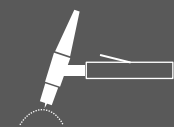
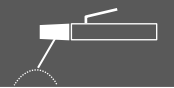




**140A  
GMAW  
FCAW**



**140A  
GTAW**



**80A  
SMAW**

**MIG  
Flux-Cored  
Spool-Gun  
DC TIG  
DC Stick**

# ***PowerMTS 141Si***

*Safety, Setup and General Use Guide*



FUNCTION: 140A MIG/TIG/ 80A Stick; Multi-Process Welder
PURCHASE DATE:
WELDER SERIAL NUMBER:
OPTIONAL ACCESSORY SERIAL NUMBER:

**120V  
1 Phase**

## **Operator's Manual**



Welders, Plasma Cutters, Multi-Process

**[www.everlastwelders.com](http://www.everlastwelders.com)**  
**Need Parts? Need Technical Help? Call: 1-877-755-9353**

380 Swift Ave. Unit 12 South San Francisco, CA 94080, USA

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## 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, 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](http://www.P65warnings.ca.gov)**

**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](http://www.everlastwelders.com). Navigate to the resources tab and to the "product registration" page to register your product. While keeping your receipt/proof of purchase 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](mailto:tech@everlastwelders.com) (US) or [mike@everlastwelders.ca](mailto: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](mailto: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](mailto: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](mailto: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](mailto:sales@everlastwelders.com)  
1-877-755-9353 ext 201  
9am-5pm Pacific (Closed holidays)  
Monday-Friday

### **Canada Technical Support:**

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

### **Canada Sales and Main Office:**

Email: [sales@everlastwelders.ca](mailto: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](http://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



**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.



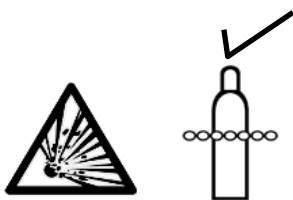
**WARNING!** Welding/cutting operations carry inherent risks which include but not limited to possible cuts burns, electrical shocks, lung damage, eye damage and even death. Take all appropriate measures to use proper Personal Protective Equipment (PPE). Always use leather welding gloves, closed toe (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 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 re-check 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 ensure 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 Flu-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 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 or drive roll mechanism. Keep welder door closed while welding to prevent access to the moving



## Safety Warnings, Dangers, Cautions and Instructions

	<b>CAUTION!</b> 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.
	<b>CAUTION!</b> 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.
	<b>CAUTION!</b> 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.
	<b>CAUTION!</b> 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.
	<b>CAUTION!</b> 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.

## 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 can be 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.*

**You will need a generator capable of producing 4500 Surge Watts to operate the unit properly.**

**Additionally, You will need a 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 automatically 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 generators not rated by its manufacturer as providing clean power (5% or less THD) is prohibited and will void the warranty. Operation with modified sine wave, or square wave generators and inverters/converters/UPS that do not produce true "sine wave" output is prohibited and doing so will also 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.

**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, just be sure not to weld or load the machine while this unit is in use.

**WARNING!** Always make sure any generator or welder generator is properly grounded, according to local code. 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.

## Extension Cord Use:

This unit will exceed the capability of most common extension cords. Use with an extension cord rated for 20 Amp continuous use. Usually this is 12 gauge extension cord that is 25 ft. or less in length. For longer lengths use a minimum of 10 gauge. Do not operate on smaller gauge than recommended or longer extension cords greater than 50 ft. Operation on cords that are undersized or excessive in length may damage the machine and void the warranty.

# Specifications

Product Specifications PowerMTS 141Si	
Construction Type	Inverter (IGBT based, Digital Control)
Input Voltage	120 (± 10%) 50/60 Hz
Phase	1 Phase 50/60Hz
I1MAX Current Rating (Inrush Amps)	120V @ 37A
I1EFF Current Rating (Rated Amps)	120V @ 19A
OCV	70V
Processes	GMAW/FCAW /GTAW/SMAW (FCAW requires purchase of optional drive rolls)
Duty Cycle (Rated at 40° C @ Max Output) *	MIG: 25% @ 140A/ 21V, 60% @ 90A/ 18.5V TIG: 25% @ 140A/ 15.6V, 60% @ 90A/ 13.6V Stick: 25% @ 80A/ 23.2V, 60% @ 55A/ 22.2V
Output Range	MIG: 15.5-21V/ 30-140A TIG: 10.4V-15.6V/ 10A-140A Stick: 20.8V-23.2V/ 20-80A
Pre Flow / Post Flow Gas Time	Auto Controlled
Burn Back Control	Auto
MIG Inductance	Fixed
Wire Spool Size	4" or 8" (2-12 lbs typically)
Wire Diameter Stock Drive Rolls	.023"- .030" (.6mm –.9mm)
Maximum Wire Diameter with Optional Drive Roll**	.035" Solid Wire,.045" Flux-Cored/Aluminum
Wire Feed Speed	No Load: 50-425 IPM.
Recommended Spool Gun	SM100N
MIG Gun Type/Length/ Connector Type	15 Series, 9.5 ft. (3m)
Work Clamp with Cable Length	5 ft (1.5m) DINSE 25 (3/8 nom. dia.)
150A Stick Electrode Holder Length	6.5 ft (2m) DINSE 35/50 (1/2" nom. dia.)
Power Cable Length	6.5 ft (2m)
Power Plug Type for 240V	NEMA 5-15P (North American Standard)
Cooling Type	Full Time Fan
Dimensions (Approximate with handles installed)	12.5" H X 8.5" W X 17.5" L
Weight (Bare Unit)	32 lbs.
Ingress Protection Rating	IP21S

\*\*May require a liner change or different gun, or special consumables.

## 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 I1MAX and the I1EFF 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. Additional HF protection and isolation may be needed if this welder interferes with the operation of electrical/electronic equipment. **WARNING!** Do not modify 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.

# Duty Cycle

## Duty Cycle Information

Duty Cycle is simply the amount of time out of a 10 minute period in which the unit can operate. For example, this unit has a duty cycle of 25%. This means that the unit can be welding for 2.5 minutes out of 10 minutes at 140 Amps (MIG, TIG; 80A for Stick) maximum output. The 2.5 minutes of welding time may be continuously, or intermittently during the 10 minute period of time. This rating standard (United States) is based on a maximum ambient temperature of 40°C. Operating above this point, or at lower temperatures with high humidity may reduce the duty cycle rating. Of course, the duty cycle will increase as ambient temperature drops. Regardless, this unit's duty cycle is not controlled by a timer. Rather, this unit is equipped with a heat sensor located on a heat sink near the critical power components of the welder. 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. **If a duty cycle event is registered, do not turn 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 more quickly triggered since the unit resets just below the heat threshold. The fan(s) must continue to run for a full 15 minutes to cool the unit properly after the duty cycle shut down has occurred.* 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 welding and have been welding continuously for extended periods of time, keep your unit on for 10 additional minutes without 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 unit.

## Cooling and Service of the Unit

This unit's cooling system depends upon the fan running continuously. It is not an thermostatically controlled fan sometimes referred to as "on demand" or "as needed basis". The fan should run without stopping to provide properly cooling to the electronics. Do not attempt to modify fan or install a thermal regulator circuit on this unit or you will void your warranty. Always check to make sure the fan is running properly, especially if overheating is encountered.

*Depending upon the amount of use, the unit's cover must be removed every 3 to 6 months so that the can be cleaned out with dry compressed air, especially if overheating is experienced if cooling fins, components and pathways become laden with dust and debris.*

Opening the unit for cleaning does not void the warranty, but rather ensures the warranty will stay in force. **Do not neglect to service this unit as needed. Use this time as additional opportunity to check wire connections and component conditions.**

### WARNING!

Always turn the unit off and disconnect the plug for at least 10 minutes before servicing the unit. Failure to do so may result in injury, shock, burns, or electrocution.

# Setup Guide

## Getting Started

### UNPACK YOUR 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: PowerMTS 141Si
2. 15 Series MIG Gun 3m (9.5 ft.)
3. Work Clamp 1.5m (5 ft)
4. Floating Ball Type Regulator with Gas Line (4a)
5. Stick Electrode Holder
6. 17 Series TIG Torch 4m (12.5 ft)
7. TIG Consumable Starter Kit



Inspect the welder for damage. Check for the presence and general condition of the accessories. Some slight rubbing or chaffing of some of the accessories may be present, but 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. Assemble the front, middle and rear handles with the supplied screws. Do not overtighten the screws.

#### NOTICE:

This unit is shipped with a .023" and .030" drive roll intended to feed solid MIG wire. While the unit is designed for use with Flux-cored, self-shielded wire, the flux core drive roll is optional. The .030" diameter wire is the best choice for the widest range of use with steel. If desired, you will need to purchase additional drive rolls. Additionally, for best results a flux-core nozzle may be purchased for use with your 15 series MIG gun. These may be bought locally. Currently Everlast does not offer the Flux-Cored only nozzles for sale. (Subject to change).

### POWER UP AND TEST YOUR UNIT.

You will need to fully test the unit as soon as possible. Within 72 hours after receipt 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 buttons, cycling through each as required. Make sure the fan is running

at full speed. After the test is completed, turn the unit off, connect the accessories, shielding gas (customer supplied) and conduct live testing of all the functions and features of the machine. For testing and welding make sure work clamp is connected directly to the part being welded (work). Check for arc starting and stability. If problems are observed, contact Everlast. See page 5 for more information. **NOTICE:** *Cosmetic damage claims after 30 days will not be accepted, unless Everlast is contacted and informed of such delay and reason for such a required delay (ie. Overseas in deployment)*

### CHECK FOR GAS LEAKS.

Be sure to check for gas leaks before attempting to weld. For TIG, you can test this by first installing both back caps into the TIG torch head (from both sides). Next install the regulator and tighten to both cylinder and unit (see section on regulator installation). After the regulator is secured, the gas flow should be set and tested. For MIG, First, release all tension on the wire feeder so the wire does not feed through the gun. Next trigger the gas flow with the torch switch by holding the torch switch down, while observing the ball on the regulator. It will float while the torch switch is held. If the trigger is released, after the post flow(2-3 seconds), the ball will sink and settle to the bottom. If the ball continues to flow after 2-3 seconds, 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 torch connections at the head and 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. **Be sure to test both the TIG and MIG sides of the unit for leaks.**

### DISTANCE YOUR WELDER FROM YOUR WORK.

As a best practice technique, be sure to locate your welder away from the immediate area you are welding. The fan found in your unit is powerful enough to create strong air turbulence in the weld area. This will disrupt the smooth, even flow of shielding gas around your weld creating unstable arcs, and a porous look to the weld. If possible the welder should be located at least 4-5 feet away from the weld area and should be on a different level to prevent weld porosity and defects being created by the welder's fan system. *Keep in mind the fan draws air in from the rear and exhausts out the front and the sides of the unit. If welding outdoors, and a breeze is present, erect a wind screen around your weld area, using a tarp, plywood or similar material.*

### 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 the sides are blocked or re-

# Setup Guide

## Getting Started

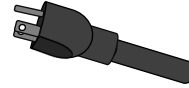
stricted, the duty cycle will be reduced, and overheating will occur, leading to possible damage if the restriction is severe enough. Never attempt to restrict air flow by attaching filters to the vents. Do not modify the unit for “on demand” fan service, or the warranty will be voided.

### CONNECT YOUR UNIT TO THE OUTLET.

Your unit has been shipped with a 15A NEMA 5-15P welder plug. This is the standard for 120V 1 Phase welders in North America. For connection, select a NEMA 5-15/20 Receptacle for operation with this unit. (Other regions/countries vary). It is recommended that you operate this unit on a dedicated circuit. In accordance with Article 630 of the NEC, the breaker required for this unit is different than the rating for the wiring/receptacle required due to differences in Inrush current and Effective Rated currents. The NEC takes into consideration duty cycle when making these determinations. For best results use a 30A delayed trip breaker, or a 30A slow blow fuse with this unit. However, when installing new wiring or making plans for a dedicated circuit for this welder, consult a locally licensed electrician. Do not attempt to wire any new circuit if you are not licensed and qualified to do so.

### 120V Plug (Supplied)

Power Plug (NEMA 5-15)



### Selecting A Breaker and Wire Size

Select a breaker based off of the I1MAX rating of this unit. This is the maximum inrush current of the unit. The inrush is not a sustained current. The I1EFF 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. A delayed trip breaker, or slow blow fuse should be used with this unit.

### 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, don't. 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. Importantly, it should not share circuits with other shop or household items. ***The input power cable 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.***

# Setup Guide

## Getting Started

### CONNECT YOUR UNIT TO THE SHIELDING GAS.

#### What Shielding Gas Should Be Used?

With this unit, the choice of shielding gas depends upon the process being used and the type of metal being welded.

For MIG (GMAW): you may choose either the standard 75/25 (which is 75% CO<sub>2</sub> and 25% Argon), or you may choose 100% CO<sub>2</sub> (Spatter may increase with 100% CO<sub>2</sub>). For Stainless, use a Tri-MIX type of gas with Helium. For Aluminum, use 100% Argon.

For Self-Shielded Flux-Cored (FCAW) since it is gasless, no shielding gas is needed. **Keep in mind this unit is not designed for gas shielded Flux-Cored wire and should not be used with this unit.**

For TIG (GTAW): Always use 100% Argon for all metals.

Before you begin to make your gas connections, please note that there are **actually two (2) rear connections for gas**. One is for MIG and the other is for TIG. Each connection is marked, but facing the rear of the unit, the gas connection for TIG is on the left, and the gas connection from MIG is on the right. Always double check which connection you are using. The unit is only supplied with one regulator, so keep the other connection capped with the supplied plastic cap when not in use to prevent dirt and debris from entering the unit's fittings and clogging and sticking your gas solenoid. *You may also purchase another regulator and keep both tanks connected while welding.* Just remember to always keep any unused cylinder valve closed. **As best practice, always close the gas valve when turning off the welder to prevent unwanted leakage and wasted gas. Shielding gas may fill a room if leaks occur and cause asphyxiation.**

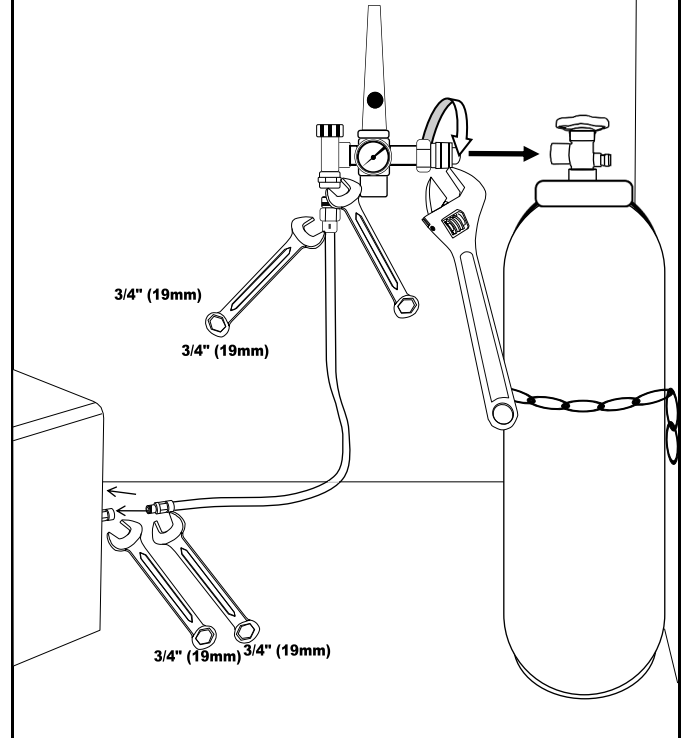
Always wear safety glasses when changing a cylinder. Before installing any cylinder, the cylinder must be chained upright to the wall or a cart. After installing the chains, uncap the cylinder. The cap may need a wrench or screw driver inserted into the cap slot to break it loose. Stand to the side of the valve, away from the discharge, and quickly open the cylinder to give it a quick blast. This will dislodge any dirt or particles stuck in the valve or the connection seat. This will help reduce the chance of dirt particles making its way into the solenoid valve, causing sticking issues later on.

Connecting your cylinder will require a cylinder wrench (1 1/16") to connect the regulator to the cylinder (North American Cylinders with a 580 CGA valve). If you do not have a cylinder wrench, an adjustable type wrench will work, but make sure it is properly adjusted to prevent rounding of the fitting shoulders. Do not use pliers, or a serrated jaw wrench such as a pipe wrench or basin wrench to tighten the fitting. The design of the fitting means that no thread sealing tape or compound needs to be used.

Locate the Regulator in the packaging. The regulator may have either a hose barb connection, or a threaded connection. If the regulator supplied has a hose barb, make sure the hose barb fitting is tight on the regulator. Connect the regulator tubing to the regulator. Tighten with a 3/4" (19mm)

#### Connect Regulator To Cylinder And Unit.

Note: Some regulators may have a hose barb connection fitting on the regulator.



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.

- **Important!** Do not use thread tape or pipe sealant on any cylinder, regulator or unit connection. The residue and debris may get into the gas solenoid. Install the cylinder on the cart or chain it to the wall closest to the welder. Do not overtighten. If leaks persist, remove regulator from cylinder and inspect fittings for dirt or debris. Do not attempt to repair a leaking regulator. Contact Everlast for a warranty replacement if a leak is discovered in the regulator itself.
- Use a mixture of warm mildly soapy water to brush on the fittings and check for leaks. Leaks are indicated by the forming of bubbles. Retighten as needed. However, do not over-tighten. If the leak does not disappear, remove the problem fitting and inspect it for dirt or metal filings, then re-install and recheck.
- Inspect and verify the pressure on the cylinder. The dial reads in both PSI and Metric Equivalents.

# Setup Guide

## Getting Started

### ADJUST THE REGULATOR FLOW RATE.

- Switch the unit on. While holding the MIG gun trigger, start opening the the regulator valve by twisting the regulator adjustment knob counter clockwise. As you open the valve, the floating ball will begin to rise. **NOTICE:** To avoid spooling out and wasting wire during this time, release the tension on the drive wheels by flipping the tensioning lever to the down position before you begin. This will release tension and allow the drive rolls to safely turn without feeding any wire.
- Increase the gas flow rate to a beginning point of 20-25 Cubic Feet Per Hour (indicated on the clear gauge with the floating ball by CFH). If MIG/Spool Gun welding Aluminum, increase flow rate to 35 CFH. Read the middle of the ball for the best reading. **Do not confuse pressure on the cylinder gauge with the flow rate on the floating ball gauge. Pressure present on the cylinder gauge does not mean gas is flowing. However, a lack of pressure on the gauge may mean there is no gas flowing.**
- Once adjustment is completed release the trigger. The gas will delay slightly until the post flow timer automatically shuts off the gas flow. The ball will settle.
- When welding it may be necessary to increase or decrease gas flow rate to compensate for conditions. If you are welding outdoors or in drafty conditions, increase the flow rate until weld porosity disappears. In extreme cases, you may need to set up a tarp or plywood to serve as a wind-break. In mild conditions, if a breeze is lightly blowing you can position your body to block the wind. *Alternatively, you can choose to weld with flux-cored wire to eliminate this problem*
- If you are concerned about wasting gas, or think gas consumption is too high, you may turn down the gas. While testing on scrap metal, turn the gas down incrementally until bubbles and porosity just begin to appear. Once they appear, adjust the regulator slightly so that they once again disappear. Once they fully disappear, add another CFH and you will have a properly adjusted regulator
- When pressure on the cylinder drops below 300 to 500 psi, it is common to have to readjust the flow regulator to compensate for the lower pressure. Pressures under 100 psi may create unstable gas flow. Once you reach 200 psi, have a replacement cylinder ready to change out. If you completely run out of shielding gas while welding it is likely you may have some hidden porosity in your welds, creating weak welds. Always change the cylinder out when gas levels reach 75 psi.

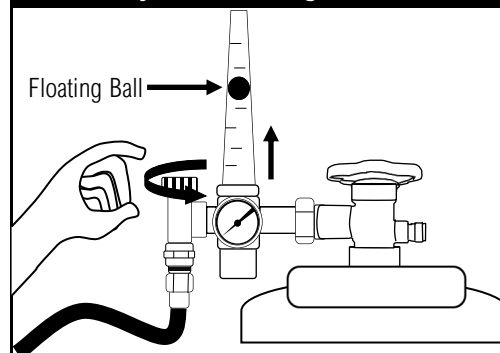
**NOTICE:** If you are planning on welding during holidays or during weekends, always take notice of the cylinder pressure well before hand. This will allow you time to get another cylinder before stores close for the holi-

days or weekends. If possible, you may want to purchase a 20CFH cylinder in addition to the regular gas cylinder that you lease or purchase so that you have a backup cylinder in case of an emergency. A 20CFH cylinder will last an hour or two of welding. These are relatively inexpensive and can even be bought "pre-loaded" with gas in many chain hardware stores and farm stores. These can also be refilled when empty.

### WARNING!

**Never leave the gas cylinder turned open after shutting the unit down after welding is finished.** Always make it a practice to close the main cylinder valve immediately after turning off the welder for more than 15 minutes. A malfunctioning regulator, valve or blown hose could fill the area with shielding gas. Argon and CO2 will build up and you can asphyxiate if the contents are not dispersed. Argon and CO2 are odorless, tasteless gases which can cause suffocation. Always fully open the cylinder valve or have it fully closed. Never leave a valve "in-between". Cylinder valves are only designed not to leak when they are either fully open or fully closed. Use the regulator to adjust the pressure. Do not use the tank valve to adjust the pressure. Any leaking regulator or line should be replaced immediately. **Do not attempt to service any regulator.**

### Adjust the Regulator/Flow Meter.



*Increase flow rate by rotating the control knob counter clockwise.*



# Setup Guide

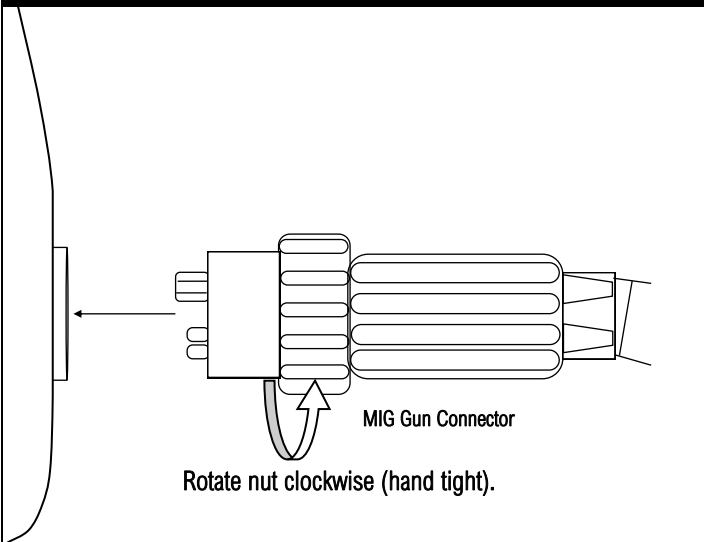
## Getting Started

### Testing Wire-Feed Operation and MIG Gun Installation

After inspecting the unit for power up, it is necessary to confirm wire feed operation. This is a simple process that requires you to install the MIG gun on the unit. To install the MIG gun:

- Locate the MIG gun in the accessory box. Uncoil the gun and straighten it out.
- **Refer to the drawing below.** Line up the Euro-Connector on the end of the gun with the connector on the unit, making sure the protruding pins are lining up with the corresponding hole.
- Once the pins are lined up, push the connector in until it is seated. Hand tighten the collar nut clockwise. Do not overtighten or use tools.
- Once the nut is tight, gently shake the connector to confirm that the gun is fully seated and the nut is still tight.

### MIG/Spool Gun Installation



After you install the MIG gun, set the wire speed knob to maximum. Open the MIG door so that you can see the drive feeder mechanism. Set the wire feed control to the maximum setting. Pull the trigger to check that the drive mechanism is turning. If it does not turn, check the MIG gun connection once again. If the drive wheel fails to rotate, contact technical support for further assistance.

### Selecting Polarity For MIG, TIG and Stick.

#### WARNING!

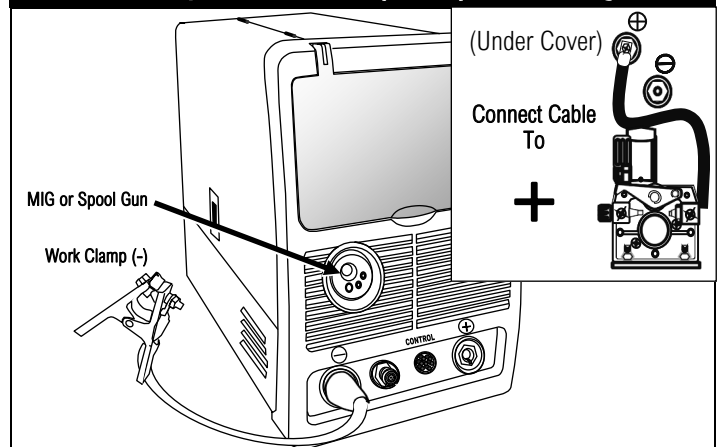
Keep only the gun or torch connected that is in use. The connections remain live and accidental arcing may occur. Damage to the machine as well as shock, burn, death or other personal injury may occur as a result.

Choosing the correct polarity for the welding process that you are welding is important. Without the correct polarity, weld quality and weldability of a metal will be an issue. Incorrect polarity can also cause undesirable operation of the

welder such as excess spatter, birds nesting of the wire, wire/electrode sticking, excessive Tungsten/consumable wear, poor penetration and even arc instability. See the following images to determine which polarity should be used with your process. Always double check, especially after switching over processes that you have the correct polarity. **In MIG, if you forget to change the work clamp but change the polarity under the cover, or vice versa, you will not even get a spark.** If something doesn't seem right about the way the welder is welding, always check your polarity first. Then check your work clamp location and make sure it is direct to the part being welded. If this has been checked and things still don't seem to weld well, consider replacing the work clamp. Inspect it for burns, corrosion, missing copper strap, damaged hinge joint. Stop and inspect the cable for tightness also.

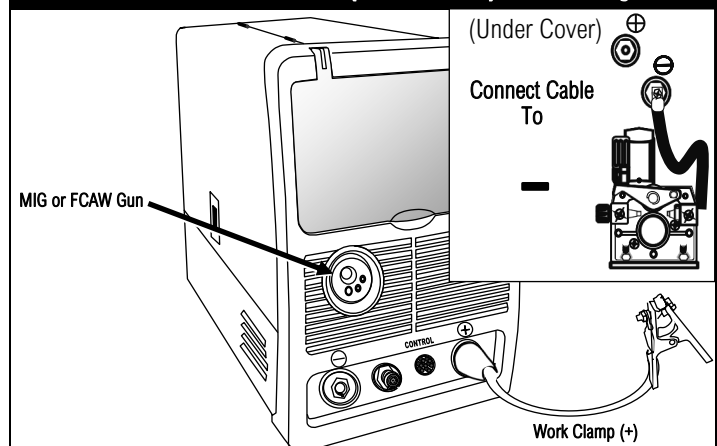
*The images below are shown without the MIG gun installed for illustrative purposes.*

### MIG/Spool Gun (Gas) Polarity +



**IMPORTANT!** Remove the TIG and Stick Torch while welding MIG to prevent arcing and damage to the machine. The connections remain live and personal injury may also occur.

### MIG Flux-Cored (Gasless) Polarity -



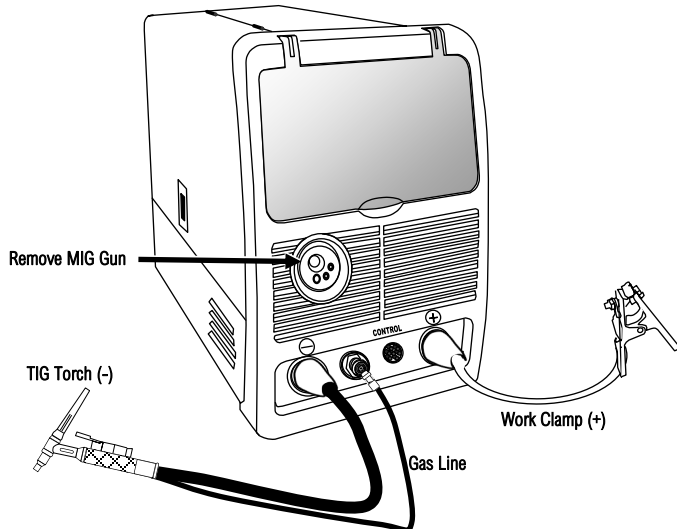
**NOTICE:** This unit is for use with gasless, self-shielded wire only. This unit is not intended for use with Gas Shielded Flux-cored Wire (FCAW-G).

**IMPORTANT!** Remove the TIG and Stick Torch while welding MIG to prevent arcing and damage to the machine. The connections remain live and personal injury may also occur.

# Setup Guide

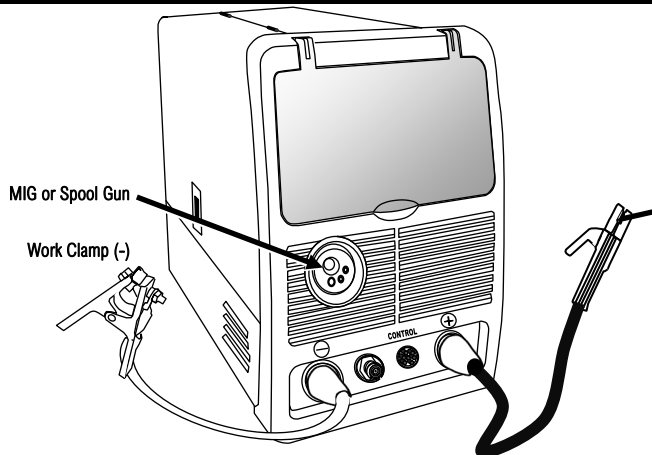
## Getting Started

### TIG Torch Polarity -



**IMPORTANT!** Remove MIG Gun while using TIG and Stick processes. Gun will remain live if connected. If it comes into contact with metal, the MIG Gun may short out, and may cause damage to the unit. Personal injury may also occur.

### Stick Electrode Polarity +



**IMPORTANT!** Remove MIG Gun while using TIG and Stick processes. Gun will remain live if connected. If it comes into contact with metal, the MIG Gun may short out, and may cause damage to the unit. Personal injury may also occur.

sible and grind a clean connection point where the work clamp will be. This will help achieve the best weld and offer the best transfer of power to the weld.

When connecting the work clamp, always be sure that you have it connected directly to the part being welded. Connecting to the table, through a vice or fixture may cause arc instability and even loss of weld power through resistance. If you are not able to connect directly to the part being welded, consider using a jumper wire, or at least connect as close as pos-

# Setup Guide

## Getting Started

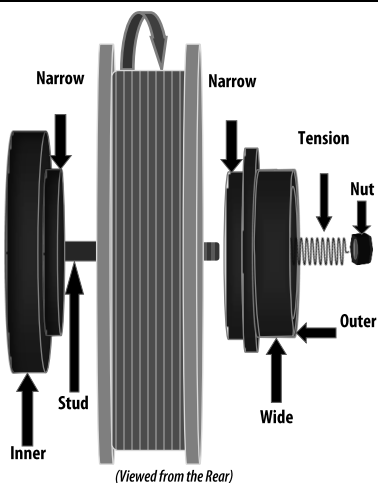
### MIG Setup

#### Install the Wire Spool.

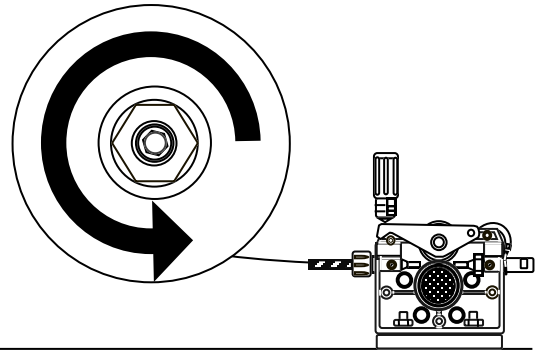
The spool carrier assembly consists of several parts. Each part must be assembled correctly. See the illustration below. There are two collars that support the 8" spool. There is an inner collar and an outer collar. The roll is held in place by tension placed on the outer collar by a small spring and a small finger nut. During installation of the wire spool, pay attention to the outer collar direction when you remove it. Viewing from the rear, the narrow shoulder of the collar faces the inside. The wider side of the collar should be turned toward the outside of the welder, facing the welder door when closed. If the outer collar direction is reversed, you will have difficulty installing the spring and the tension will be too tight. Installation of the wire spool is slightly different depending upon the spool size. For 8" spools, the spool rides on the narrow shoulders of the two collars. The spool rotates on these collars. To install 4" spools, the spool is installed so that it sits between the two collars and rotates on the spindle stud.

**NOTICE:** The wire spool must be installed so that the wire unwraps and feeds from the bottom of the spool. It should never be installed so the wire comes over the top. When installed properly, the spool will turn counter clockwise. See the following illustration for proper rotation direction. Tension the spring with the finger nut until the spool will only free wheel 1/4" turn when spun by hand. Do not let the spool free wheel completely or the wire will unwind itself and can get tangled. Don't over tighten the spool, as this will cause rapid wear to the feeder components.

### Wire Spool Installation



### Wire Spool Direction and Rotation



### Which Spool Gun?

If you are wishing to extend your reach, or desire to use 4" diameter rolls of wire, you may be interested in using the spool gun function. Small diameter wire such as .023" wire is not recommended to feed in standard MIG guns over 10 ft in length. .030" wire should not be fed in guns over 12 ft in length. 4" rolls can be fed directly from the machine however. But if you want maximum convenience, the spool gun option is best. If you need to feed long distances, you may want to purchase the SM100N spool gun for use with this unit. However, .035" Aluminum wire will be the best choice for use in the unit whether you are welding with the main gun and poly liner, or if you using the spool gun. The maximum wire speed of this machine limits use of .30" and below Aluminum wire. With .030" wire, the wire feed will be barely enough to keep up with the burn back rate of the wire and many "burn back" to the tip events will occur. Larger wire requires a slower wire feed speed to deliver the same Amperage, so this is why .035" wire is recommended for this unit while welding Aluminum. Minimum weld thickness for Aluminum is usually considered between 14 gauge and 1/8" due to the spray arc nature of it. The SM100N gun is calibrated and best synchronized for this unit. Typically spool guns are used to weld Aluminum, and occasionally small spools of flux-cored wire or stainless. Spool Gun polarity connections are the same as in regular MIG or Flux-Core.

# Setup Guide

## Getting Started

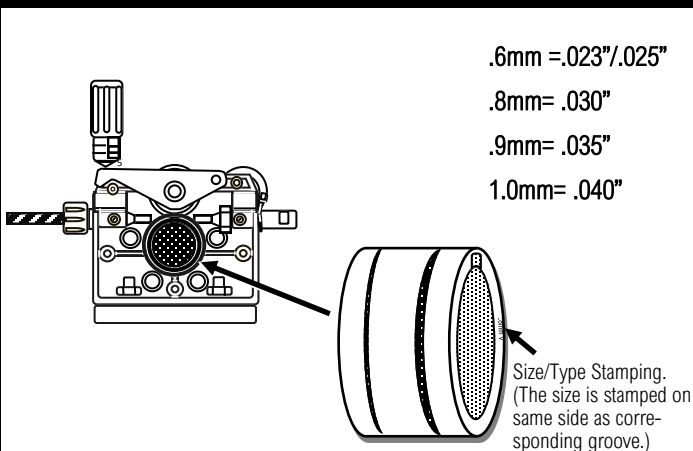
### Identifying and Changing the Drive Rolls.

The unit comes equipped with .023" and .030" drive rolls. **NOTICE:** *For most purposes 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.* However, if you change wire size or type, you will need to change the drive roll to the correct size and type.

This unit uses two drive rolls to feed the wire. 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 .023(.025") and .030" 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 or stainless wire 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 a "U", this is a special drive roll for feeding aluminum wire. Aluminum wire is best fed with a spool gun.

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, replace it before replacing the drive roll.

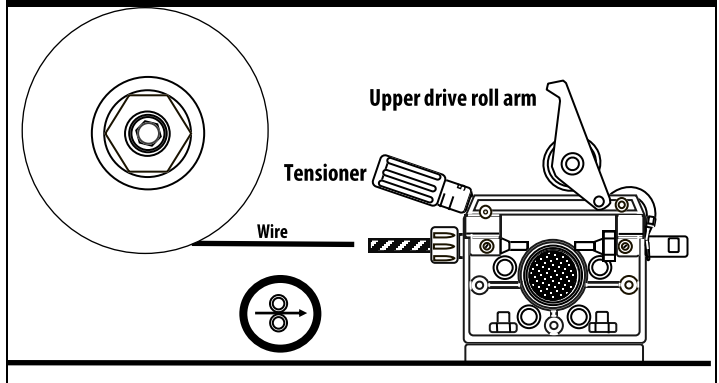
### Drive Roll Size and Location Info



### Guiding the Wire Through the Feeder and Gun.

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 despooling 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.*

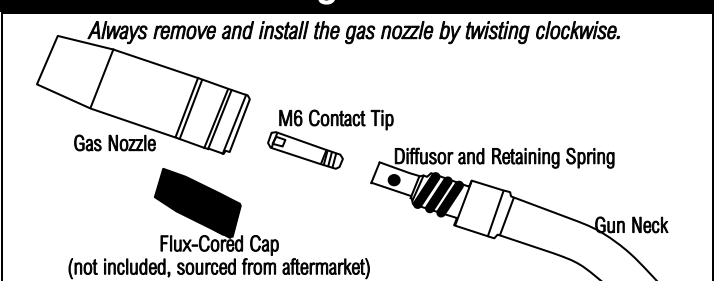
### Installing the MIG Wire



After the tensioner is raised back to the vertical position, confirm the wire is still in the groove and is not riding up on the shoulders of the drive roll.

Turn the welder on and adjust wire feed speed (IPM) to maximum. Remove the gas nozzle by twisting it clockwise and pull. Unscrew the contact tip as shown in the illustration below. Hold the gun cable and gun straight as possible. Pull the trigger on the gun. The wire should slowly begin to feed through the gun cable and eventually through the gun. As the wire exits the gun, allow 3 to 4 extra inches of wire to be fed out past the diffuser. 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.

### Assembling the MIG Gun

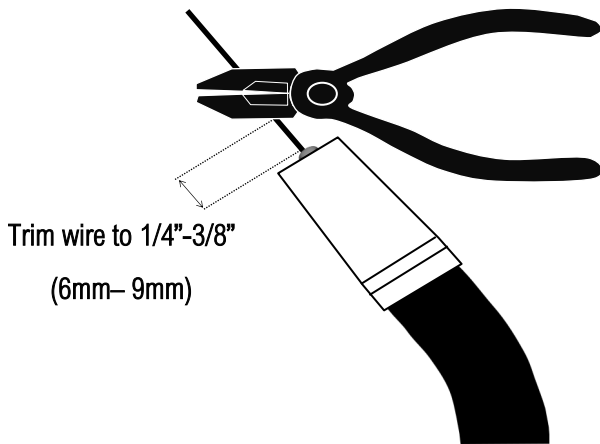


# Setup Guide

## Getting Started

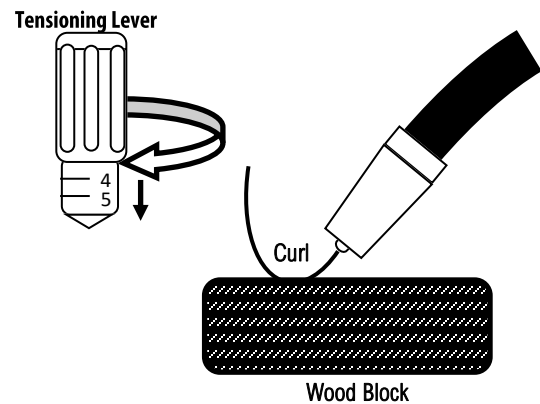
Trim the wire sticking out of the nozzle to 1/4" to 3/8" (6mm to 9mm) in length with wire cutters. See the illustration below. The gun is now ready for welding. *Hint: Always make sure that you re-trim the wire before beginning a new weld if the wire is not already trimmed to this length. This will help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

### Trim Wire Before Starting a Weld



sary. When the wire begins to curl without any stoppage, the tension is enough.

### Test Wire Tension Before Welding



#### Tensioning the Drive Roll Pressure


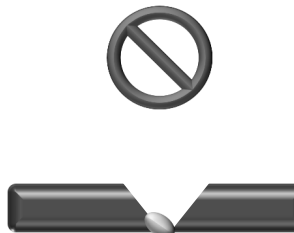
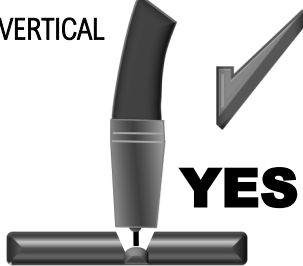
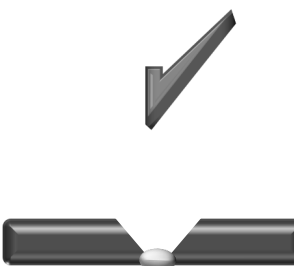
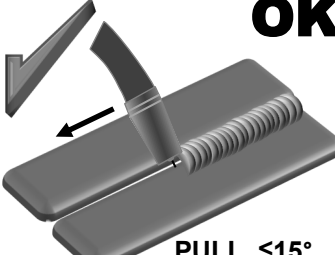
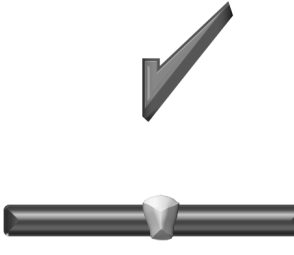
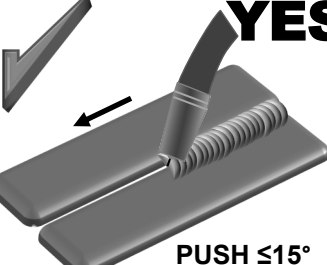
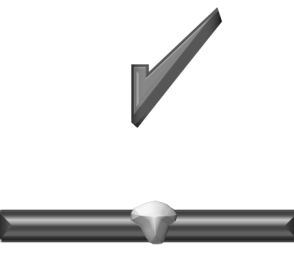
To feed properly, the wire needs to be tensioned before you begin welding. The tensioning lever has numbers on the dial. To increase tension, rotate the tension lever clock-wise. Different types of wires require different tensions. There is no exact tension that works for all wire types. However, for 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!**
- 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 to the wood.
- 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 neces-

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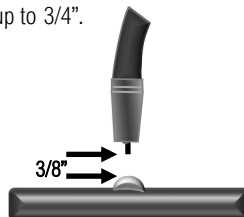
## Do I Drag or Push In MIG?

MIG Welding is fairly simple if you keep travel angle and direction in mind when welding. See below. If you are welding flux-core, the gun direction is reversed. **Remember: If it has gas, you use a push angle. If it is gas-less you use a drag angle.** *The old welder's saying "If it has slag, you drag." applies to Flux-Cored Wire welding.*

	<p><b>Problem Technique:</b> 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. <b>Correction:</b> Hold the gun so that the angle of the neck stands perpendicular from side to side.</p>	
<p>VERTICAL</p> 	<p><b>Correct Technique:</b> 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.</p>	
<p>OK</p>  <p>PULL <math>\leq 15^\circ</math></p>	<p><b>Correct Technique:</b> 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.</p>	
<p>YES</p>  <p>PUSH <math>\leq 15^\circ</math></p>	<p><b>Correct Technique:</b> 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.</p>	

### Contact Tip to Work Distance (CTWD)

The overall stick-out of MIG and Flux-Cored wire is important to creating a good weld. The distance of the stick-out of the wire from the end of the contact tip to the weld puddle is the Contact Tip to Work Distance. For a small MIG like this typically hold 3/8-1/2" CTWD. Flux-Cored wire is similar but is a bit more forgiving and able to hold a longer arc, up to 3/4".



# Setup Guide

## Explanation of Terms and Features

*To help understand the settings and features of this basic machine, a basic explanation of the terms and proper use is necessary. The following information should be used to help setup and weld with the machine.*

### Getting Familiar With MIG, TIG and Stick Basics.

#### MIG Volt and Amp Settings.

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. **However, while actively welding, the display will change function and display actual amp output.** The relationship between wire diameter, wire speed and amps is easily figured with the following approximate industry conversions:

.023":  $3.5 \times \text{Amps} = \text{Inches per minute (IPM)}$

.025":  $3.1 \times \text{Amps} = \text{Inches per minute (IPM)}$

.030":  $2 \times \text{Amps} = \text{Inches per minute (IPM)}$

.035":  $1.6 \times \text{Amps} = \text{Inches per minute (IPM)}$

.045":  $1 \times \text{Amps} = \text{Inches per Minute (IPM)}$

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

.023":  $\text{IPM} \div 3.5 = \text{Amps}$

.025":  $\text{IPM} \div 3.1 = \text{Amps}$

.030":  $\text{IPM} \div 2 = \text{Amps}$

.035":  $\text{IPM} \div 1.6 = \text{Amps}$

.045":  $\text{IPM} \div 1 = \text{Amps}$

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 reduce stick-out of wire to 3/8" or less. If this still does not help, reduce the wire speed. Some 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.

#### Starting the Arc in MIG Mode

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" above the weld. The gun should be in the vertical position, with no more than 5 degrees lean in either side to side 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. In either case, 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 open-minded people who are well 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 pene-

# Welding Information and Tips

tration 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.**

## 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. This includes MIG, TIG and Stick processes. Stringers are simply straight beads that move forward with little or no side to side travel, stepping or oscillation. These will offer the most sound and reliable welds for a beginner. Stringer welds leave little or no room for contaminants 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. Weaves 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, contaminants 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 contaminants 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, whether it is MIG, TIG or Stick. This technique is a good way to induce cold-lap and inclusions into the weld. Single pass welds should not exceed 1/4” even with the heaviest wire the welder is capable of handling. On this unit, we suggest no more than 3/16”. A thick pass may also begin to cool before contaminants 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 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 contaminants 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 can be introduced.

## 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.



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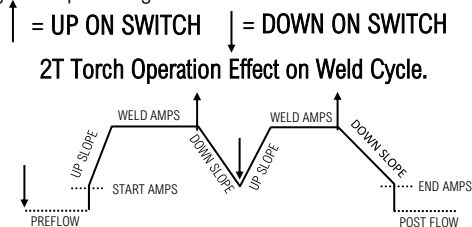
## Getting Started

### MIG and TIG 2T/4T and Pedal Operation.

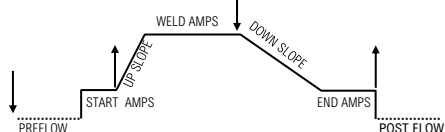
2T and 4T are functions common to both MIG and TIG. These settings allow you to change how the weld cycle is controlled through the up and down (or in and out) motions of the torch switch. Only in TIG mode can the pedal function be used. The optional pedal is designed to vary the Amps from the default minimum (10A) up to the maximum Amperage set on the panel. For an explanation of 2T and 4T work, see below.

### How Does 2T and 4T Work?

The MIG and TIG torch has a switch that has two possible modes of operation. The first is a "press and hold". The second allows the switch to be released to weld, but offers separate motions to start and stop the arc. For TIG, however, an optional foot pedal may also be used to control both the Amps and the On/Off cycle of the arc. See below for how each function is activated by movements of the torch switch. For this model, Start/End Amps and Up/Slope are factory set and cannot be changed. They are optimized for basic operation and may appear to be more on/off than a gradual slope up or down. Pre and Post Flow can be either selected to be On or Off with automatic adjustments to the duration of flow being made by the machine programming as amps change.



### 4T Torch Operation Effect on Weld Cycle.



### MIG and TIG Pre-Flow and Post Flow.

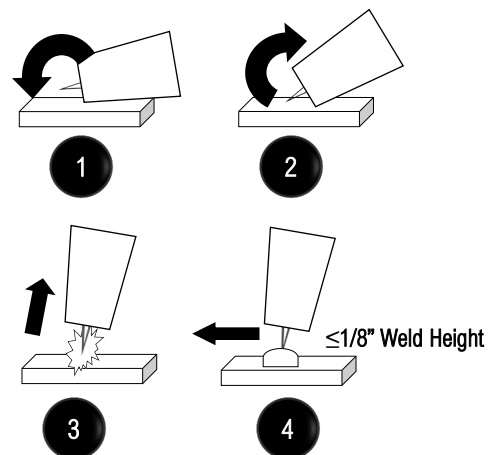
Pre and Post Gas Flow are invaluable tools that can be used for both MIG and TIG welding. This feature provides an automatic flow of gas before the arc starts and after the arc terminates. The duration of the pre and post flow are different and are determined automatically according to the machine settings for Amps. The use of Pre and Post Flow is optional as it can be turned on and off. However, whenever possible it is recommended to use this feature. Doing so will increase weld quality on start up as well as at arc termination by providing a protective shield of gas around the weld area to prevent porosity and oxidation around the weld.

### TIG HF, Live Lift, and Remote Lift Start.

The PowerMTS 141Si is unique in its class by offering all three forms of arc starting. Live lift is a simple function where the Tungsten remains live all the time and the torch is simply touched down to the metal and lifted back up to start. This is a style often used while pipe welding or doing basic DC welds out in the field. With this unit, when the tungsten is touched to the metal, the gas flow will start automatically but will bypass the pre-flow cycle. Remote lift allows the use of a torch switch or optional foot pedal. A similar method of touching the Tungsten to the metal and lifting up is used, *except* the foot pedal or torch switch must be pressed to energize the torch first. HF start (High Frequency) is only available for use with the torch switch or the optional foot pedal. To start the arc with HF engaged, the torch held 1/8" or less of the metal and the foot pedal or torch switch is activated. Then, arc will automatically fire and transfer to the metal without touching it. The HF method of starting the arc is the easiest and preserves the tungsten the longest, preventing frequent regrinding of the Tungsten.

### How Do I Perform a TIG Lift Start?

1. Rest the edge of the cup on the work piece so that the tungsten is slightly off the work. (If using Remote Lift, Press the trigger or foot pedal at this point.) 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. Travel forward with a "push" angle of 10-20 degrees.



### NOTICE:

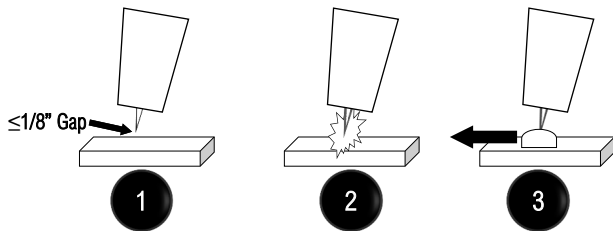
The arc start will be delayed by the amount of Pre-Flow time programmed by the welder. This is sometimes easy to forget, especially when tacking. If doing rapid tacking in MIG or TIG, this is a situation where you may wish to turn off the Auto Pre-Post Flow feature. However, if it is left on, you will see smoother and less oxidized tack welds even if the functions may cause a slight slow down in welding progress.

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### How Do I Perform an HF TIG Start?

1. Place the point of the tungsten 1/8" or less over the work piece.
2. Press the torch trigger or foot pedal, whichever is connected, and the HF spark will be emitted. It may appear as small sparks or lighting if the arc doesn't start immediately.
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. Continue to use a "push" angle of 10 to 20 degrees.



#### Setting up for TIG welding.

If you are needing basic help getting started TIG welding, here are some general settings and selections to get you started. This guide is intended to be only a starting point, not a completely exhaustive source. Keep in mind that no guide is a substitute for practice and experience. You may find that your final settings may be different from the ones listed. **The following guide does not represent the maximum capability, or even the recommended capability of the unit.** However, it demonstrates what is considered to be a practical capability limit of multiple variables when factored together. It is possible to weld thicker materials with the same amp range. However, as a best practice, the industry does not recommend heavy passes, rather thinner "stacked" passes on thicker plate. Multi-pass welds are typically stronger, have less defects and require less amperage. On heavy gauge plate, such as 1/4" and thicker, up to 3 to 5 passes may be required. Additionally beveling of the joint is required for complete joint penetration, even at higher amperages. The thickness rating takes into account the "heat sink" capability of the metal, and the power of the amperage to overcome the conductivity of heat of the metal used using multiple passes. The position of the weld also influences the amperage, cup size, gas flow rate and tungsten size used. For the following recommendations, these are all in "flat" position. Modify your settings accordingly. Vertical will require less amperage the more you weld "up hill".

Amp Range	Metal Thickness Single Pass Weld	Electrode Dia.	Cup Number	Flow Rate (CFH) Standard Lens
10-30A	.010" to .035"	.040 (1.0 mm)	4 or 5	5 to 7
10-70A	.010" to .093"	1/16 (1.6mm)	4, 5, 6	6 to 12
10-140A	.010" to .375"	3/32" (2.4mm)	5,6, 7 or 8	10 to 18

### TIG Cup Size Inside Diameter

TIG Cup Size	Inside Diameter
4	1/4"
5	5/16"
6	3/8"
7	7/16"
8	1/2"
10	5/8"
11	11/16"
12	3/4"

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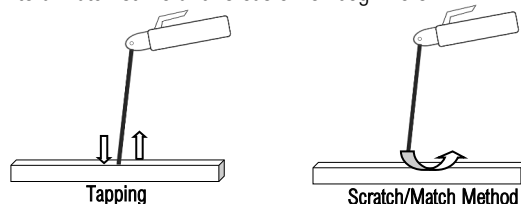
While using the optional foot pedal, or the optional slider switch, the welder's digital display will revert back to the minimum amp setting on the welder after the arc is terminated and it will not display maximum set amps. **(Basically the welder reads the position of the foot pedal when not in use. To recall the setting of the maximum Amperage. Simply touch or press the main Amp control knob. It'll then briefly display maximum Amp setting until no input is sensed and it reverts back to its default state.)** It will only display maximum set amps while the unit is being adjusted for amperage. While welding the display will read actual weld amperage. After 3-4 seconds the display will default back to the minimum amp reading. When using 2T or 4T control modes, the amps will register the maximum set amps before the arc is started. To see the maximum set amperage in the pedal mode without the arc on, simply make a small adjustment in the main adjustment knob. The unit will revert to the "setting" mode and display selected maximum amperage.

#### Welding with Stick.

The most challenging part of learning stick is starting an arc. There are a couple of different starting techniques used and are depicted below. Once the arc is started, simply drag the rod along the metal in a straight line at a 10 to 20 degree drag angle. As mentioned earlier, weaving isn't necessary. Amp selection is more tied to rod diameter than metal thickness, although thickness is a component of it. For best results, take a look at the manufacture's on-box recommendations on Amp range for the rod type and diameter. For best all around performance select a 3/32" E7014.

### 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.



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### Selecting the Proper Tungsten Type for TIG.

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.

### Grinding Tungsten properly for stable arc.

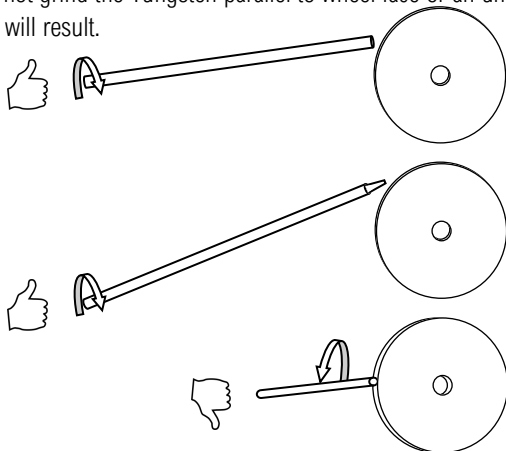
An improperly ground tungsten is a cause of many issues with arc stability, arc directability, and penetration. A bench grinder and a fine stone dedicated only for tungsten sharpening is all you need to put a point on the Tungsten. This is the age old standard. This does take practice to master. However, there are hand held special grinders that feature diamond stones with guided slots, designed to hold the tungsten at the proper angles. . A chemical sharpener is available and is relatively inexpensive, and does an excellent job in seconds. An added bonus of it is that it can be done without getting up from the bench top without removing the tungsten from the cup. The tungsten should be hot before attempting as this activates the chemical.

### WARNING!

Wear safety glasses and leather gloves while grinding tungsten or serious injury may occur. On occasion tungsten may split or shatter.

### How Do I Grind My Tungsten?

- 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 wheel face or an unstable arc will result.



### What Type of Tungsten Do I Use?

Selecting the correct tungsten for your welder is important. While Thoriated 2% Tungsten can be used in an inverter for DC, it is falling out of favor in the industry due to the slight radioactive nature of it, and it does present some issues while welding in AC than other choices. But it is still an industry standard.

#### For welding in DC 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, and its point holding capability is excellent.
- Ceriated 2% (Gray Band or Orange Band, depending upon brand and country of origin). This is a good choice for welding but doesn't hold up as well and starts to erode faster than Lanthanated at higher amperages. But arc starting is excellent.
- Lanthanated 1.5% (Gold Band). Holds up nearly as well as Lanthanated 2%.
- Tri-Mix/Rare Earth (Purple Band or Turquoise Band). Still relatively new. Some swear by it, and 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. 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 composition blend are usually stated to be around .06 to .08%, but can be allowed to vary up or down from .04% to .01%, making the blend prone to inconsistency in quality control.
- Thoriated 2% (Red Band) Still considered the best for DC, works ok for AC, 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.
- 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.

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:

- Always grind in-line with the length of the tungsten. Never make

# Setup Guide

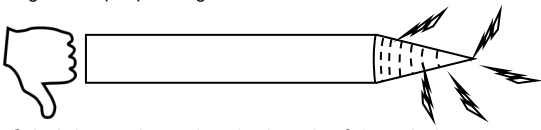
## Getting Started

radial grind (in the direction of the circumference) marks on the tungsten which will cause arc instability. Never grind with the tungsten held parallel to the stone face.

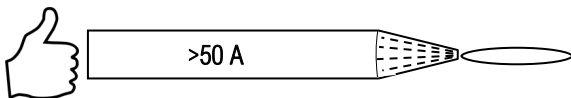
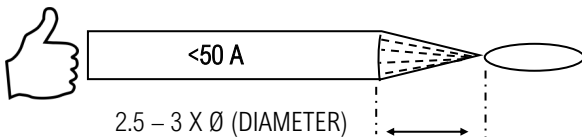
- For most applications, grind a point that is 2 –2.5 times in length than the tungsten is wide. This will create an angle of about 30° to 35°.
- For AC, a more blunt angle may be used (around a 60 degree) for best penetration. However, the 2 to 3 times in length rule will still work for many circumstances.
- For higher amperages, you will want to put a slightly truncated tip on the tungsten.
- Grip the tungsten firmly and slowly rotate it while grinding.

### 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.



### NOTICE.

A tungsten such as a 1/8" diameter or larger may not start as cleanly at the minimum capable start amp of this unit. If arc wander or difficulty establishing a stable arc exists and you need to operate and weld at a much higher amperage, increase the Start Amps to 25 to 30 Amps. A higher start amperage may be selected if needed for more rapid puddle development, but usually is not used with a foot pedal.

### What Size of Tungsten Do I Use?

Everlast advertises low arc start capability on their units. Surge Amperage to establish the arc are quite low. When starting an arc, some brands have a high surge in amperage to start the arc, lasting just a fraction of a second. This surge isn't usually reflected in the display. This surge ensures good arc starting, but can blow through thin materials before the arc is established and welding begins at a lower amperage. Everlast has kept the surge to a minimum. However, when welding with thicker tungsten like 1/8", arc starts may appear "soft" and not forceful enough to start cleanly. For best results, when low amp starts are needed, use a 1/16" or .040" tungsten. Arc starts will be clean and crisp. The adjustable HF point gap can be further adjusted to improve starting with larger diameter tungsten, but simply dropping down a size in tungsten to operate at low amperages is the best solution.

The tip angle and grind preparation will ultimately affect amperage carrying capability of the tungsten. Machine wave form can also affect it. Each type of Tungsten blend will vary in amperage handling capability, but in general, consider the following for selecting your tungsten diameter. The list below is not the absolute maximum range of the tungsten, but recommended range. Absolute range is up to 30% higher. However, 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. In general, for AC and DC operation, consider the following:

- .040" (1mm) 3-30A
- 1/16" (1.6mm) 5-70A
- 3/32" (2.4mm) 10-200A.
- 1/8" (3.2mm) 20-250+A

NOTE: Starter kit does not include .040"(1mm) collets.)

# Setup Guide

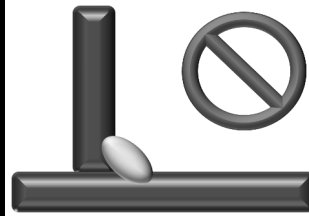
## When Do I Use Multi-Pass Welds ?

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 or filler 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.

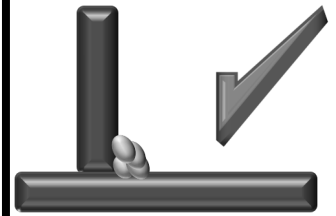
## What Are the Different Kinds of Welds?

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.

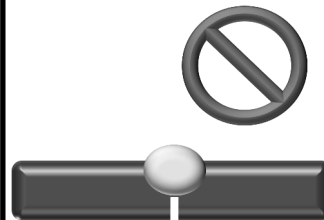
## Weld Pass Examples



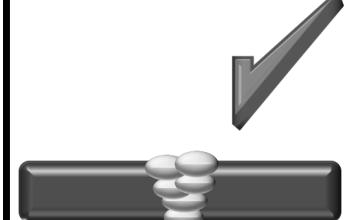
$\geq 1/4"$  Fillet



$\geq 1/4"$  Fillet



$\geq 1/4"$  Butt



$\geq 1/4"$  V

## Joint Preparation

V-GROOVE (60-80°)



DOUBLE V-GROOVE



U-GROOVE



DOUBLE U-GROOVE



BEVEL GROOVE



DOUBLE BEVEL GROOVE



J-GROOVE



DOUBLE J-GROOVE



# Setup Guide

## MIG Recommended Settings

Gas Type/Mode	Wire Size	Metal Thickness	WFS Range	Volt Range
MIG C25	.023"	18 Gauge	251-271 IPM	15.1-17.1 V
MIG C25	.023"	16 Gauge	261-281 IPM	15.5-17.5 V
MIG C25	.030"	18 Gauge	166-186 IPM	15.4-17.4 V
MIG C25	.030"	16 Gauge	175-185 IPM	15.8-17.8 V
MIG C25	.030"	14 Gauge	180-200 IPM	16.0-18.0 V
MIG C25	.030"	1/8"	230-250 IPM	17.7-19.7 V
MIG C25	.035"	18 Gauge	149-169 IPM	15.8-17.8 V
MIG C25	.035"	16 Gauge	165-185 IPM	16.2-18.2 V
MIG C25	.035"	14 Gauge	193-213 IPM	18.3-19.3 V
MIG C25	.035"	1/8"	265-285 IPM	19.2-21.0 V
MIG C25	.035"	3/16"	290-310 IPM	19.8-21.0 V
MIG C100	.023"	18 Gauge	250-270 IPM	16.0-18.0 V
MIG C100	.023"	16 Gauge	290-310 IPM	16.5-18.5 V
MIG C100	.030"	18 Gauge	130-150 IPM	15.4-17.4 V
MIG C100	.030"	16 Gauge	195-215 IPM	16.2-18.2 V
MIG C100	.030"	14 Gauge	210-230 IPM	17.0-19.0 V
MIG C100	.030"	1/8"	250-270 IPM	18.0-20.0 V
MIG C100	.035"	18 Gauge	153-173 IPM	15.8-17.8 V
MIG C100	.035"	16 Gauge	170-190 IPM	17.0-19.0 V
MIG C100	.035"	14 Gauge	194-214 IPM	18.0-20.0 V
MIG C100	.035"	1/8"	220-240 IPM	19.0-21.0 V
Flux-Cored	.030"	18 Gauge	82-102 IPM	14.5-16.5 V
Flux-Cored	.030"	16 Gauge	100-120 IPM	15.2-17.2 V
Flux-Cored	.030"	14 Gauge	157-177 IPM	15.7-17.7 V
Flux-Cored	.030"	1/8" Gauge	340-360 IPM	19.7-21.0 V
Flux-Cored	.035"	18 Gauge	63-83 IPM	14.5-16.5 V
Flux-Cored	.035"	16 Gauge	72-92 IPM	14.5-16.5 V
Flux-Cored	.035"	14 Gauge	123-143 IPM	16.0-18.0 V
Flux-Cored	.035"	1/8"	273-293 IPM	19.9V-21 V
Flux-Cored	.045"	16 Gauge	72-92 IPM	14.5-15.5 V
Flux-Cored	.045"	14 Gauge	76-96 IPM	15.3-17.3 V
Flux-Cored	.045"	1/8"	121-141 IPM	19.0-21.0 V
Flux-Cored	.045"	3/16"	165-185 IPM	19.9-21.0 V
Aluminum	.035"	12 Gauge	370-380 IPM	20.8-21V
Aluminum	.035"	11 Gauge	385-395 IPM	21V

## TIG Recommended Settings

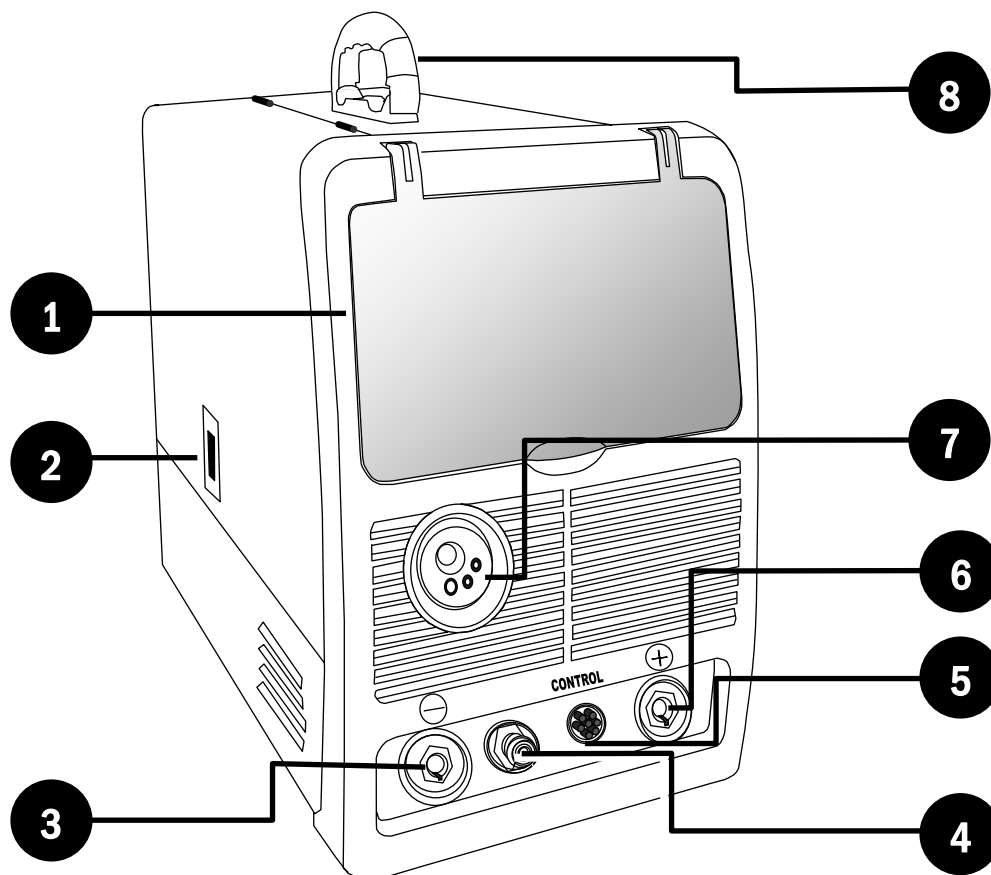
Tungsten Dia	Steel Thickness	Amps	Filler Dia. (ER70S-6)
1/16	24 Gauge	22-26A	.023"
1/16"	22 Gauge	27-33A	.030"
1/16"	20 Gauge	33-37A	.045"
1/16"	18 Gauge	43-48A	.045"
1/16-3/32"	16 Gauge	55-65A	1/16"
3/32"	14 Gauge	65-80A	1/16-3/32"
3/32"	12 Gauge	85-100A	3/32"
3/32"	1/8"	90-120A	3/32"
3/32"	3/16"	135-140A	3/32"

## Stick Recommended Settings

Rod Dia.	Steel Thickness	Amps Range	Rod Type
3/32"	16-1/8"	50-75A	E6011
1/8"	1/8"-3/16"	80A	E6011
1/16"	18-16Gauge	30-50 A	E7014
3/32"	14 Gauge to 1/8"	70-80A	E7014

# Component Identification and Explanation

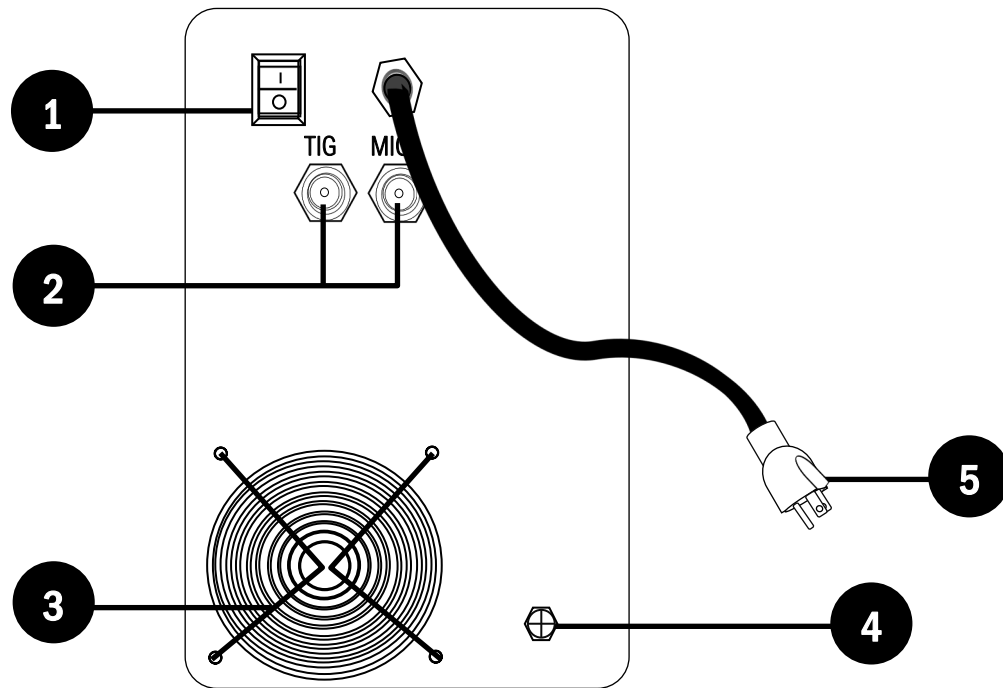
## Front Panel View



Number	Component Identification	Component Note
1	Protective Cover	Keep down and in place during welding activities and in storage.
2	Door and Latch	Keep door closed while in use. Only open for wire replacement and starting
3	Negative Terminal (-) (DINSE 25 Type, 3/8" approximate dia.)	For MIG (GMAW): This is the location of the work clamp For Gasless (self-shielded) Flux-Cored (FCAW): This is the location of the wire feeder lead.
4	Shielding Gas Quick Coupler (9mm B type)	This is used to connect the TIG torch to the shielding gas.
5	7 Pin Control Connector	This connector is the control connector for the Spool Gun. It supplies operating voltage to the drive motor on the gun.
6	Positive Terminal (+) (DINSE 25 Type, 3/8" approximate dia.)	For MIG (GMAW): This is the location of the wire feeder lead. For Gasless (self-shielded) Flux-Cored (FCAW): This is the location of the work clamp.
7	Euro Quick Connector	Standard Type MIG Gun Connection.
8	Handle	

# Component Identification and Explanation

## Rear Panel View



Number	Component Identification	Component Note
1	Power Switch	This is used to switch the unit on and off.
2	TIG and MIG Shielding Gas Connection (5/8" CGA)	5/8" CGA Fitting is used in North American Markets. Other markets may use a hose barb connection.
3	Fan location	Periodically check for proper fan function and cleanliness.
4	HF Ground Service Bolt**	For use in a combined effort to mitigate any electrical interference that may be caused by this unit.
5	Power Cord and NEMA 5-15P (12 Gauge, 6 ft.)	This plug and cable is correctly sized for the rated amps, duty cycle and length of the cable. Consult Article 630 of the NEC for more connection and wiring details.



# Component Identification and Explanation

## The Control Panel Layout and Use



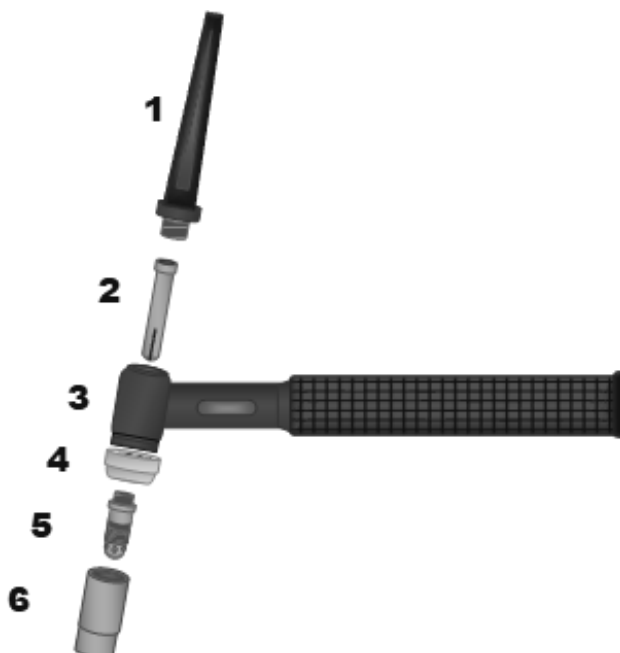
Number	Component Identification	Component Note
1	Remote/Trigger	This is used to set the function of the trigger. MIG/TIG 2T: Press and Hold, 4T Press, hold and release to start the arc/Press and release to terminate the arc. Pedal is used with TIG to vary Amperage within range (up and down) Spool is used with MIG only.
2	Volt Display	The Voltage Display displays voltage for MIG, TIG and Stick. While welding it displays dynamically, to read actual output of the machine. In MIG mode the voltage can be adjusted. In TIG and Stick, since they are constant current machines, voltage is not able to be adjusted on the machine. The voltage reflected in TIG and Stick mode is OCV.
3	Volt Adjustment Knob	This is only used in MIG/Flux-Cored/Spool Gun modes. In Stick and TIG, this knob has no function.
4	Amp Adjustment Knob	This is used to adjust weld Amperage in TIG and Stick. In MIG/Flux Cored/Aluminum modes the knob adjusts wire feed speed in Inches Per Minute.
5	IPM/Amp Display	This display reads in Inches per minute while it is being adjusted in MIG mode. In TIG and Stick modes this display reflects Amps being adjusted. In MIG, TIG and Stick modes, while welding it changes and reads actual Amps output.
6	TIG Start Type	This is used to select the type of TIG start, whether Lift with Remote, Live lift (always on) and HF Start. It is only used for TIG and becomes inactive while in other modes.
7	Process Selector	Choose between MIG, TIG and Stick Processes.
8	Warning/On Indicators	The green "power button" LED should be lit while the machine is on. The temperature symbol will light up in the event of a duty cycle event (machine runs too long or hot) and interrupt the welding output. Allow to cool for 15 minutes. If the light does not go out automatically, turn the machine off and restart it. If it does not clear, call Everlast Tech Support at number found in this manual. The lightning bolt symbol indicates an over current and will also interrupt welding output. If this occurs, turn the machine off, examine/remedy cause and turn back on. If overcurrent does not clear upon restart, call Everlast Tech Support at the number found in this manual.
9	Auto Pre/Post Flow Selector	This turns the Auto Pre/Post Flow feature on and off.

# Innotec Series 15AK Torch



# Component Identification and Explanation

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



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](http://www.everlastwelders.com).

#	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"	NVA10N32	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

## Error Codes

TROUBLE CODE WITH WARNING LIGHT/UNIT STOPS WELDING BUT IS TURNED ON.	DIAGNOSIS
01	OVER TEMPERATURE/ DUTY CYCLE EXCEEDED. Allow unit to rest for 15 minutes. Check for obstacles, clean welder, and heat sinks. Make sure unit is unplugged for 30 minutes before opening
02	OVER CURRENT. Check to make sure input power cable is correct length and size. Internal unit fault or low input voltage. Possible issue running on generator with dirty power. Identify cause, plug directly into the receptacle. Cycle the switch one time. If the code does not clear, call Everlast
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 and the fan does not work.	Fan damaged. Fan connector plus is loose	Replace. Check. Reinstall.
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 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 gas nozzle size. Clean metal thoroughly with approved metal cleaner, or use acetone and a rag to clean metal.
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.	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.
7.	Unstable Arc. Spatter.	Bad work clamp connection. Metal is indirectly connected through table or other item. Incorrect settings	Change Work Clamp. Use a direct connection to the part being welded. Check and adjust settings. Spatter usually increases when smaller wires are at the maximum welding capacity.
8.	Continuous Overheating	Settings too high. Too large of wire for job. Unit has 25% duty cycle at an output of 180A.	Reduce Settings, use smaller wire
		Fan not running.	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.
	Tungsten is Rapidly consumed	Wrong Polarity. No gas. Wrong gas. Bad gas. Draft. Wrong Tungsten	Check Gas. Check for Drafts. Move welder away from work area. Make sure correct gas is connected at rear. Use Blue 2% Lanthanated Tungsten.
9.	Other.		Contact Everlast.

