slightly differently to accommodate the operational differences, but in the main drawing and discussion, the function will be more generic to accommodate both processes.

NOTICE:

This unit features a slow run-in. This means the wire will feed slowly until the arc is started. It is used to improve arc initiation and reduce weld porosity which results in poor fusion during the arc starting process. Once the arc is sensed, the wire speed will ramp up and weld at the selected wire speed.

Component Identification and Explanation

Using The Trigger/Torch Switch Remote Functions

Operating the 2T/4T Remote Function

The Remote Torch Trigger function works with both the MIG and TIG processes. The Trigger function is designed to allow the user to program the welder so that the stages of the weld cycle can be controlled via operation of the torch switch. This should not be confused with a Remote Amp control like a Foot Pedal or a Spool Gun Amp control wheel. The switch itself provides no adjustable control. It is only designed to cycle a stage or stages of the weld cycle. Both TIG and MIG processes behave similarly in 2T and 4T modes since there are very similar controls in both processes.

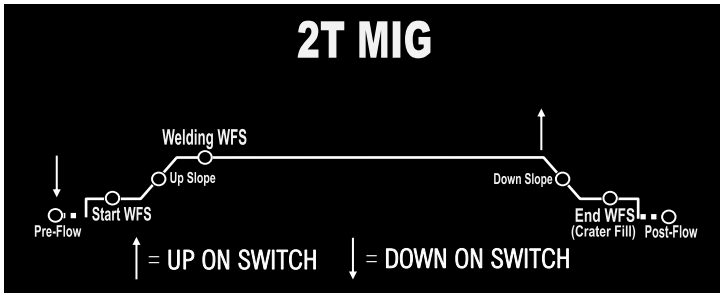
2T function controls all of the weld cycle with a simple press-and-hold and release action. This is the conventional "pull the trigger" mode that is familiar to most users, but it involves controlling more functions than a simple "on and off" of the weld arc. This is also called a 2 step function. The torch trigger moves in two directions, each change of direction signals the welder to advance to another part of the weld cycle

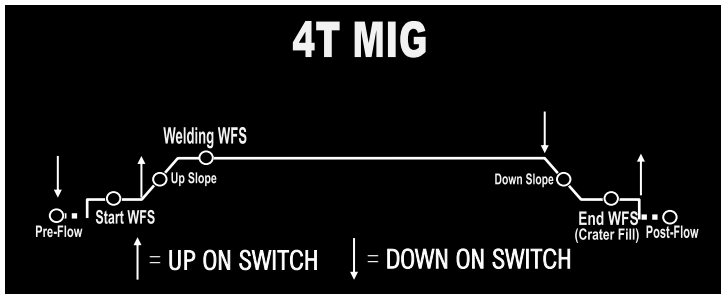
4T function controls each stage of the weld cycle by multiple press and hold actions of the torch trigger. This is used to retain manual control over the slope stages and start and end portions of the weld cycle through each movement of the torch trigger. Press the trigger and hold to start the Preflow cycle and start the weld. Once the arc has started release the trigger to upslope and weld at the normal set Amperages. Pull and hold the trigger to allow the down slope cycle to occur. Once the down slope cycle has completed and the weld crater is adequately filled, release the trigger to end the weld. The arc will terminate and the Post Flow cycle will begin. A common error is to simply click the torch trigger rather than hold the trigger during the down slope. The only time the trigger should be clicked is in the middle of the down slope cycle to toggle the weld back to the welding cycle Amperage. If the cycle has fully reached the bottom of the down slope the cycle cannot be restarted and the arc will terminate when the trigger is released. This is useful for managing the weld heat once it begins to get hot. This toggling feature can be repeated during the weld. It's not meant to be a adjustable amp substitute, but it is useful to help manage heat temporarily when a weld gets too hot to manage.

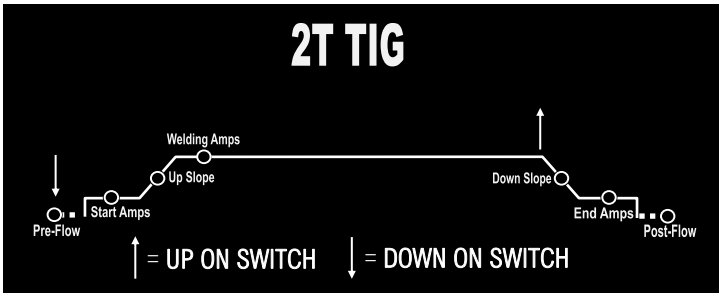
When using the TIG foot pedal, the Up and Down Slope functions are irrelevant because the user's foot is controlling the weld function manually. It's important to select only the "Pedal" function for the unit when the foot pedal is plugged in.

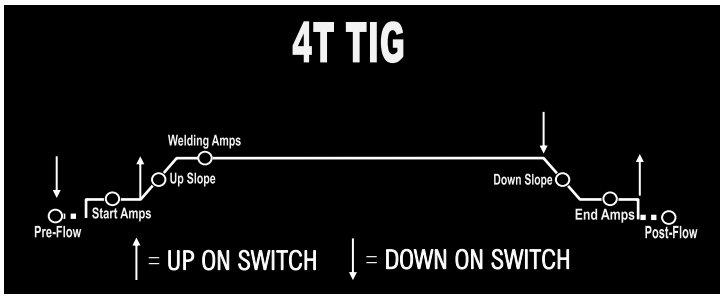
For the Spool Gun in MIG mode, the selection of the torch type automatically gives you control over the Amperage, but it still cycles all of the 2T/4T programming through the separate trigger pulls. The Wire Speed/Welding Amps are adjusted on the gun, while the max amperage is set on the screen.

See the next column for a visual explanation of 2T and 4T function in TIG and MIG. Notice that the arrow buttons indicate an up (in or press) or down (out or release) movement of the torch trigger.









NOTE: The 2T+A and 4T+A settings allowed by this welder are special functions that operate essentially the same way as 2T and 4T. These settings are **only** meant for use with a TIG torch that has a separate torch switch for starting the arc and triggering the programming and a separate potentiometer/amptrol. The purpose of this type optional torch is to be able to pre-program the slopes, start/end amps, but still retain a moderate amount of control of welding amps without having to go to the machine to readjust. This torch is not meant to "roll on or roll off" the Amperage during welding. The tapering is done with the slope cycle. This type of torch configuration is only meant to be used to fine tune amperage before welding and during welding. The maximum amperage is still set on the machine which dictates the control the range of the torch amptrol.

Component Identification and Explanation

Explanation of Parameters, Functions and Welding Terms

EXPLANATION OF GENERAL WELDER FUNCTIONS.

Volt and Amp Settings (MIG).

When welding, the two main functions that require adjustment are Voltage and Wire feed speed. The function of voltage in MIG welding is to control the overall width and to a great extent, the height of the weld bead. In other words, voltage controls the bead profile. It controls wet-in at the toes of the weld, and arc length. Short arc lengths provide wider welds. The wire feed speed directly controls the amps, and in turn amps control penetration. When setting the welder up you will notice that the wire speed is displayed in Inches Per Minute. The relationship between wire diameter, wire speed and amps is easily figured with the following approximate industry conversions (for steel):

.023": 3.5 x Amps = Inches per minute (IPM)

.025": 3.1 x Amps = Inches per minute (IPM)

.030": 2 x Amps = Inches per minute (IPM)

.035": 1.6 x Amps = Inches per minute (IPM)

.045": 1 x Amps = Inches per Minute (IPM)

To convert wire speed (IPM) into approximate Amps, use the following conversion formula (for steel):

.023": IPM ÷ 3.5 = Amps

.025": IPM ÷ 3.1 = Amps

.030": IPM ÷ 2 = Amps

.035": IPM ÷ 1.6 = Amps

.045": IPM ÷ 1 = Amps

Keep in mind these are approximate conversions and do fall off in accuracy as amps are increased into the upper current limits for the given wire diameter.

Even though you will find general recommendations about setting the Amps, Volts and even shielding gas through a variety of free downloadable apps and online calculators, every filler metal manufacturer has its own specific parameters for Volt and Amp settings for each wire diameter and class of wire. The ranges of volt and amp parameters generally varies somewhat from brand to brand, so be sure to read the packaging and/or manufacturer literature to determine what range of settings are recommended. The wire diameter also limits the practical maximum thickness of what can be reasonably welded. The issue with following charts, graphs and calculator recommendations is that most people find them either too hot or too cold. For some people, it may not be close to the setting they are used to. However, nothing can substitute for watching and listening to the arc. If the arc is correct, a steady sound, similar to the sound of bacon should be heard. The actual frying sound can vary somewhat and may have somewhat of a higher pitch whine to it. If these sounds are present, look at the arc to see if it is steady, and producing low amounts of spatter. If large amounts of spatter are present, the puddle seems fluid (appears wet) and the wire speed is within the targeted range, decrease volts a little at a time to reduce the spatter. If this does not correct the problem, change the torch angle and torch height. Hold the torch more vertical, with less than a 15 degree deviation from vertical and make sure wire stick-out is 3/8" or more. If this still does not help, reduce the wire speed. Some slight spatter is normal, though it should be minimal overall.

The wire can also pop and spatter if the voltage is too low for the wire speed and/or wire diameter. This is mostly observed as flying bits of red-hot but un-melted wire, along with popping as the wire inconsistently stubs into the puddle. This is followed by the wire pushing back against your hand pressure while the wire visibly turns white/red hot before burning off. Too low of voltage will also produce a high piled bead with the toes (edges) of the weld not properly wetting in resulting in poor fusion.

Even though the PowerSet feature has been provided, sometimes additional adjustment may need to be made to the settings based off of welding position or joint type. With this unit, we've tried to provide plenty of adjustment range in the PowerSet function. Normally, this will still allow a functional setting. However, when the welding wire is pushed to its maximum limits with Volts and Wire Speed limit, welding may not be smooth and spatter, undercut, and burn back (when the wire melts back to the tip) may occur.

Starting the Arc and Welding In the MIG Process.

Starting the arc is a relatively simple process. Before beginning, the wire should initially be trimmed to between 1/4 to 3/8". Once the wire is trimmed, the gun should be firmly grasped to prevent a phenomenon often referred to as "machine gunning". A light grasp, especially at start, can cause the arc to stutter as the wire pushes back on the gun, lengthening the wire stick-out and creating an irregular start and a porous weld.

The end of the wire should be positioned just barely above the metal when the trigger is pulled for the cleanest start. This will position the end of the contact tip about 1/2" to 5/8" above the weld. The gun should be in the vertical position, with no more than 5 degrees lean in either direction.

Holding the wire too far off from the metal will result in rough starting and too long of wire stick out.

Once the arc has been established, the gun can then either be pushed or pulled in the direction of the weld. With either method, the gun nozzle should be positioned directly over the weld without angling the wire to one side or the other of the weld as already mentioned. The gun should have no more than 15 degrees lean pointed into (push) or pointed away from (pull) the direction of travel. In most cases a push motion is desired. However, a lot of texts offer conflicting information on whether to push or to pull the gun. In reality, both are correct if used correctly and with each having particular strength and weakness. Either one done with too much gun angle will result in undesirable results. Most people who are well

Explanation of Parameters, Functions and Welding Terms

versed in MIG quickly develop a sense of when to push and when to pull the gun. Even for novices, a sense of when to push and pull the gun comes quickly with a little practice. Pushing can result in shallower penetration but the molten puddle is easier to see and the arc sits easily on the leading edge. It will usually leave a aesthetically pleasing bead. However, be careful to prevent the gun from leaning toward or away from the direction of travel too much as spatter will increase and shielding gas flow may become turbulent, creating porosity in the weld. Pulling will result in deeper penetration, but can result in a narrow bead without much side fusion. It also can leave an undesirable humped appearance if not done correctly or if travel is too slow. **Whenever MIG welding with Aluminum, whether with the standard MIG gun or the Spool gun ALWAYS push the gun. If using Flux Cored wire, a dragging motion is almost always recommended.**

For TIG, a push angle of the torch is always recommended. This keeps the gas pushing in front of the weld, and keeps shielding built up in front of the weld. The filler rod should be introduced in front of the torch travel.

For Stick, a drag angle should be used unless welding vertically. The angle may change to a more perpendicular or push angle to keep the puddle in place.

Weaving in Welding. Weaving (oscillating the torch or electrode from side to side in one pattern or the other), particularly in MIG, is a topic of controversy as much as whether to push or pull the MIG gun. Stringer beads are often best for novice welders. Stringers are simply straight beads that move forward with little or no side to side travel or oscillation. These will offer the soundest welds for a beginner in MIG or Stick. Stringer welds leave little or no room for contaminates to enter the weld and are the fastest to produce without creating an opportunity for cold lap. Moving too quickly however with a stringer can create undercut which will weaken the weld. The best policy is to move a slow steady speed, making sure the sides of the weld are filled. If undercut is present, it is either from too much voltage or moving before the wire has time to fill the area the arc has melted.

Think of weaving as a method of "sewing" the metal together. If weaving is of interest to you, start with the basic weave pattern. Simple weaves using one variation or the other of a cursive "e" motion are best to begin with. Other weave patterns can be used of course. C's, V'S, U's , Triangles and many more weave patterns can be used depending upon the application. Vertical stick will use a more exaggerated side to side Z pattern weave when traveling up hill on thicker plate metals. Whether it is MIG, TIG or Stick, weave patterns are employed for a number of reasons. Weaves are often considered to have a more pleasing appearance and can help bridge gaps where fit up is a problem. A weave is also frequently used to manage heat build up. For example: when welding vertically weaves are almost always used to prevent the molten metal from sagging due to the force of gravity. The major drawback of weaving is that it introduces a greater possibility of getting inclusions and other forms of contamination in the weld. Properly done weaving is a valuable tool, but it must be practiced before employing it in any structural or critical application.

Metal Cleaning.

MIG and TIG welding requires a well prepped surface to obtain a sound weld. The removal of paint, rust mill scale, or other contaminate such as grease should be done before welding. Stick welding is more forgiving of rust and mill scale, but when MIG welding, contaminates will result in porosity and inclusions in the weld, weakening it. In TIG welding it can be disastrous. TIG requires the most cleaning effort. A grinder will usually prep the metal sufficiently to remove oxidation and paint. However, to remove grease a degreaser such as acetone should be used. Do not use any degreaser such a brake cleaner with chlorinated solvents or death or serious injury may occur!

MIG and TIG filler wires such as ER70S-6 or ER70S-2 include a sufficient level of deoxidizers such as silicone and copper that are formulated to allow it to handle minor to moderate amounts of rust and mill scale. These deoxidizers will float out most moderate amounts of contaminates out of the weld and will appear in the usual form of glassy like deposits on top of the cooled metal. They are easily brushed off before starting the next pass. They should not be welded over. Any pinholes that appear are a result of trapped gas in the weld and should be ground out before the next pass. It should be noted that some MIG wires such as ER70S-3 have low levels of deoxidizers and must be thoroughly cleaned and ground before welding. MIG and TIG ER70S-2 and ER70S6 are the same except that TIG wire is cut to lengths and MIG wire is continuous. When welding fine gauge materials in TIG, you can substitute sections of thinner MIG wire.

Multiple Pass Welds.

One of the common misunderstandings that people have when beginning to weld is that if the welder has the power, then a single heavy pass should be used to weld it up. This is wrong. This technique will induce cold-lap and inclusions to the weld. Single pass welds should not exceed 1/4" even with the heaviest wire the welder is capable of handling. A thick pass may also begin to cool before contaminates and gas pockets have the time to float out to the surface. It's far better to make multiple smaller passes to complete a plate weld for a higher quality result. For best results, this requires that most joints 1/4" and over be prepared with a grinder to accept multiple weld passes. The weldment edges should be ground to form a V, U or J shaped groove to create a recess where the welds can be welded one on top of another. For MIG/Flux-Cored welding with .035" wire and under, create a bead no thicker than 3/16" in a single pass, no more than 1/8" with .030" wire, and with .025"wire and smaller no more than 3/32 for best results. This will help maintain proper fluidity of the weld and prevent gas from being trapped in the weld and give time for any minor contaminates to float out of the weld. It will also help to maintain reasonable forward travel speeds. Too slow of travel speeds will create excess build up and can tend to create cold lap at the weld toes resulting in poor tie in. One issue created with a weaving technique even if the metal deposited is the correct thickness is that it can slow the forward progress down. If weaving is too wide, one side of the puddle will cool and oxidize before the torch is brought back across to that side. This is a point where porosity

Explanation of Parameters, Functions and Welding Terms

can be introduced.

Arc Length in Welding.

Keeping a tight, short arc for TIG and Stick is important to prevent inclusions in the weld, especially while weaving. It helps control the puddle. Keep arc length ≤ 1/8" for TIG. For Stick dragging the rod is the best policy unless using a cellulose rod, then about 1/8" with a slight whipping/stepping motion helps the puddle to penetrate.

When welding in MIG mode, too tight of an arc length (<3/8" for most wire diameters) will produce excess spatter as the wire shorts into the puddle. This is also dependent up the MIG gun size choice. This creates a violent reaction in the puddle and will send globules of metal flying out of the weld. If excess spatter is noticed while MIG welding increase the arc length and reduce wire speed. If the arc is too long the arc will tend to wander at the end of the wire.

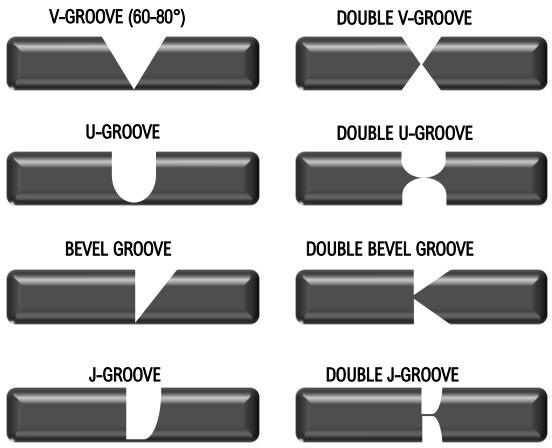
What Are the Different Kinds of Welds?

Besides a butt joint (Flat edge to flat edge) and lap joint (overlapping edges) which are often used for thinner metal gauges, consider using one of these groove joints for best welding results. When grinding or cutting the bevels, especially with a single V-groove, it may be beneficial to leave a small land with a gap between the joint to achieve full penetration. In this case a temporary backer plate can be used to support the bottom of the weld to create the root pass. The root weld will weld the backer to the main plate. This backer can later be ground or cut off. However, in many cases a plain open root can be used as a backer plate adds to the time and labor involved. A knife edge is also acceptable so long as the joint is fully penetrated when the weld is completed. Open root gaps without a backer can range from 1/16" to 1/8" depending upon wire diameter and application.

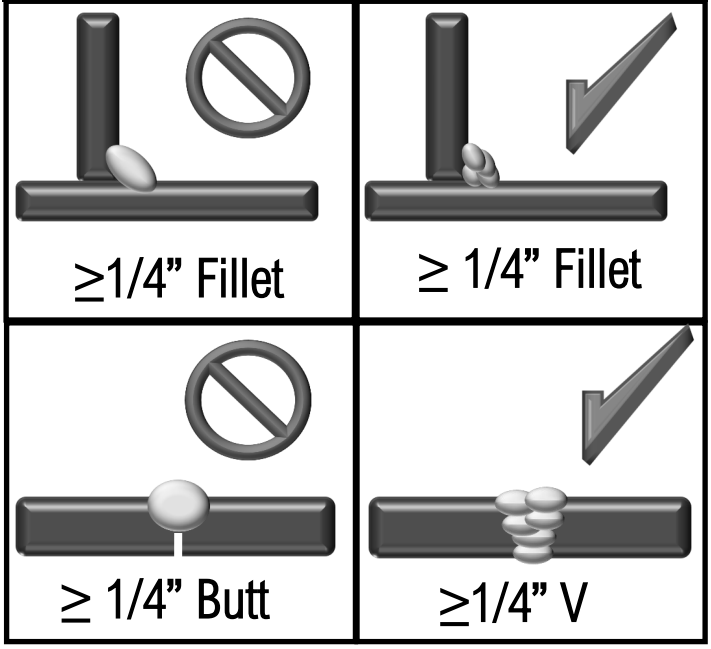
When Do I Use Multi-Pass Welds?

When welding material 1/4" and over be careful about trying to put too much metal down in a single pass. Use multiple passes to complete the weld along with any necessary joint preparation especially with wires of smaller diameter. As metal thickness goes up so does the number of required passes. Depending upon the wire diameter and power settings used, a 1/4" joint may only require 1 or 2 passes, but a 3/8" joint in plate metal or pipe will require not only beveling but 4 to 6 overlapping weld passes including a cap and root pass. See Example below.

Joint Preparation



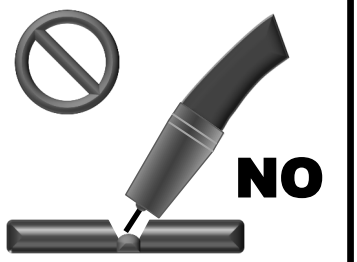
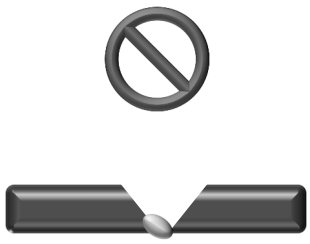
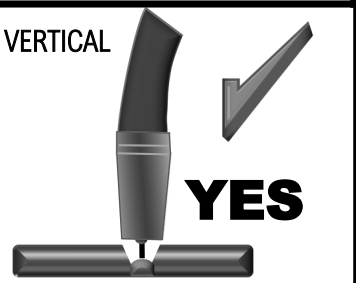
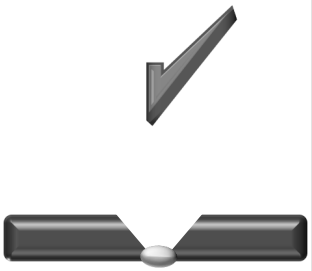
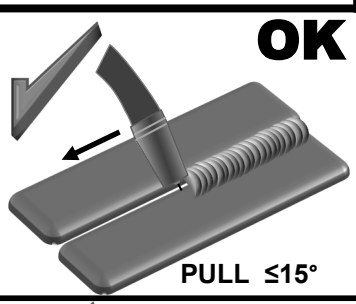
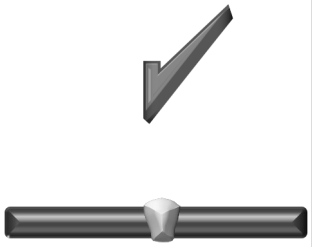
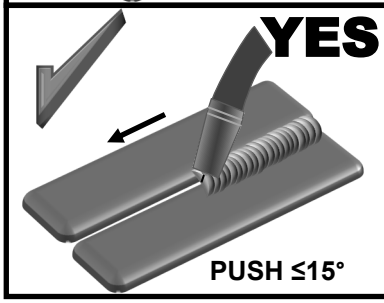
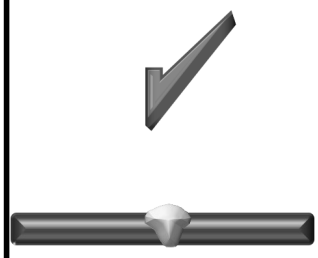
Weld Pass Examples



Component Identification and Explanation

Explanation of Parameters, Functions and Welding Terms

Drag or Push MIG?
MIG Welding is fairly simple. Just keep travel angle and direction in mind when welding. **A push angle is often recommended for short circuit MIG and Spray Arc Welding for the least amount of spatter and bead profile. Push is always recommended for welding Aluminum.** *The old welder's saying "If it has slag, you drag." applies to Flux-Cored Wire welding.*

	**Problem Technique:** The Gun is not being held vertical from side to side. Wire is not being directed to the center of the puddle. This concentrates heat on one side of the joint and results in poor fusion on the neglected side. It also can create more buildup on one side of the joint than the other. **Correction:** Hold the gun so that the angle of the neck stands perpendicular from side to side.	
	**Correct Technique:** The gun is held in a near vertical position. A variance of 5 degrees or less is acceptable from side to side. The purpose is to prevent the arc from being concentrated on one side of the weld joint or the other. This balances the heat on both sides of the joint and keeps the bead centered. Don't confuse this with push or pull angle in the travel direction.	
	**Correct Technique:** The gun is angled toward the back of the weld when traveling forward. This angle should not exceed 15 degrees. This provides a narrower but more deeply penetrating weld. Use this method when Flux Core wire is being used. Use this method where the unit may be reaching its maximum welding capacity. Not for use with Aluminum wire.	
	**Correct Technique:** The gun can be angled toward the front of the weld when traveling forward. This angle should not exceed 15 degrees. This provides a wider and generally more pleasing weld. However it is shallower penetrating. This method typically allows a much better view of the arc. Use for most types of welding unless deeper penetration must be achieved.	

Component Identification and Explanation

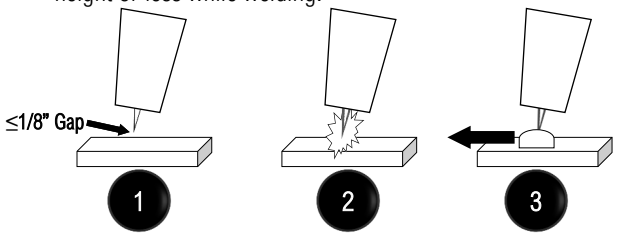
Explanation of Parameters, Functions and Welding Terms

The TIG arc start can be performed in three basic ways.

The first and primary arc starting method used is **High Voltage Start**. HV start is a contactless start which is performed by holding the Tungsten off the metal about 1/8" or less and using the remote to activate the Solid state HV which will send a high Voltage impulse to the Tungsten, causing the arc to jump and create continuity to the work, allowing the inverter to kick in and put out a normal welding arc. This is the most preferred way of starting, especially with Aluminum. The tip of the Tungsten is not easily contaminated this way, and it requires little skill to perform. *While this unit technically is considered an HV start, it electronicallysimulates the HF start.*

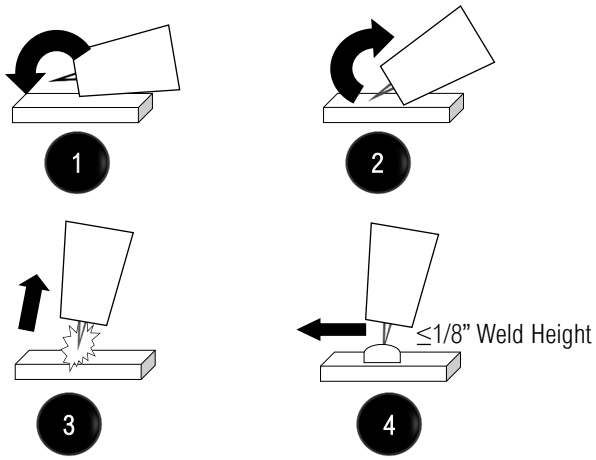
How Do I Perform an HF/HV Start?

1. Place the point of the tungsten 1/8" or less over the work piece.
2. Press the torch trigger or foot pedal, and the HV spark will be emitted. It may appear as small sparks or lighting if the arc doesn't start immediately. (If Live Lift is used, no pedal or trigger is required.)
3. Once continuity establishes, the welding arc will begin. You may begin to advanced the torch when a puddle forms. Maintain 1/8" height or less while welding.



How Do I Perform a Lift Start?

1. Rest the edge of the cup on the work piece so that the tungsten is slightly off the work. Press the trigger or foot pedal. Quickly rotate the tungsten to the work using the cup edge as a pivot.
2. A small spark may be noticed as it touches. Once the Tungsten touches, quickly and seamlessly rotate the cup back to draw an arc.
3. Raise the cup to establish the arc to 1/8" or less in height.
4. Allow the puddle to form and move the torch forward maintaining 1/8 or less height.



The second method is **Lift Start** which requires direct, purposeful contact with the surface of the metal to create continuity followed by a quick lift-off of the Tungsten to strike the arc. To understand how this works, when the Tungsten is touched to the metal, there is a small current supplied to the tip. At the time the Tungsten is lifted up, the welder senses the break of continuity. Then, the inverter sends full output to the Tungsten tip as the arc is established through the small spark created by breaking continuity. This form of Arc Starting is used when people need to start an arc without the use of an HF energy being present which can interfere with sensitive electronics nearby. It works well with steel, stainless and similar metals. It can work with Aluminum, but there is a chance of contamination of the Tungsten and more rapid wear.

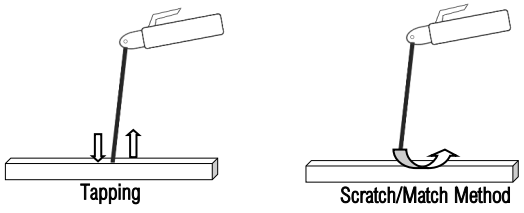
The third method is the **Scratch Start** method. This method involves a full current start with a live Tungsten that requires the Tungsten to be lightly, but quickly scratched on the metal, or drug quickly over the filler wire which is temporarily touching the metal to draw and strike up the arc. The quick brush across the metal can create a skipping motion if not performed correctly which can result in a stuck Tungsten. This is the least efficient method, but is in common use in the field with basic DC TIG rigs that have no automatic control of shielding gas and use a gas-valve torch. However this unit is not equipped with this type of function, though Live Lift can function similarly while also providing automatic control over the gas. Live lift can also be used with a TIG Rig with a valve controlled torch, *but* the solenoid will need to be covered when not in use. Use the plastic dust caps that are included with the unit and are installed on the fittings of the welder to cover the holes when the solenoid gas valve will not be used.

Starting the Stick arc with a tapping or striking method.

Stick is a fairly simple process. Arc starting can be done with a scratch or tapping method. The electrode is always live, but the VRD function can reduce the risk of electrocution, and may be required in some situations for safety. But it will be more difficult to start the arc. A quick double tap can help improve arc starting with the VRD engaged.

How Do I Start an Arc With Stick?

There are two basic types of arc starting methods used. The tapping motion allows pin point placement of the arc, while the scratch start method is similar to a match strike and is easier for beginners.



Component Identification and Explanation

Explanation of Parameters, Functions and Welding Terms

Amps (TIG/Stick). Shortened from "Amperes." Amps is a measurable value of Current. Amperage is used to refer to the magnitude of Current. *Amps will also be displayed while actively welding in MIG mode as well instead of wire feed speed.*

Anti-Stick (Stick). This is a special function that helps make removing stuck rods easier. When the mode is activated, the unit senses the low voltage ouput of the stuck rod and drops current to prevent the rod from sticking fast in the weld puddle, overheating and flaming out. The goals is to make releasing and removing the stuck rod easier so that it can be salvaged.

Arc Force (Stick) Arc force is used to offset the loss of overall wattage (V x A = W) as the arc length is shortened and voltage begins to drop while stick welding with short arc conditions. It offsets the drop in voltage by injecting extra amps into the weld when voltage drops below the 20V threshold. This enables the amperage to react aggressively or mildly, depending upon settings. It also helps to prevent arc outages, and allows the user to hold a tight arc and maintain better control. This function is also referred to as "Dig" and "Inductance" in the industry. Arc force is set as a percent of Amps over the set welding Amps. As the welder nears the top end of the Amp rating for stick welding, Arc Force action will be reduced due to less compensating Amperage being available for use. This will happen regardless of Arc Force Setting. Typically Arc force settings with rods such as E7018 and E6013 should be set to around 20 to 35%. Arc force for Cellulose based Flux rods such as E6010 and E6011 is 60% or greater.

Direct Current or **DC (MIG/TIG/Stick).** Used to describe one way flow of electrons. Used in TIG to weld Steel, Stainless Steel (Inox), Chrome Moly, Titanium, and more. Not used with Aluminum and Magnesium. For MIG this is the standard method of MIG welding with all metals. This is the preferred method of stick welding. For most MIG and Stick applications, DC polarity of the torch will be positive (DCEP +). For Flux-Cored and TIG use the DC polarity will be negative (DCEN -). The welder will remind you of this polarity.

Down Slope (MIG/TIG). Downslope is the duration of time that it takes for the programming to transition the Amperage from the Welding Amps to the End Amp setting . Adjustment in TIG Pedal mode will be blocked. This timer controls the decrease of the amperage and provides a window to fill the crater as the puddle begins to cool before the arc terminates. Used with all remote functions except the foot pedal in manual mode.

End Amps (TIG) or End Wire Feed Speed (MIG). This is the destination current value (or MIG end wire feed speed) set for the end of the weld cycle. When used with the torch switch, this is the final current (end wfs) set used to taper off and fill the crater at the end of the weld. For TIG foot pedal use, this value should be kept at a minimum for proper tail off. However, the Tungsten size will ultimately dictate the exact minimum amperage that a stable tail off of amperage can be performed. For MIG, this helps slow the wire and makes a more gentle termination and better crater fill.

High Voltage Start or HV Start (TIG). Depicted as HV on the menu screen under the start function, this is a touchless type of start. It is actually an simulated HF electronic controlled start, but due to the familiarity of users with HF, it is labeled as such to avoid confusion. When HV start is selected, the user positions the torch 1/8" or less above the weld area and either presses the foot pedal or the torch switch and the arc will jump. This HV start is created by a HV electronic system, instead of the traditional point gap design. A high voltage, low amperage current is created which jumps from the Tungsten to the work piece when activated. Once the machine sends a High Voltage impulse to the torch, the HV energy jumps the gap between the electrode and the work piece. Then, the welding arc will initiate after continuity is established. When continuity is established, the HF/HV shuts off. On this unit the HF/HV parameters can be programmed in the back ground menu. The length of HV start attempt, the strength of the HV arc and the HV impulse Amperage can all be set in the background menu. Once set, these parameters will seldom be changed. If the arc attempts to start longer than the set time, an error code "E05" will be displayed temporarily, meaning the switch is either stuck closed, or the arc has been activated too long without an arc start. This helps prevent damage to the machine and chance of accidental shock to the user. Do not "air fire" with the pedal or torch switch pressed unless testing gas flow function. Use the gas purge to set gas flow rate instead of firing the torch. The arc should only be used to strike an arc against the work piece.

NOTICE:

The HF on an inverter is not continuous. Formerly the term "HF" was synonymous with AC welding as it was required continuously to help stabilize the arc on a transformer welder since switching time in AC was so slow. The two terms were often confused used interchangeably. Inverter switching frequencies are so rapid that the need for continuous HF overlay is eliminated. HF now refers to the HV arc start.

Hot Start Amps (Stick). This setting controls the intensity of the arc start by boosting the initial amps at the start of the weld cycle. It is used to improve arc starting and reduce the time needed to establish a puddle and helps to prevent porosity at the beginning of the weld. The Hot Amps are set as a percent of Amperage over the welding Amps. Maximum Hot Start action may be limited by available Amperage for stick welding. As the current is raised near the top Amperage of the welder, Hot Start Action will be less forceful due to less Amperage being available, regardless of machine setting. Typical settings can be between 30 and 70%, depending on electrode type. Iron Powder and Low Hydrogen rods will require less Hot Start action from 30 to 50%. Cellulosic rods may require 60 to 75%.

Hot Start Time (Stick). This is the time the Hot Start Stays engaged. The Hot Start Time will be increased on thicker plates, but in general, .5 to .7 seconds works well for plate thicknesses up to 3/8".

Inductance (MIG). Although the action is different, this is similar to arc force in stick that helps change the puddle characteristics and defines the feel of the arc, whether stiff, or soft and fluid. It is a relative amount and cannot be turned off completely. The user may also notice that the arc width is also controlled to a small extent. If in doubt as to a proper setting

Explanation of Parameters, Functions and Welding Terms

in manual mode check the PowerSet mode. The PowerSet function gives excellent range recommendations for each wire feed function. Inductance should never be set lower than the minimum settings provided in PowerSet mode or unsatisfactory performance may be experienced.

Lift Start (TIG). Lift start requires touchdown and lifting up of the Tungsten to start the Arc. *There are two types of Lift Start that this unit has.* The first is a live lift start. This means the tungsten is always electrically live until the arc is started. When the tungsten is touched to the metal, continuity is sensed and the welder sends welding power as soon as the continuity is broken. The other type of lift start is a "remote lift start". It functions essentially the same except, the tungsten is not electrically live and the torch switch or foot pedal must be used to make the torch live. This is a safer form of lift start and helps prevent accidental starting of the arc. It also means that the start type can be used with the welder programming in 2T and 4T mode, or with the foot pedal.

Open Circuit Voltage (OCV). OCV is the voltage that is present when the arc is not struck. OCV is particularly important to stick arc starting. OCV is reflected in the left main display area as the default when not welding.

Post Flow (MIG/TIG). Post Flow is the amount of time (in seconds) that the shielding gas flows after the arc is terminated. This is an important function. The flow of shielding gas after welding is stopped helps to 1) Cool the torch and/or tungsten and prevents oxidation of the tungsten/filler wire as it cools. 2) Provide cooling and shielding while the weld puddle solidifies and cools. This helps to prevent the weld from forming porosity and prevents oxidation of the weld as it cools. Post Flow should be increased at the Amperage increases. **For TIG use, use one second of Post Flow for every 15 to 25 Amps used. At a minimum, 2 to 3 seconds should always be used. For MIG use, use 2 to 3 seconds for every 50-70 Amps.** To properly use Post Flow, the torch should be held in place over the weld after termination until the gas shuts off.

Pre-Flow (MIG/TIG). Pre Flow is the amount of time (in seconds) that the shielding gas flows before the weld starts. It is very important that the Pre Flow be set for at least a short flow before any weld. The Pre-Flow not only purges the torch of any contamination, but it also establishes a protective envelope of shielding gas around the weld before the arc initializes. In TIG mode this protects the tungsten, and helps to establish an arc more quickly by surrounding the tungsten and work with more easily ionized gas so that arc starts are more efficient. For MIG, it provides a stable gas pocket to strike the arc and helps prevent inclusions at the beginning of the weld. It also allows time for the gas flow to stabilize before the arc is struck. When initializing the Pre Flow a "rush" of gas can often be heard just ahead of the arc strike. Then the gas flow will quieten down as the weld begins. This is normal. This rush of gas is caused by several things, but it is in part due to regulator attempting to regulate the sudden rush of gas. As it does this, extra gas may be consumed until the regulator has had time to react. The extra flow of gas may create turbulence around the weld. The Gas flow rate may also temporarily increase due to the back pressure "ballooning" of the gas lines. As the slightly swollen gas lines stabilize, extra gas is propelled as the solenoid opens relieving the back pressure. For MIG or TIG, using .3 to .7 seconds is usually enough to allow the "gas rush" to stabilize, unless extra large shielding cups are used. If over-sized TIG cups are used (≥#10) or longer torch cables are used, increase to 1 to 2 seconds.

NOTICE:

The arc start will be delayed by the amount of time chosen for Pre Flow. If Pre Flow is set for 2 seconds, the arc will not start for 2 seconds. This is sometimes easy to forget, especially when tacking or spot welding.

PowerSet (MIG/TIG/Stick). The welder offers a unique power set menu mode that allows the user to input several operating parameters such as Tungsten/Wire/Electrode Diameter, Metal type, and Material Thickness. In return, the unit will provide a usable range of settings based off the user inputs. It will limit and preset most all other parameters and functions so that the user doesn't have to go through an extensive set-up routine. for the user. For TIG, the PowerSet mode also includes the option to use a simplified form of pulse, with only a frequency (Hz) adjustment. The basic Pulse parameters are fixed so that consistent results can be achieved without having to worry about additional adjustment of settings. For users that are new to the welder or unfamiliar with basic functions or setup, this should be the mode that is used. It is also used to provide settings in lieu of a weld chart. Consider the PowerSet settings to be the weld chart on this unit, but expressed in a digital format.

Pulse (TIG). The TIG pulse creates two amp values, a high and a low value that cycle back and forth between each other while welding. This helps preserve travel speed while reducing the size of the Heat Affected Zone (HAZ). The pulse is divided in to two phases or stages. The upper amperage phase is called the Welding Amps, which is the default Amp setting on the unit. This is sometimes also referred to as Peak current. The lower amperage phase of the pulse is called "Pulse Amps". This is also called "background" or "base" current and represents a drop in Amps. Pulse Amps are set as a percent value of Welding Amps. Pulse has several uses and can be used to control arc directability, arc cone width, heat spread, penetration, travel speed and even weld appearance. It is particularly useful on metals that are prone to structural deterioration from the HAZ or burn through. Pulse is used strategically to create a lower average Amperage, by varying one or more of several adjustable pulse parameters to reduce heat input.

1. **Pulse Amps (Base)**. Base Amps is the low Amperage value of the pulse. When you adjust the base Amps in pulse mode, you are actually setting a ratio of base Amps to peak welding Amps. Base amps are expressed as a percentage of Peak welding Amps. So, when you set base amps, you are only setting it as a percentage, not the actual Amps. As you increase Peak welding Amperage through the use of the foot pedal, or the panel control, the pulse will maintain the same ratio of Base to Peak welding Amps, raising the base Amps automatically. To illustrate: Adjust the Peak (main welding) Amps, to 100. Set the base Amps to 50%. This will yield a 50 Amp value for the

Explanation of Parameters, Functions and Welding Terms

base Amps. The foot pedal controls both Peak welding Amperage and Base Amperage simultaneously, using the pre-set ratio.

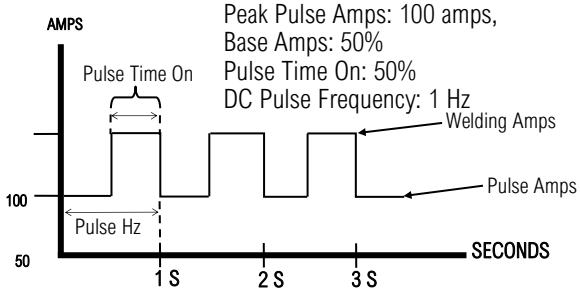
2. **Pulse Frequency (Hz).** Pulse speed is referred to as Frequency, which is measured in Hertz. Pulse frequency controls the arc constriction and also helps with heat management. A slower pulse frequency around 1 to 3 hertz gives the "stacked dime" appearance. At higher frequencies the "stacked" appearance will be lost while heat control is increased. This is also referred to as "Pulses Per Second" or "PPS".

3. **Pulse Time On (Balance/Duty Cycle).** Pulse Balance is the percentage (%) of time that the pulse stays in the TIG (Peak) pulse Amp phase of the cycle. Increasing the Pulse time-on will increase the duration the Peak Amp phase of the cycle which in turn will increase the heat and will increase penetration. Pulse Balance is also known in the industry as "duty cycle". For TIG welding purposes the term "Pulse Time On" is used here.

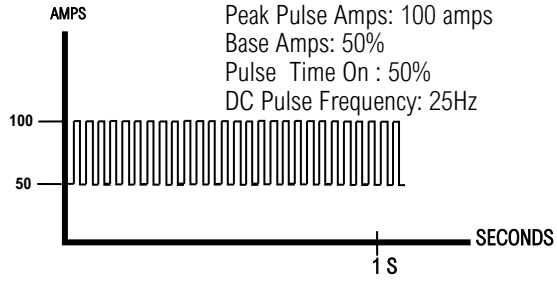
Is There a Better Way to Understand Pulse?

Pulse is essentially a wave form created by the pulsing amperage. This wave form can be skewed, expanded, compressed, increased or decreased in magnitude. Each change in Amps, Pulse Time On Balance, and Frequency all affect average heat being put into the weld. The examples below attempt to explain the parts of the pulse and how each part of the pulse functions. *Examples not to scale.*

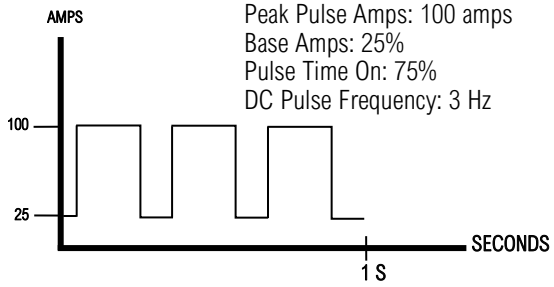
EXAMPLE 1
Peak Pulse Amps: 100 amps,
Base Amps: 50%
Pulse Time On: 50%
DC Pulse Frequency: 1 Hz



EXAMPLE 2
Peak Pulse Amps: 100 amps
Base Amps: 50%
Pulse Time On : 50%
DC Pulse Frequency: 25Hz



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



Setting up TIG pulse is not a one-size-fits-all process. There's no template or list of settings that can be offered to the user that will work in all situations. It's very difficult to offer pulse setting lists for even well-defined applications. (Even though the PowerSet menu features pulse, the pulse control is limited to Frequency (Hz) only operation. All others parameters are fixed at an optimized level.) In manual setup mode changes to any one pulse parameter, whether it be frequency, balance, or Pulse Amperage will skew the effect of the pulse. Keep this in mind when making changes and make only small changes to one parameter at a time to dial in the desired effect.

A slow pulse between .7 and 2.5 Hz with an equal 50% pulse time on and somewhere around a 30-60% Pulse Amp setting can be used to help with timing the addition of filler metal to the weld puddle. This type of setting will improve bead appearance. A high pulse frequency that is combined with complimentary settings of 50% or below Pulse Time On and a low pulse Amps settings of 40% or below can be used to prevent burn through and speed up welding on thin materials. It can also help maintain a proper bead profile 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. There are limitless ways to adjust the pulse. Regardless of how you choose to adjust the pulse, always keep in mind, that the basic purpose of the pulse is to average the heat input while maintaining penetration and welding speed.

Regulator./Flow Meter (MIG/TIG). Controls the flow rate of the shielding gas at the cylinder. The regulator should never be left turned on. Leaks can and do develop over time or suddenly. Gas solenoids can fail to close properly. Whenever a regulator is not in use, the pressure should be relieved so that the diaphragm/spring will not prematurely fail or lose accuracy.

CAUTION*: Always open the regulator slowly, while standing to the side so that if it were to fail parts will be ejected away from you. Never stand over a regulator while opening.*

Remote (MIG/TIG/Stick). Remote refers to the ability to start the arc and control the weld cycle at a distance. High Frequency Start must be used with a remote to operate. Lift Start can also be used with a Remote. A remote can be a foot pedal, torch switch, torch mounted slider or hybrid Amp-trol torch. All of them are used to start and end the arc as well as control other parts of the weld cycle to varying extents. The unit has multiple Remote settings to choose from. **2T/2T+A/4T/4T+A/Pedal** settings all must be used with a remote switch. Pedal mode is reserved for use with a Foot pedal or slider Amp control mounted on the torch handle. The hybrid torch switch/amp-trol must be used with the special 2T+ Amp and 4T+ Amp functions.

Component Identification and Explanation

Explanation of Parameters, Functions and Welding Terms

TIG Pedal mode is the most straight forward. Operation is quite simple. The maximum amperage is set on the panel. Then the foot pedal is used to start and stop the arc as well as vary the amperage from the minimum welding setting, up to the maximum welding setting selected on the panel. When used in pedal mode, many weld cycle parameters will not be available for adjustment since the pedal itself controls those functions manually.

This welder also allows the stick function to be used with a remote amperage control device.

Shielding Gas (MIG/TIG). Shielding Gas is necessary while MIG or TIG welding. It is not use for Flux-Cored welding on this machine. Shielding gas protects the weld from oxidation by the atmosphere while the weld puddle is still molten. Gas flow rates are controlled by the supplied regulator. Too little gas flow will cause porosity, heavy scale and or oxidation. Too much gas flow is wasteful and can also create a turbulent flow, which can pull the atmosphere into the weld, creating oxidation. *The recommended shielding gas type is always listed on the display as a reminder.*

Start Amps (TIG) or Start Wire Feed Speed (MIG). This is the initial Amperage of the weld in TIG mode and the initial, or the starting wire feed speed in MIG mode. This is the starting stage of the weld cycle, at which the arc initiates. For TIG, the Start Amps setting is sometimes confused with the surge amperage required to start the arc. These are separate items. The surge amperage (which all TIG welders have, whether it's published on the screen or not) is a micro surge of Amperage required to establish the arc lasting only milliseconds. TIG Start Amperage is the actual Amps at which the arc will establish itself as it stabilizes. It becomes particularly effective when using the torch switch for welding aluminum by allowing a more rapid wet in at the beginning of the weld. For larger diameter tungsten, the Start Amps can be increased to provide a more stable low end start with the foot pedal. The Tungsten size function dictates the minimum Starting Amperage so that the best start can be obtained. However, it is not the absolute lowest limit. To obtain complete control over the Start Amp parameter, set the Tungsten function to "Manual." Start Amps may be set higher than the Welding Amperage, but more rapid wear of the Tungsten may result.

MIG Start Wire Feed Speed is the beginning wire feed speed used to initiate the arc and controls how smooth the arc starts, when combined with upslope. This can serve as a "reverse" hot start by slowing the wire speed at the beginning of the weld while providing a higher voltage.

Spot Weld Timer (MIG/TIG). The Spot weld timer simply is an Arc-On timer for MIG/TIG and is calibrated in tenths of a second. The function is intended to help the user create better tack welds with improved consistency in weld size and penetration. Once the torch switch trigger is activated and held, the arc will stay turned on for the amount of time selected. After the time has expired, the welding arc will shut down. The Spot function should be used with 2T only. . **This is not meant to be used with or serve as a controller for tong-type Spot welders.**

Stitch (MIG/TIG). Whereas the Spot function is an "Arc-On" timer, the Stitch timer is an "Arc-Off" timer which works in a continuous cycle as long as the switch is continually held. This creates a repeating on/off cycle that is useful for welding long seams on sheet metal, or creating regular sized spot welds along a object while tacking up an object for fitment.

Up-Slope (MIG/TIG). Upslope is the duration in time that it takes for the programming to transition the TIG Start Amperage (or MIG Wire Feed Speed) from the TIG Start Amp/ MIG Start WFS value to the Welding Amp value. If TIG Start Amps/MIG Start WFS are set higher than the Welding Amp values, then technically it will down slope to the Welding Amp value. However high TIG start values can increase Tungsten wear. Used with all remote functions except the foot pedal in manual mode.

Voltage (MIG/TIG/Stick). Voltage is the main default control in the left screen. For TIG and Stick, Voltage is not adjustable because the length of the arc will dictate the voltage. This is a static function and only reflects the output voltage and will be displayed in green for TIG and Stick. For MIG/Flux-Cored use, the voltage is able to be set and controlled. Voltage is also referred commonly to "Heat" when referring to MIG and helps to control the arc length. Too much voltage will cause undercut, while too little will cause poor wet-in of the weld and cold lap at the toes of the weld.

Voltage Reduction Device or VRD (Stick). This function reduces Open Circuit Voltage (OCV) while welding stick. This is required in some applications to comply with safety standards. This reduces high OCV down to 20V or less. This can also make arc starting slightly more difficult. A quick double tap can offset the hard starting. *See specifications on page 12 for OCV data to determine if the use of the VRD is required.*

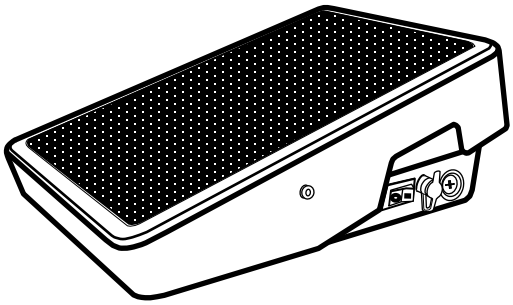
Welding Amps (TIG/Stick) or Wire Feed Speed(MIG WFS). This is the main default current control in the right screen. For TIG, when used in the context of Pulse, this is the "Peak" part of the pulse while the Pulse Amps is the "Base Amp" part of the pulse. Without Pulse, the main welding amps simply controls the Amperage of the welder. For MIG, Wire feed speed is expressed in inches per minute or in meters per minute, depending upon the units selected.

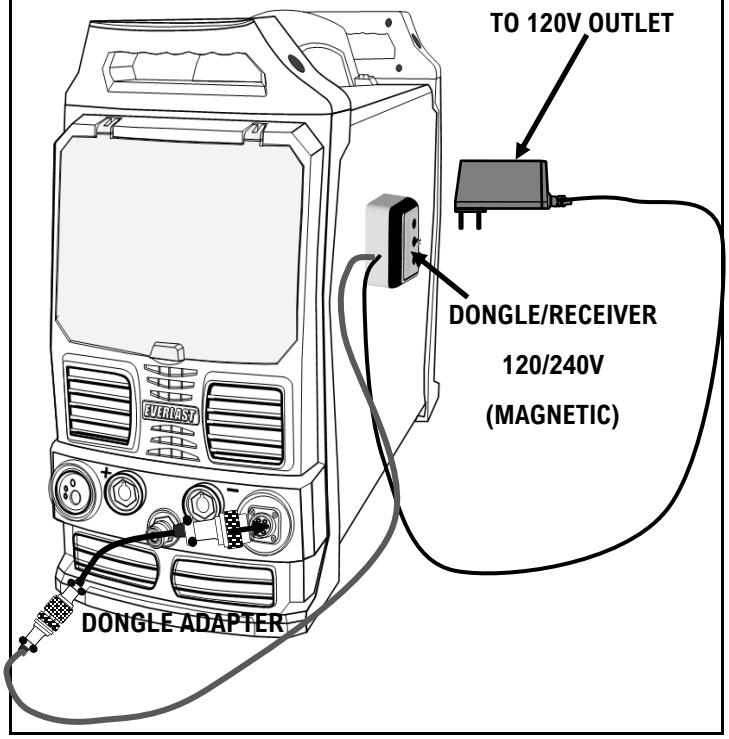
Component Identification and Explanation

Wireless Foot Pedal Option

Can I Use a Remote Wireless Pedal?

The Thunder series is able to be used with the NOVA wire less pedal system. This system is composed of the pedal and internal transmitter and and the external dongle receiver.



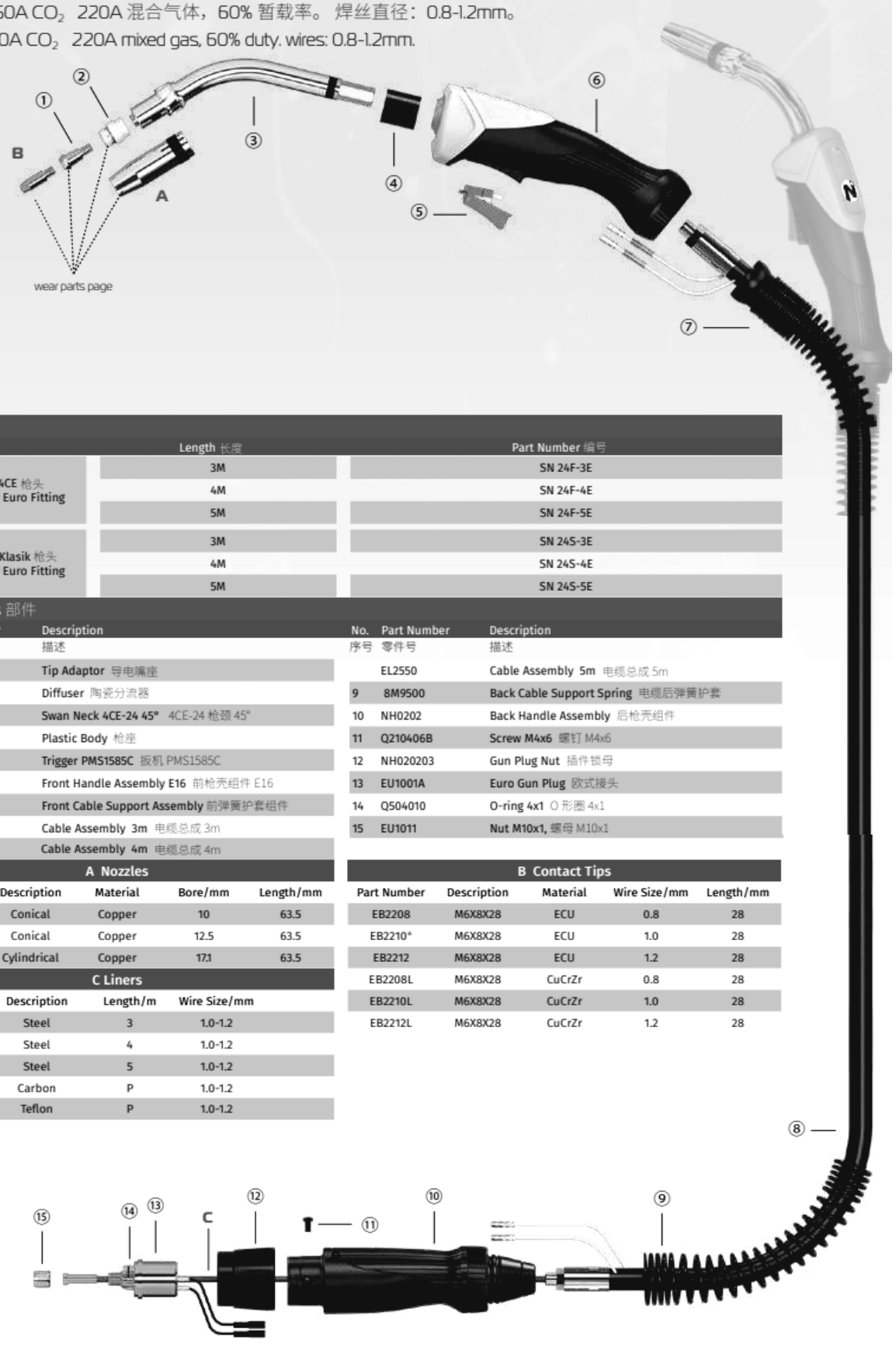


Component Identification and Explanation

North 24 Series MIG Gun

额定值：250A CO_2 220A 混合气体，60% 暂载率。焊丝直径：0.8-1.2mm。

Rating：250A CO_2 220A mixed gas, 60% duty. wires: 0.8-1.2mm.



Model 型号 Description 描述	Length 长度	Part Number 编号
SN 24F 欧式接头 4CE 枪头 Welding Gun c/w Euro Fitting	3M	SN 24F-3E
	4M	SN 24F-4E
	5M	SN 24F-5E
SN 24S 欧式接头 Klasik 枪头 Welding Gun c/w Euro Fitting	3M	SN 24S-3E
	4M	SN 24S-4E
	5M	SN 24S-5E

Components 部件

No. 序号	Part Number 零件号	Description 描述
1	EC2001	Tip Adaptor 导电嘴座
2	ED2001	Diffuser 陶瓷分流器
3	300624	Swan Neck 4CE-24 45° 4CE-24 枪颈 45°
4	305500	Plastic Body 枪座
5	EJ0005B	Trigger PMS1585C 扳机 PMS1585C
6	NH010216	Front Handle Assembly E16 前枪壳组件 E16
7	NS0101	Front Cable Support Assembly 前弹簧护套组件
8	EL2530*	Cable Assembly 3m 电缆总成 3m
	EL2540	Cable Assembly 4m 电缆总成 4m
	EL2550	Cable Assembly 5m 电缆总成 5m
9	8M9500	Back Cable Support Spring 电缆后弹簧护套
10	NH0202	Back Handle Assembly 后枪壳组件
11	Q210406B	Screw M4x6 螺钉 M4x6
12	NH020203	Gun Plug Nut 插件锁母
13	EU1001A	Euro Gun Plug 欧式接头
14	Q504010	O-ring 4x1 O 形圈 4x1
15	EU1011	Nut M10x1, 螺母 M10x1

A Nozzles

Part Number	Description	Material	Bore/mm	Length/mm
200305	Conical	Copper	10	63.5
200300*	Conical	Copper	12.5	63.5
200290	Cylindrical	Copper	17.1	63.5

B Contact Tips

Part Number	Description	Material	Wire Size/mm	Length/mm
EB2208	M6X8X28	ECU	0.8	28
EB2210*	M6X8X28	ECU	1.0	28
EB2212	M6X8X28	ECU	1.2	28
EB2208L	M6X8X28	CuCrZr	0.8	28
EB2210L	M6X8X28	CuCrZr	1.0	28
EB2212L	M6X8X28	CuCrZr	1.2	28

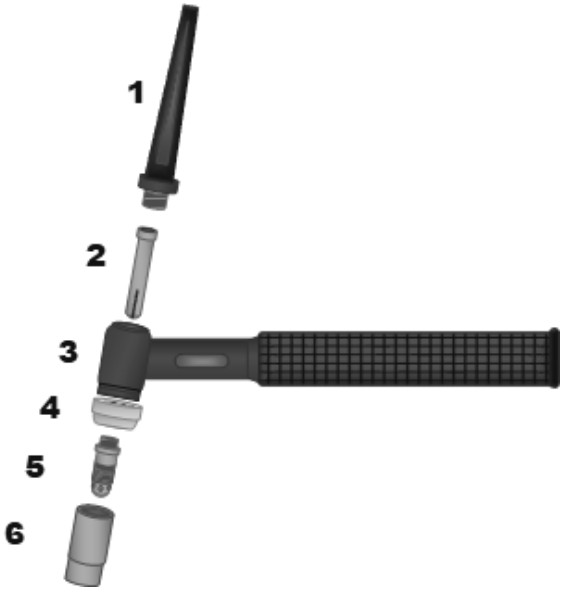
C Liners

Part Number	Description	Length/m	Wire Size/mm
302535	Steel	3	1.0-1.2
302545	Steel	4	1.0-1.2
302555	Steel	5	1.0-1.2
ER3412-P	Carbon	P	1.0-1.2
ER3312-P	Teflon	P	1.0-1.2

Component Identification and Explanation

26 Series Air-Cooled Welding Torch (Typical Type) Parts and Assembly.

DC: 200A @ 60% Duty Cycle; AC: 175A @ 60% Duty Cycle



Typical Everlast and NOVA Torch Assembly (17,18, 26 Series)

(Some parts may not appear exactly the same but are equal in assembly order and type.)

Tungsten not included, but available in select Consumable Kits on the website at www.everlastwelders.com.

Consumables are standard sized for series 3 torches, and interchange with consumables made for similar torches with similar nomenclature.

#	Description	Size/Type	Part#	Alternate Ref.	Note
1	Back Cap	Long	NVA57Y04-3	57Y02	
1	Back Cap	Medium	NVA41V35-3	41V35	Or 300M
1	Back Cap	Short	NVA57Y04-3	57Y04	
2	Collet	.040”	NVA10N22-3	10N22	1.0mm
2	Collet	1/16”	NVA10N23-3	10N23	1.6mm
2	Collet	3/32”	NVA10N24-3	10N24	2.4mm
2	Collet	1/8”	NVA10N25-3	10N25	3.2mm
3	Torch Body/Handle	17,26, or 18	Call for App.		Varies by Type
4	Heat Shield	17/26/18	NVA-HS172618	Heat Shield	Interchanges with similar aftermarket
5	Collet Body	Universal one size fits 1/16” to 1/8”	Stock	Stock	Universal Collet Body and Collets supplied with original starter kit
5	Collet Body	.040”	NVA-10N30	10N30	1.0mm, match to collet size
5	Collet Body	1/16”	NVA-10N31	10N31	1.6mm, match to collet size
5	Collet Body	3/32”	NVA10N	10N32	2.4mm, match to collet size
5	Collet Body	1/8”	NVA10N28	10N28	3.2mm, match to collet size
6	Cup	4	NVA-10N50-3	10N50	Standard, non gas lens 1/4”
6	Cup	5	NVA-10N49-3	10N49	Standard, non gas lens 5/16”
6	Cup	6	NVA-10N48-3	10N48	Standard, non gas lens 3/8”
6	Cup	7	NVA-10N47	10N47	Standard, non gas lens 7/16”
6	Cup	8	NVA-10N46-3	10N46	Standard, non gas lens 1/2”

Troubleshooting

Common MIG/Flux-Cored Welding Issues

NO.	Trouble	Possible Cause	Solution
1.	Unit is switched on, but the fans and display won't run or light up.	Switch damaged.	Check.
2.	After welding machine is overheating and the fan does not work.	Fan damaged.	Replace.
4.	Intermittent, wandering arc.	Work Clamp not connected directly to part being welded. Work Clamp worn/damaged Torch height too high.	Reconnect. Replace. Reduce MIG torch height to under 3/8".
5.	Porosity of the Weld. Discolored weld color. Tungsten is discolored.	Low flow rate of shielding gas. High flow rate of shielding gas. Possible gas leaks internally or externally due to loose fittings. Base metal	Increase flow rate on regulator. Check for kinks in tubing. Increase post-flow time. Reduce stick-out to less than 1/4". Increase gas nozzle size. Clean metal thoroughly with approved metal cleaner, or
6.	Weld quality is poor. Weld is dirty/oxidized, or porous.	Drafty conditions. The welder is located on the workpiece and is blowing gas off due to fan activity. Solenoid is sticking. For Flux Core, a certain amount of spatter, haxe and smoke is common.	Eliminate drafts. Move welder. Check if there is sufficient shielding gas left in tank. Check gas flow. Adjust for higher flow of gas. Listen for audible click of gas solenoid. If no click is heard, then contact Everlast Support. Clean weld properly. Increase pre flow or post flow. Check polarity is correct for either MIG or Flux-Core, especially after changing between processes.
7.	Unstable Arc. Spatter.	Bad work clamp connection. Metal is indirectly connected through table or other item.	Change Work Clamp. Use a direct connection to the part being welded. Check and adjust settings. Spatter usually increases when
8.	Continuous Overheating	Settings too high. Too large of wire for job. Fan not running.	Reduce Settings, use smaller wire Check fan, repair or replace if not running or running at low speed. If it is not running correctly (fan should run continuously) contact Everlast.
9.	Other.		Contact Everlast.

Troubleshooting

Common TIG Welding Issues

NO.	Trouble	Possible Cause	Solution
1.	Unit is switched on, but the power light isn't on.	Switch damaged. Service Breaker/ Input Line Damaged.	Check. Replace.
2.	After welding machine is overheating .	Duty Cycle Exceeded. Fan damaged and not running. Fan connector plus is loose. Temp Sensor damaged Unit is dirty	Do Not Turn off if fan is running. Allow to cool while running and unit should automatically reset. Allow to continue to cool for no less than 15 minutes after duty cycle is exceeded, even if the unit resets before this time. Replace. Check. Reinstall. Check operating temperature in background menu and check fan operation. Check and clean.
3.	When switch/pedal is pressed, no gas flows.	Empty Cylinder/ Closed Valve. Regulator Faulty/shut off. Solenoid Dirty/Stuck Shut. Damaged PCB.	Check. Replace/Open Valve. Check regulator and cylinder. Check. Clean or replace. (Contact Everlast Technical Support). Contact Everlast Technical Support.
4.	When switch/pedal is released gas continues to flow after Post-Flow cycle has timed out. May happen irregularly, or when unit is turned on.	Solenoid Dirty/Stuck. Excess moisture from Argon Cylinder.	Disassemble and clean, or replace. (Contact Everlast Technical Support). Install a dryer inline to remove moisture. Solenoid may need to be cleaned or replaced.
5.	Intermittent, wandering arc.	Work Clamp not connected directly to part being welded. Work Clamp worn/damaged. Torch height too high. Wrong Polarity	Reconnect. Replace. Reduce TIG torch height to under 1/8". Drag Welding Rod (Stick. Torch should be in negative for all TIG work. Stick should be positive.
6.	Arc will not start unless lift started.	HV/HF board is damaged or disconnected HV/HF settings are incorrect HV Start not selected.	Make sure unit is set to HF Start. Adjust Settings
7.	Tungsten is rapidly consumed.	Inadequate gas flow. Too small of tungsten. Wrong shielding gas. Using green tungsten. Wrong polarity. Possible contamination of shielding gas from gas supplier. Welder is too close to work.Fans are blowing gas.	Check gas flow. Check for Leaks thoughout system/regulator/tank. Check for 100% Argon. Use Lanthanated 2% or any other type besides Green (Pure) or Zirconiated. Put torch in Negative terminal. Move unit 6 to 8 ft away.
8.	Tungsten is contaminated, arc changes to a green color.	Tungsten is dipping into weld. Too long of stick-out. Tungsten is melting.	Check and adjust stick out to 1/8". Reduce stick-out to less than 1/4". Reduce amperage or increase tungsten size.
9.	Porosity of the Weld. Discolored weld color. Tungsten is discolored.	Low flow rate of shielding gas. High flow rate of shielding gas. Tungsten stick-out is too far. Too short of post flow period. Wrong TIG cup size. Possible gas leaks internally or externally due to loose fittings. Base metal is contaminated with dirt or grease.	Increase flow rate on regulator. Check for kinks in tubing. Increase post-flow time. Reduce stick-out to less than 1/4". Increase cup size, or use gas lens. Clean metal thoroughly with approved metal cleaner, or use acetone and a rag to clean metal.
10.	Weld quality is poor. Weld is dirty/oxidized, or porous.	Drafty conditions. The welder is located on the workpiece and is blowing gas off due to fan activity. Solenoid is sticking. Too short of pre-flow or post-flow.	Eliminate drafts. Move welder. Check if there is sufficient shielding gas left in tank. Check gas flow. Adjust for higher flow of gas. Listen for audible click of gas solenoid. If no click is heard, then contact Everlast Support. Clean weld properly. Increase pre flow or post flow.
11.	Unstable Arc.	Poorly ground or shaped tungsten. Bad work clamp connection. Metal is indirectly connected through table or other item.	Regrind to proper point. Wrong polarity. Place torch in DC negative (-). Connect work clamp directly to item being welded.
12.	Other.		Contact Everlast.

Troubleshooting

Common Welding Issues

NO.	Trouble	Possible Cause	Solution
1.	Unit is switched on, but the power light isn't on.	Switch damaged. Service Breaker/ Input Line Damaged.	Check. Replace.
2.	After welding machine is overheating .	Duty Cycle Exceeded. Fan damaged and not running. Fan connector plus is loose. Temp Sensor damaged Unit is dirty	Do Not Turn off if fan is running. Set fan to run continuously. Allow to cool while running and unit should automatically reset. Allow to continue to cool for no less than 15 minutes after duty cycle is exceeded, even if the unit resets before this time. Replace. Check. Reinstall. Check operating temperature in background menu and check fan operation. Check and clean.
3.	Intermittent, wandering arc.	Work Clamp not connected directly to part being welded. Work Clamp worn/damaged. Torch height too high. Wrong Polarity	Reconnect. Replace. Stick should be positive.
4.	Arc will not start easily	Wet Welding Rods Low Hot Start Settings VRD is on	Use fresh clean welding rods Increase hot start percent and time. Turn VRD off
5.	Porosity of the Weld. Discolored weld color.	Too long of arc length. Amperage set too high.	Reduce arc length. Reduce amperage.
6.	Weld quality is poor.	Dirty metal. Too much or too little amperage.	Clean metal. Readjust amperage.
7.	Arc goes out while welding	Arc Length too long. Wrong rod selection on machine screen. Poor quality rods or wet rods. Arc length too short with anti-stick turned on.	Shorten arc length and increase arc force. Make sure correct rod is chosen. Use fresh, high quality rods. Turn off anti-stick.
8.	Unstable Arc.	Arc length is too long Metal is indirectly connected through table or other item.	Shorten arc length and increase arc force. Connect work clamp directly to item being welded.
9.	Other.		Contact Everlast.

Troubleshooting

Error Codes

TROUBLE CODE WITH WARNING LIGHT/UNIT STOPS WELDING BUT IS TURNED ON.	DIAGNOSIS
E01	OVER TEMPERATURE/ DUTY CYCLE EXCEEDED. Allow unit to rest for 15 minutes while running. The unit should reset. If it does not or condition reoccurs, check for obstacles near unit blocking cooling. Then clean unit internals paying close attention to boards and heat sinks. Make sure unit is unplugged for 10 minutes before opening up for cleaning. Check for proper fan operation.
E02	OVER OR UNDER CURRENT. Check power input cable for length/size, check input voltage. Running on poor quality power supply or dirty power from generator. Possible Internal Issue.
E05	TORCH SWITCH IS STUCK CLOSED. This simply means that the arc has been trying to start and for too long. If this does not clear after releasing the switch, turn off unit immediately and check torch switch for stuck contact. If the pilot arc or HF Start is engaged without attempting to cut or weld for more than 3 seconds this will activate.
OTHER	CONTACT EVERLAST

Maintenance

What is the Thunder 215 Maintenance Schedule ?

This unit uses a HV electronic device to simulate an HF start. There are no points to maintain or point gaps to adjust.

However, every 3 to 4 months (or more depending upon use level), the unit should be opened up for inspection and cleaning. Use compressed dry air to blow out dust. Take care to remove any metal dust or other buildup from fan blades and vents. Take time to check the seating of all connectors and accessible wires. *Opening the unit up for cleaning does not void the warranty, but rather preserves it. Neglected cleaning can lead to failures of boards and components. Cleaning is a necessary component of operation to maximizing service life and maintaining warranty.* Warranty claims submitted that are a result of neglect or abuse may not be covered under warranty.

CAUTION! *Use Safety glasses and protective equipment when using compressed air or attempting to service this equipment!*

To Access and Clean the Unit:

1. Unplug unit for 10 minutes before starting to allow capacitors to discharge.
2. Remove front, middle and rear handle screws. (If handles are not installed, remove top bezel screws on front and rear. Remove any top mounted screws used in lieu of handles.
3. Remove handles.
4. Remove rear plastic bezel screws. Be sure to remove the screws located on the bottom of the bezel.
5. Remove rear bezel. Do not attempt to remove underlying metal case end. The case end is a structural part of the frame.
6. Remove the main green cover screws.
7. Insert fingers under bottom edge of the cover, near the rear of the cover. Gently spread the cover about 1 inch.
8. Slide the main cover to the rear and up carefully to clear any wires or obstructions.
9. When the cover has been removed, use dry compressed air to gently blow off boards and connectors.
10. Check to make sure all connectors are clean and fully seated. Make sure no wires have been unseated from the connectors themselves.
11. Clean bezel vents and fan blades. Fan blades accumulate build-up which can cause reduced cooling efficiency, vibration and eventually failure.
12. Once cleaned, reassemble unit in reverse order.

IMPORTANT: *Never remove the front cover or upper operator's panel unless instructed by Everlast.*