Pro Pulse™ 300

Owner's Manual

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Forward

Thank you for purchasing an HTP® Pro Pulse™ 300—our advanced, full synergic, multi-process welder. Our feature-rich, high-quality, and versatile Pro Pulse 300 includes a pulse option in every welding process the machine offers; welding processes offered by the Pro Pulse 300 include: SMAW (Stick), SMAW-P (pulsed Stick), GTAW (TIG), GTAW -P (pulsed TIG), GMAW (MIG), and GMAW-P (pulsed MIG). In MIG mode, every pulse program, in every alloy and every wire diameter, automatically includes options for standard double pulse and manual adjustable double pulse! These features give you 100% control over the bead appearance and heat input at any given time.

The Pro Pulse 300 also offers the ability to run on single- or 3-phase power from 200V to 575V. Due to the extensive list of accessories available for the Pro Pulse 300, the Pro Pulse 300 manual only describes the power source's features and capabilities; you can find more in-depth information on the use of accessories in their respective manuals (e.g., spool gun, push-pull gun, TIG setup, or advanced MIG setup, etc.).

Please refer to the following list for accessories currently available for the Pro Pulse 300:

- 10', 12', and 15' air-cooled MIG welding guns for steel, stainless steel, silicon bronze, and flux-cored wires.
- 8', 10', and 12' air-cooled MIG welding guns for aluminum wire.
- 10' water-cooled MIG welding gun for aluminum wire.
- Air-cooled and/or water-cooled specialty MIG welding guns for specialty applications and severe conditions (available by special order).
- 19' to 39' air-cooled and/or water-cooled push-pull guns (we stock a 26' water-cooled push-pull gun with built-in remote control; all other options available by special order).
- 25' air-cooled spool guns (optional 50' air-cooled and 25' water-cooled spool guns available by special order).
- 12' and 25' air– and water-cooled TIG welding torches.
- 250A Stick welding electrode holder.
- Smart water-cooler that controls the welding machine (if the cooler detects an issue, the cooler turns the welding output off to protect your equipment).
- Classic water-coolers with audible and visual flow alarms.
- Carts, flow meters, heavy-duty ground clamps, power plugs, etc.

In order for you to get the most out of your Pro Pulse 300, please work with HTP America, Inc. so we can help you customize your Pro Pulse 300 package for your specific welding application(s)—communication is essential for us to understand your needs and wants, as well as the task(s) you expect the Pro Pulse 300 to perform. For example, a customer who builds aluminum trailers in a shop all day, and a customer who repairs those same trailers in the field all day, most likely need the machine set up differently. If you then add assorted materials, material thicknesses, and multiple welding processes into the mix, your package necessities become even more complicated.

The Pro Pulse 300 produces high-quality, virtually spatter-free welds on all common metals when you use the correct gas and consumables for your welding application. By following the instructions closely, you can achieve success when welding with the Pro Pulse 300, even when welding aluminum where the margin of error is very small. When welding aluminum, almost everything must work out just right in order to achieve good results; without everything working out just right, failure is likely. This does not mean that a novice welder will not be able to perform aluminum welds successfully with the Pro Pulse 300. No matter your skill level, your chances of success dramatically increase with the more knowledge you have about the welding process you plan to perform and the operation of the Pro Pulse 300. HTP provides the Pro Pulse 300 manual and a few videos, along with classes at our Elk Grove Village, IL facility or on-site at your facility, to familiarize you with, and help you weld successfully with, the Pro Pulse 300.

Customers interested in the Pro Pulse 300 often ask us the following questions: *If I buy the Pro Pulse 300, will I be able to weld aluminum right out of the box?* and *Why do some customers find welding with the Pro Pulse 300 difficult? Why do some customers, including customers with decades of regular MIG welding experience, struggle when welding with the Pro Pulse 300 even after reading the entire manual twice and watching several videos?* First, the majority of our customers successfully weld aluminum with the Pro Pulse 300 within hours, not days. Second, experienced welders struggle when welding with the Pro Pulse 300 for multiple reasons, including the following:

⇒ *Muscle Memory.* Operators who typically MIG weld steel are accustomed to the frying bacon sound the machine makes when welding and accustomed to holding the gun close to the work piece. Operators may be thrown off by the sound the Pro Pulse 300 makes when welding, and muscle memory causes the operator to keep the gun too close to the work piece when welding aluminum, which requires a 3/4" to 1" stick-out.

⇒ *Old Habits and Frugalness.* For aluminum welding (all spray arc transfer and pulse welding applications), your gas flow rate must be significantly higher than for classic MIG welding (steel). Flow rates, in fact, must be set upwards of 35 CFH and often as high as 50 CFH. We also see operators running economy Asian import wire or random wound wire. For aluminum welding, where everything must be just right, a bad roll of wire can make a bad day in aluminum welding. We recommend using HTP brand wire (made in North America) or Alcotec brand wire (Made in the U.S.A.). We found that the HTP and Alcotec brand wires work best with the Pro Pulse 300. Spool size matters as well when welding aluminum; 8" and 12" spools work great and 4" spools do not work at all—the cast is too tight, and 4" spools are actually designed for spool gun use, NOT for regular MIG welding or push-pull gun use.

⇒ *Unrealistic Expectations.* No matter what, MIG welds will never look identical to TIG welds. Although, with manual adjustable double pulse, and when the settings on your machine and the movements of your hand are in perfect harmony, your MIG welds can look very similar to your TIG welds.

Also, when everything works right, welding aluminum is a lot like welding steel, though there are a few differences—from gas, to the torch and the torch angle, to the consumables and consumable use. When welding aluminum, even a skilled welder may go through a few contact tips before finishing a roll of wire; unlike when welding steel, where some operators can weld an entire 12" spool of wire, or more, through one tip. Aluminum, due to the nature of aluminum, requires more contact tips. As a novice welder, you may go through five to ten contact tips in the first few hours, or first day, of welding with the Pro Pulse 300. Typically, air-cooled MIG welding guns expend a good deal of consumable life in high amperage welding applications. Also air-cooled MIG welding guns typically use more consumables than water-cooled MIG welding guns.

Birds nesting is not much of an issue with the Pro Pulse 300. However, burn back may occur and must be addressed immediately—failure to do so will result in EXCESSIVE tip usage! When a burn back occurs, the damaged tip becomes useless and must be replaced. Furthermore, if you experience burn back, run about 10' of wire through your MIG gun to discard any wire damaged by slipping in the drive roll (an effect of burn back into the contact tip).

⇒ *Material Thickness Ratings Displayed in the Machine.* We designed this feature to give you an idea about settings (wire speed and voltage). The ratings displayed, generally speaking, are designed for straight line, push or pull (depending on the application) welds made at a rather fast travel speed (to reduce heat input into and distortion of the material you are welding on) and without any gun manipulation (no weaving, swirly motion, etc.). However, depending on the joint configuration (butt, lap, or T-joint) and on the welding position (flat, horizontal, vertical up or down, and overhead), you need to adjust the synergic setting accordingly.

Now, with a better understanding of what you will experience when welding with the Pro Pulse 300, enjoy finding out all of the details by reading the rest of the manual and watching the videos.

If you already read through the entire manual once, and you simply want to locate essential information quickly, please look for our ***Pro Tips: in bold, italicized, blue print***.

Manufacturer's Warranty

It is expressly agreed that there are no warranties, expressed or implied, made by either the Salesman, Dealer, or HTP America, Inc. on products or parts furnished hereunder, except the Manufacturer's Warranty against defects in materials or workmanship as follows:

HTP America, Inc. warrants each new welding machine to be free from defects in materials and workmanship under normal use and service for Three (**3**) Years after delivery to the original purchaser. HTP America, Inc. will repair and replace, at its factory, any part or parts thereof. Products should be returned to HTP America, Inc., with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been thus defective. This warranty being in lieu of all other warranties, expressed or implied, and all other obligations or liability on its part, and it neither assumes nor authorizes any person to assume for it any liability in connection with the sale of its machines.

This warranty shall not apply to any welding machine which has been repaired or altered by unauthorized service departments in any was so as, in the judgment of HTP America, Inc., to affect its stability and reliability, nor which has been subjected to misuse, negligence, or accident.

HTP America, Inc. shall not be liable in any event, unless HTP America, Inc. receives notice of alleged breach of warranty, actual or constructed, specifying the claimed defect within not more than Thirty (**30**) Days after discovery.

HTP America, Inc. has reserved the right to make changes in design or add any improvements to its products, at any time, without incurring any obligation to install the same on equipment.

This warranty is void unless the warranty card is sent to HTP America, Inc. within Fifteen (**15**) Business Days from the date of purchase.

Exclusions to Warranty:

1) MIG welding guns and TIG welding torches are warranted for a period of Ninety (**90**) Days against defects in material and workmanship.
2) Contact tips, tip holders, gas diffusers, gas nozzles, liners, tungsten, collet bodies, collets, gas lenses, and back caps are consumable items, WHICH CARRY NO WARRANTY.
3) This warranty is to the original purchaser only. The warranty can be transferred to another owner, with HTP's approval, for a warranty transfer fee. HTP America, Inc. must be notified within Fourteen (**14**) Days of the sale and must be provided with the contact information of the original owner, the contact information of the new owner, and the serial number of the machine.

Safety Suggestions

It is forbidden for people with **PACEMAKERS** to use of come near the machine.

Electric arc welding produces ultra-violet rays, which are harmful to skin and eyes. Ultra-violet radiation can penetrate lightweight clothing, reflect from light colored surfaces, and burn the skin and eyes.

- Wear a heavy, pocket-less, long-sleeved shirt, cuff-less trousers, and high-topped work shoes or boots.
- Wear a full-faced welding helmet with a number ten or darker lens and a cap.

Electric arc welding produces flying sparks and hot material, which can cause fire.

- To avoid fire, do not weld on wood, plastic tile, or carpeted floors. Concrete or masonry floors are safest.
- Do not weld on pressurized containers.
- Do not weld on drums, barrels, tanks, or other containers until they have been cleared and cleaned as described in AWS Standard A6.01.
- Do not wear flammable materials.
- Wear non-oily/non-greasy, flameproof welding gloves; the oil or grease on the gloves may ignite.
- Avoid having any type of fuel, such as cigarette lighters or matches, on your person as you weld.
- Ensure that there is a fire extinguisher in the welding area.

Noise can damage your hearing. Protect yourself suitably to avoid hearing damage.

The welding arc can cause burns. Keep the tip of the welding gun/torch far from your body and far from other persons.

Electric arc welding produces toxic fumes.

- Provide adequate ventilation in the welding area at all times.
- Do not weld on galvanized zinc, cadmium, or lead beryllium materials unless you are POSITIVE that sufficient ventilation is provided. These materials produce toxic fumes.
- Do not weld in areas close to degreasing or spraying operations. Chlorinated hydrocarbon vapors may react with the ultra-violet rays and form highly toxic phosphate gas.
- If you develop momentary eye, nose, or throat irritation when welding, stop welding immediately. This is an indication that ventilation is not adequate. Do not continue to weld until ventilation is improved.

ELECTRIC SHOCK CAN KILL.

Exposed, electrically hot conductors, other bare metal in the welding circuit, or ungrounded, electrically hot equipment can fatally shock a person whose body becomes a conductor. Do not stand, sit, lie, lean on, or touch wet surfaces when welding.

- Disconnect the power supply before working on the welding machine.
- Do not weld with deteriorated or damaged cables.
- Frequently inspect cables for wear, cracks, or damage. Replace those with excessively worn insulation to avoid a possible lethal shock from bared cable.
- Do not touch bare electrical parts.
- Ensure that all of the panels covering the welding machine are firmly secured in place when the machine is connected to the power supply.
- Insulate yourself from the workbench and from the floor (ground); use insulating footwear and gloves.
- Keep gloves, footwear, clothes, the work area, and the welding equipment clean and dry.
- Check the machine and power cable frequently; the power cable must be free from damage to the insulation. BARE CABLES ARE DANGEROUS. Do not use the machine if the power cable is damaged; a damaged power cable must be replaced immediately.
- If it is necessary to open the machine, first disconnect the power supply. Wait Five (**5**) Minutes to allow the capacitors to discharge. Failure to take this precaution may expose you to the dangerous risk of electric shock.

For more information, refer to the following standards and comply as applicable.

1) ANSI Standard Z49.1 SAFETY IN WELDING AND CUTTING, obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
2) ANSI Standard Z87.1 SAFE PRACTICE FOR OCCUPATIONAL AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from the America National Standards Institute, 1430 Broadway, New York, NY 10018.
3) AWS Standard A6.0 WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable from the American Welding Society, 2051 NW 7th St., Miami, FL 33125.
4) NFPA Standard 51 OXYGEN-FUEL GAS SYSTEMS FOR WELDING AND CUTTING, obtainable from the National Fire Protection Association, 470 Atlantic Ave., Boston, MA 02210.
5) NFPA Standard 51B CUTTING AND WELDING PROCESSES, obtainable from the National Fire Protection Association, 470 Atlantic Ave., Boston, MA 02210.

CA Prop 65—*For Residents of California*

Warning: Welding and cutting equipment, accessories, and fumes can expose you to chemicals, including Chromium (Hexavalent Compounds), Lead, and Nickel, which are known to the State of California to cause cancer and/or birth defects or other reproductive harm.

For more information, please visit www.P65Warnings.ca.gov.

Fig. 1

Pro Pulse 300 Specifications	
Maximum Output Amperage	MIG: 320 TIG/Stick: 300
Minimum Output Amperage	MIG: 12 TIG/Stick: 4
Maximum Recommended Thickness *Single pass capacity varies depending on the material being welded and the settings of the machine.	Up to 5/8”
Duty-Cycle	40% @ 300A (77º F) 100% @ 220A (77º F) 35% @ 300A (104º F) 60% @ 250A (104º F) 100% @ 200A (104º F)
Arc Voltage	13-35 (MIG +/-8)
Open Circuit Voltage	79
Electronic Overload Protection	Yes
Cooling (On-demand, electric fan, variable speed)	Air, Dual Fan
Wire Spool Capacity *Up to a 44 Lb. weight capacity.	8” & 12”
Wire Diameter *Depends on the material being welded (not all wire can be welded in all sizes.	.023” to .045”
Input Voltage	Single Phase: 208 to 240v 3-Phase: 200-575v
Input Amperage (@ max output)	Single Phase: 51 3-Phase, 240v: 31 3-Phase, 480v: 15
Frequency	50/60 Hz
Wire Feed Rate (In./Min.)	55 to 787
Size (Length x Width x Height)	26-3/4” x 12” x 17-1/4”
Weight *Without wire and cables.	95 Lbs.

	4 A /20,16 V				300 A / 32 V
	⎓	X	35%	60%	100%
S	U_0 V	I_2	300 A	250 A	200 A
	65	U_2	32V	30V	28 V

	4 A /10,16 V				300 A / 22 V
	⎓	X	35%	60%	100%
S	U_0 V	I_2	300 A	250 A	200 A
	65	U_2	22 V	20 V	18 V

	15 A /14,75 V				300 A / 29 V
	⎓	X	35%	60%	100%
S	U_0 V	I_2	300 A	250 A	200 A
	79	U_2	29 V	26,5 V	24 V

	U_1	230 400 460 500	V	I_{1MAX}	32,5 18,0 15,6 14,8	A	I_{1EFF}	19,2 10,6 9,2 8,8	A

	U_1	230	V	I_{1MAX}	52,9	A	I_{1EFF}	31,3	A

IP 23			Made in Italy

Front Panel Connections

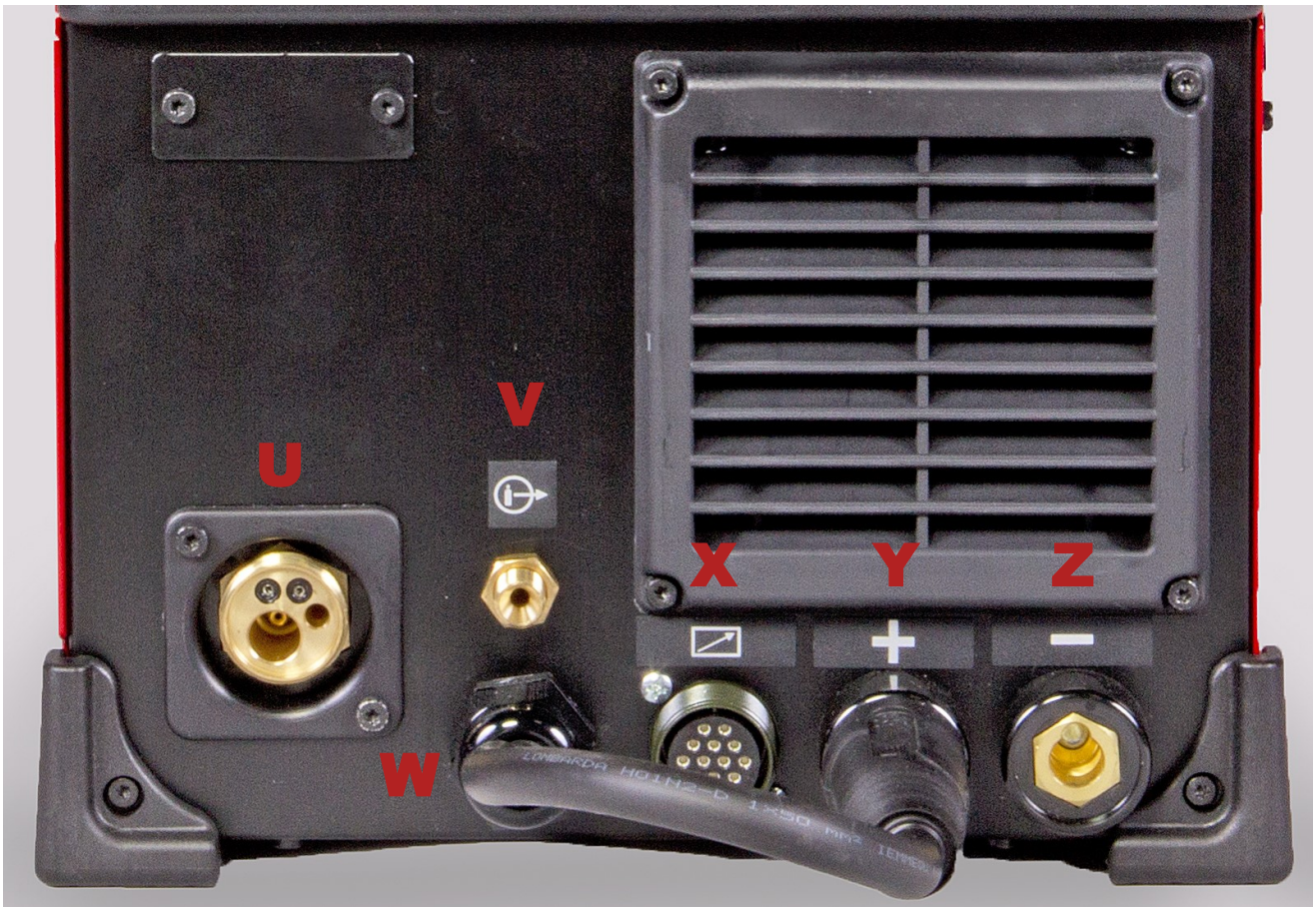


Fig. 2

Pos.	Type	Description
U	Euro Connector	Connects MIG welding guns and push-pull guns to the machine. The Euro Connector includes a trigger connection as well as a gas connection. The wire from the internal wire feed unit also feeds through the Euro Connector.
V	Gas Outlet	Shielding Gas Outlet for TIG welding torches and spool guns.
W	Polarity Cable	Supplies the welding current to the Euro Connector (**Pos. U**). For the correct polarity, plug the Polarity Cable into the matching Dinse Receptacle (**Pos. Y** for Electrode Positive, and **Pos. Z** for Electrode Negative).
X	Remote Control & Accessory Receptacle	Designed to accept foot pedals and hand controls (rotary or slider). Also powers optional spool or push-pull guns.
Y & Z	Female Dinse Receptacles	For welding current; **Pos. Y** for Electrode Positive and **Pos. Z** for Electrode Negative; used to power MIG welding guns, push-pull guns, spool guns, TIG welding torches, stick welding electrode holders, and ground cables.

Back Panel Connections

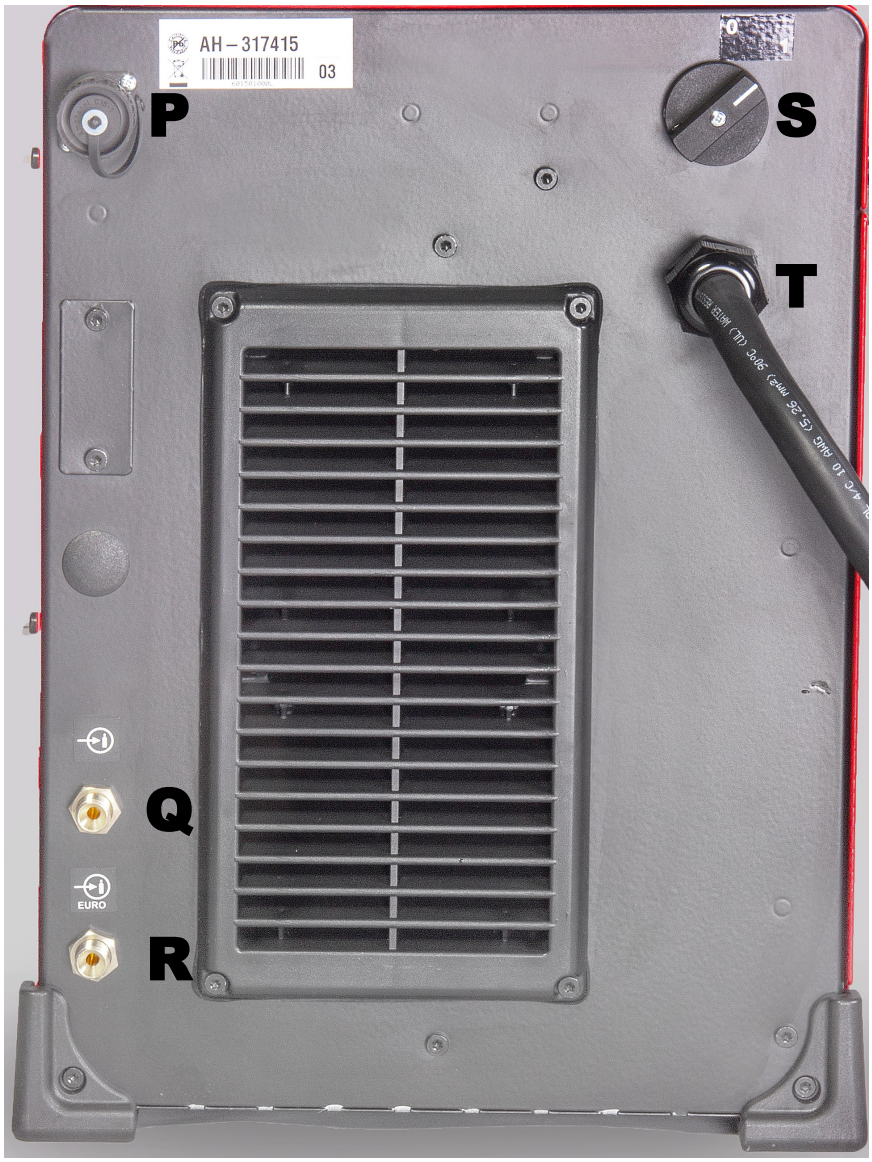


Fig. 3

Pos.	Description
P	Port for the Smart Water-Cooler
Q	Port for TIG and Spool Gun Shielding Gas
R	Port for MIG and Push-Pull Gun Shielding Gas
S	Power Switch
T	Input Power Cable

Electrical Connection

Your Pro Pulse 300 operates on single-phase, 230 volt power (208-240 volt). The machine draws 51 amps out of the wall when operating at a welding output of 300 amps. If you run the Pro Pulse 300 on single-phase power, please carefully follow the steps below:

1) Plug the machine into the power receptacle (**Fig. 3, Pos. T**; you will need to install a plug on the power cable).
2) Turn the machine on (**Fig. 3, Pos. S**).
3) Wait 10 to 15 seconds before pressing any buttons or striking an arc.
4) Select your process and settings, and then begin welding.

The Pro Pulse 300 automatically recognizes whether you plug into single- or 3-phase power, as well as the voltage you plug into. The machine requires a 10-15 second wait time, as outlined in Step 3 above, to make internal adjustments to the power supply. **FAILURE TO WAIT 10-15 SECONDS WILL RENDER THE MACHINE TEMPORARILY UNUSABLE, and a wait time from 10 minutes up to one hour will be required to reset the machine.**

The Pro Pulse 300's input power cable (**Fig. 3, Pos. T**) contains four wires—one ground wire and three hot wires. You can easily identify the ground wire thanks to color-coding (either green or green/yellow striped). The machine does not require a common or neutral wire. If one of the three hot, non-ground wires, is white, connect the wire to a hot leg. (Although, connecting the third hot wire is not necessary for single-phase operation.)

Alternatively, you can run the Pro Pulse 300 on 3-phase power from 200 to 575 volts; the power draw on 240 volt, 3-phase power is 31 amps and 15 amps on 480 volt, 3-phase power. If you are planning to use your Pro Pulse 300 on a generator, you may connect the machine to a single– or 3-phase power generator. Due to the design of the inverter, the Pro Pulse 300 operates on most generators; however, the Pro Pulse 300 is not compatible with all generators. A Hertz rating very close to 50 or 60Hz is necessary for proper operation on a generator; noise levels are critical to ensuring proper operation on a generator. If your generator does NOT meet the requirements, you, most likely, will not be able to run the Pro Pulse 300 off the generator. However, thanks to sophisticated protective electronics in the Pro Pulse 300, plugging the machine into a non-suitable generator should not result in damage. In order to run the Pro Pulse 300 on a generator, it needs to be a generator with a minimum of 12000 watts (12000 watts must be the "continuous rating" or "running-watts rating" of the generator, NOT the "peak rating" or "starting-watts rating" of the generator).

The Pro Pulse 300 is a synergic welding machine.

The key feature of a synergic welding machine is the ease of set up. In the past, you needed charts from wire manufacturers to determine wire speed and voltage, as well as CTWD (contact tip to work distance) of different welding applications, which ultimately determined the arc length and also indicated which shielding gas to use. With the Pro Pulse 300, this information is preprogrammed, readily available, and displayed to you. The Pro Pulse 300 features an LCD that allows you to select a synergic program for a specific wire, such as steel, aluminum, stainless steel, silicon bronze, etc. Once you select a program, the machine tells you which gas to use and then allows you to select the thickness of the material being welding. After selecting the synergic program and the material thickness, the machine automatically sets the correct wire feed speed (in inches per minute, or IPM) and the matching voltage to achieve the best welding results. Of course, since you will encounter atypical situations, especially during repairs on used or dirty material, the Pro Pulse 300 gives you the option to adjust the weld either colder or hotter by reducing or increasing the voltage.

The Pro Pulse 300 also offers, just like its little brother the Pro Pulse 200, ST-arc (Short Transfer Arc). The ST-arc function reads welding parameters back to the welding machine live (while welding). The function monitors the arc length and keeps the arc length constant, while allowing the stick-out (CTWD) to vary. ST-arc, essentially, allows the new welder to focus on the location of the weld, as well as the travel speed, and also allows the experienced welder to keep a perfectly uniform weld bead, along with uniform low heat input, which enables the welder to achieve good welds in tight corners—a feat that couldn't be reached previously with conventional welding equipment.

What is pulsed process MIG welding?

For an in-depth explanation of pulsed process MIG welding, please consult the **Glossary** on **Page 34**.

Front Panel Controls

Fig. 4

A (Select Mode Button)—Allows you to access different welding modes by pressing repeatedly.

B, C, D, E (Setup and Selection Buttons)—The function of these buttons differs depending on which mode the machine is in and what setup screen the machine is on. The function of the individual button is shown in the display right above each button.

F (Left Encoder)—Turning the left encoder in manual mode adjusts the wire feed speed, while turning the left encoder in all synergic and pulse programs adjusts the material thickness, wire feed speed, amperage, and voltage. (This can also be done while welding).

G (Right Encoder)—Turning the right encoder in manual mode sets the voltage, while turning the right encoder in all synergic and pulse programs adjusts the voltage of the synergic curve but does not set an absolute arc voltage as it does in manual mode. (This can also be done by welding). If the machine is in a setup menu screen, you may use the right encoder to scroll through lists and make adjustments as necessary.

How to Weld (Express)

1) Press and release button **A** (Select Mode) as often as required to set the desired mode (MIG 2T is probably the most popular.
2) Press and release button **B** once to enter program selection. Use right encoder **G** to scroll through the program list and find the program you need. Push and release button **C** to select the program, and use left encoder **F** to set the desired material thickness. **Note:** If you press button **B** twice within a short period of time, the machine will go into manual mode. In manual mode, simply use left encoder **F** to set the wire feed speed and right encoder **G** to set the arc voltage.
3) Pull the trigger and weld.

The Programs—Overview

The Pro Pulse 300 offers 32 synergic programs, both with and without pulse, as well as a manual mode. The manual mode operates just like a classic MIG machine with wire speed adjustment in IPM, from 55 to 709, and voltage adjustment, from 13.0 to 35.0. Manual mode can be used for wire types not included in the synergic programs list (e.g., cast iron wire). Please obtain the correct wire speed, voltage, and CTWD settings from your wire distributor or manufacturer.

The synergic, non-pulse programs sound very similar to classic MIG welding. These programs offer inductance adjustments, which makes the arc crisp or soft. The ability to change arc characteristics is a desired feature, and these features are not offered on classic transformer-based machines. The pulse programs are also synergic, but they sound different than classic MIG welding; the sound when pulse welding changes based on the material thickness (wire feed speed). These programs offer a slop down function, which can be used to fill craters at the end of aluminum welds.

Both pulse and non-pulse programs offer adjustments in start-speed (wire run-in), speed and duration, as well as burn back and pinch. The start-speed feature offers the ability to set a crisp arc ignition without a "machine gun" start. Burn back determines how long the wire sticks out of the contact tip when you complete a weld; the lower the burn back number, the longer the stick out **(ATTENTION: High numbers can cause the wire to burn back into the contact tip, which destroys the contact tip)**. Pinch refers to the shape of the wire; when MIG welding (classic), a ball usually forms at the end of the wire upon completion of the weld. Then, you typically trim off the ball with a pair of pliers. However, the Pro Pulse 300 can trim off the ball for you electrically by setting the pinch. The higher the pinch number, the more the wire gets trimmed electrically **(ATTENTION: The number required will change based on the type and the diameter of the wire used. Also, numbers higher than 75 can cause burn back into the contact tip, which destroys the contact tip, when welding with aluminum)**.

Regardless of whether you run a synergic or a pulsed program, you can also adjust the pre- and post-flow gas. Pre-flow ensures shielding gas is already in place when you strike an arc, which minimizes or eliminates porosity, discoloration, and/or peppering. Post-flow shields hot, glowing wire from contamination through ambient air and also protects the weld (as long as you keep the torch in place for the post-flow duration after you complete the weld). This function is extremely helpful when welding stainless steel and aluminum.

Welding Aluminum with the Pro Pulse 300 *(Hot Start and Crater Fill Functions Explained)*

The Pro Pulse 300 offers several different programs for welding aluminum. All of the programs are designed to get the best results using 100% Argon gas. Helium mixtures are NOT recommended. Welding aluminum requires the use of a U-shaped drive roll, and the tension of the wire feed unit must be properly adjusted. Aluminum wire requires very little tension. A setting just at, or even much less than, 1 will be absolutely sufficient. If you select a higher tension, wire feed issues, such as deformation of the wire, wire getting stuck in the contact tip, burn backs, and birds nesting, will arise. Aluminum shavings will also be deposited in and clog the liner; you will then need to replace the liner.

The use of CuCrZr contact tips is strongly recommended when welding aluminum with a water-cooled MIG welding gun and ABSOLUTELY necessary when welding aluminum with an air-cooled MIG welding gun, a push-pull gun, or a spool gun. The contact tips used can be size-on-size when welding at a low amperage with low duty-cycle, but needs to be .005" larger than normal (e.g., .040" tips for .035" wire) when welding at a high amperage. Regular copper tips are not designed to withstand the extreme heat of pulsed spray arc aluminum MIG welding.

Aluminum wire should be fed through a designated gun if cross-contamination is a concern. Generally speaking, 5356 and 5554 alloy aluminum wire, due to their stiffer nature, feed better than 4043 alloy aluminum wire, but large diameter wire also feeds better than small diameter wire. A graphite liner is highly recommended for all aluminum welding applications. If a graphite liner is unavailable, a nylon or Teflon liner can be used in place of a graphite liner; however, you must expect reduced or severely reduced performance when not using a graphite liner. Given all of these variables, we offer 8', 10', and 12' MIG welding guns with graphite liners.

Flush tips or slightly recessed tips (tip holders) can be used for aluminum welding or stainless steel welding. To improve shielding gas coverage, we suggest the use of a cylindrical nozzle.

Please see the instructions that came with your aluminum wire for shielding gas flow rates and CTWD. A good gas flow rate starting point for welding aluminum is about 40-50 CFH, but ultimately depends on wire diameter, nozzle shape, nozzle size, etc. A good CTWD starting point for welding aluminum is about 3/4" to 1". The pinch function needs to be set no higher than 75 to prevent burn backs. ***Pro Tip: We suggest starting out at 25 and then work your way up in increments of five or ten until the ball at the end of the wire is cut off when you stop welding.*** More pinch than that is not necessary. The harder the wire and the larger the diameter of the wire, the more pinch you will need. Pinch for steel wire is usually set at 100. To fill the crater at the end of the weld, slope down (t2) time may be set (a slope down time between 2.5 and 4 seconds should suffice, but again, this number depends on the material thickness and the type of filler wire used).

Everybody knows that aluminum is supposed to be preheated before welding. However, there are a few situations in which preheating the material is not possible, practical, or safe. If you choose to not preheat the part(s) that you are welding, for whatever reason, there is a hot start function built into the Pro Pulse 300 that will reduce the effects of starting an aluminum MIG weld on a cold part.

Hot Start and Crater Fill in MIG 2T

The hot start function boosts the welding current by approximately 30% above the selected settings. As the chosen settings reach 300 amps, the hot start setting tapers automatically because the machine is only capable of putting out a maximum of 320 amps in MIG welding mode. The MIG 2T hot start function is a time-controlled application, and the same hot start time occurs every time you pull the trigger when hot start is set. To select a hot start time from 0.2 to 4 seconds in the MIG 2T start menu, please follow the instructions below:

1) Set the start speed between 90% and 100% and the start time to 0.1 seconds for **NO** hot start. These settings still give you 0.2 seconds of hot start time. In reality, however, this is the amount of time it takes to ignite the arc so you will not notice any effects of hot start.
2) Set the start time to 2 seconds to get 4 seconds of hot start time. During the first 2 seconds, you will get 30% hot start. During the following 2 seconds (seconds 3 and 4), you will get hot start tapering down from +30% to the selected welding current.

You can activate the crater fill function through the t2 slope down setting. When you release the trigger with t2 slop down set, the machine continues to weld (wire keeps coming out) for the amount of time you selected in the t2 setting. For example, when you set slope down to 4 seconds, the wire continues to feed out of the gun while the settings automatically lower (slope down) to fill the end crater. Depending on the alloy of the wire used, 5000 series wire works better than 4000 series wire, along with the material thickness and temperature, the slope down time may need to be adjusted.

Hot Start and Crater Fill in MIG 4T

In MIG 4T, you can set hot start from 10% to 90% over the selected settings. Another available feature is the base (final) current function that you can select for better crater fill. The base current is a percentage of the welding current that you choose. The welding current results from the wire speed and the voltage (material thickness) selected (the welding amperage shown in the display is an estimation, which varies slightly by the distance of the MIG gun to the work surface and the shielding gas flow rate). Nevertheless, the base current is a percentage of that amperage. This does not mean, however, that the base current is a percentage of the wire speed or the voltage, but a percentage of the estimated amperage.

To activate hot start and slope down in MIG 4T, please follow the instructions below (you fully control, with no time limit, hot-start and base current through trigger motion in MIG 4T):

1) Pull and hold the trigger; the selected percentage of hot start is activated.
2) Release the trigger; the selected settings run, the arc stays lit, and welding is in progress.
3) Pull and hold the trigger; the machine initiates the slope down sequence and fills the crater at the end of the weld. Once the slope down timer runs out, the welding current switches to the selected base current.

4) Release the trigger; the base current arc extinguishes, the post-flow gas timer runs out, gas flow stops, and the weld is completed.

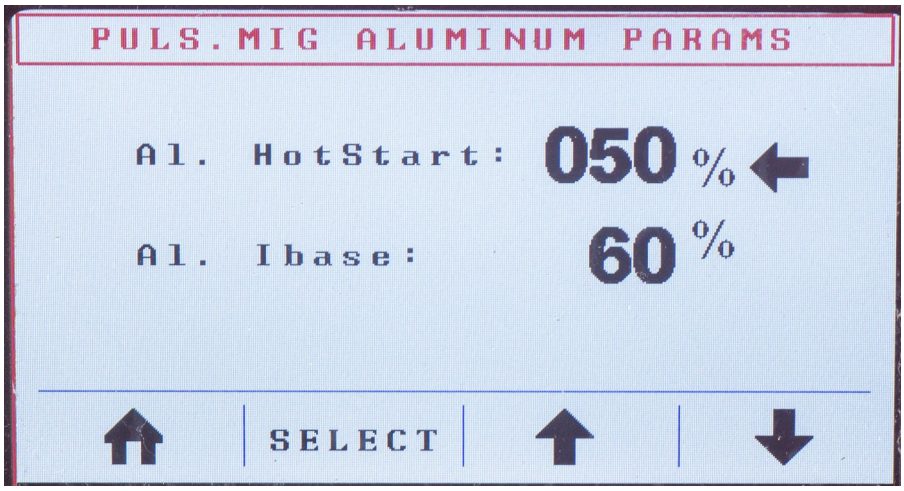


Fig. 5

The menu shown in **Fig. 5** is only available in MIG 4T mode and in pulsed MIG welding aluminum programs. You can enter the menu by pressing button **E (Fig. 4**).

Note: The 4T trigger is reprogrammed in the aluminum pulse programs.

The material thickness settings in the display are approximate, especially when welding aluminum. When welding aluminum, the values change with the temperature or with the material being welded. If the material is cold, the chosen material thickness in the display may have to be a little higher than the actual material thickness. When the material is preheated properly or has been welded on for a while, then the thickness in the display needs to be lower or a lot lower than the actual material thickness. Therefore, you have the ability to adjust the material thickness (which will adjust the wire speed and the voltage at the same time), while welding, by turning left encoder **F** (**Fig. 4**) counterclockwise. Our push-pull and spool guns come standard with remote control options, but we offer remote control options with our MIG welding guns as well.

Pro Tip: Because this is not always practical while welding, or you purchased a MIG gun without remote control, there is a second way to control heat input. For instance, if the machine is in MIG 2T and the slope down time is set, for example, anywhere between 3 and 6 seconds, you have the option, if you notice that the weld is getting too hot, to let go of the trigger. Laying off the trigger lets the machine go into slope down, causing the welding current to taper gradually. Just before the machine turns off, depress the trigger again allowing the process to repeat. Doing this allows you to fill in gaps and/or manually compensate for a too hot setting or the material heating up.

HTP recommends using a MIG remote control for maximum control when welding aluminum. If a MIG remote control is not available, MIG 4T is the next best option for performance and control.

How to Weld—Step by Step

Stick Welding

Use the Select Mode button (**Fig. 4, A**) to toggle through the menu until the LED next to Stick illuminates.

The display will show the welding amperage. If necessary, unplug the male Dinse plug (**Fig. 2, Pos. W**) that supplies the welding current to the MIG welding gun, and then plug the electrode holder (stinger) into the desired outlet. Most stick electrodes use DCEP; for DCEP, plug the electrode holder into the positive female Dinse receptacle (**Fig. 2, Pos. Y**) and the ground cable and clamp assembly into the negative female Dinse receptacle (**Fig. 2, Pos. Z**). Use the left encoder (**Fig. 4, F**) to set your welding amperage.

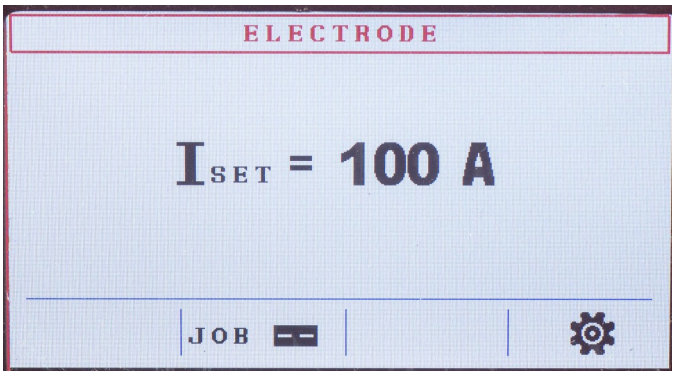


Fig. 6

Fig. 6 shows a selected welding amperage of 100 amps. When you strike an arc, the LCD will change and show the accrual welding amperage along with the arc voltage.

In order to access the settings submenu, press button **E** (**Fig. 4**). The following submenu will appear (**Fig. 7**).

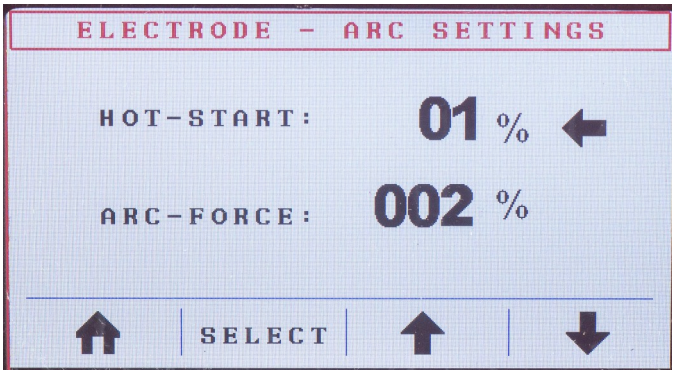


Fig. 7

The settings submenu (**Fig. 7**) allows you to select a hot start percentage for the stick electrodes. By turning right encoder **G** (**Fig. 4**), the hot start percentage can be changed to the desired setting. In order to adjust the arc force setting, press button **C** (**Fig. 4**); you will see the little arrow next to the % sign moving from the first line in the display to the second line in the display. Now, turning right encoder **G** will change the arc force value. (For more information regarding Hot Start and Arc Force, please refer to the **Glossary**, which starts on **Page 34**.)

In order to start welding, either press the home button (**Fig. 4**, **B**) or wait five (**5**) seconds for the display to revert back to the welding screen. Now, strike an arc.

While still in the Arc Settings screen, press button **E** (**Fig. 4**) once to access the advanced pulse settings screen (**Fig. 8**).

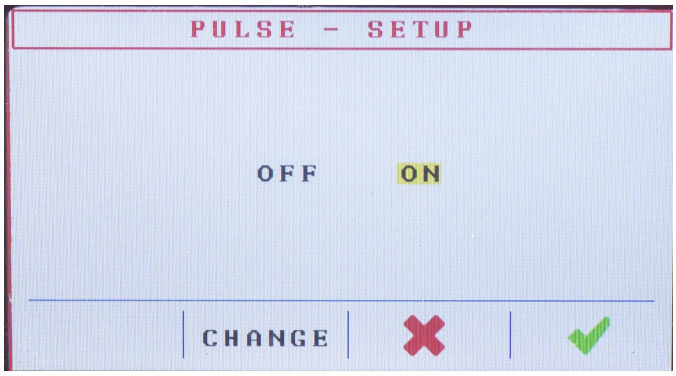


Fig. 8

Press button **C** (**Fig. 4; CHANGE**) to highlight either OFF or ON, as shown in **Fig. 8**. Confirm your changes by pressing button **E** (**Fig. 4; the green check mark**).

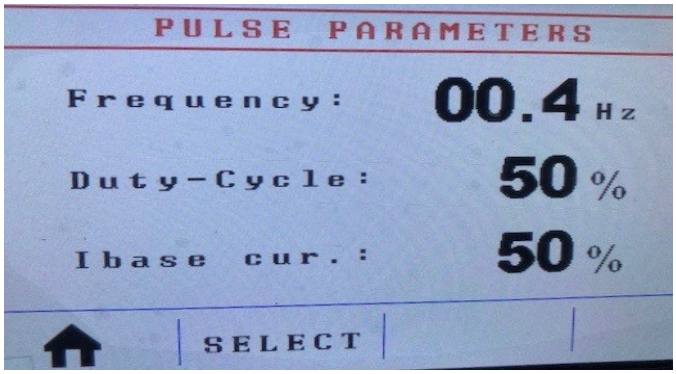


Fig. 9

Turning right encoder **G** (**Fig. 4**) will now change the pulse frequency from 0.4Hz to 5Hz. You may adjust your pulse frequency according to your application, the rod you are using, or personal preference.

Press button **C** (**Fig. 4; SELECT**) to change the Duty-Cycle, and press button **C** again to change the Ibase current. Duty-Cycle refers to pulse-on time or the percentage of time that you weld at peak current (the previously adjusted welding current) over the background current. Ibase current, a percentage of the peak/welding current, refers to the background current.

All other HTP stick welding machines (the Inverarc 200 TLP and the Invertig 221) have the duty-cycle and the Ibase current factory fixed at 50% each. After months of research and years of experience, a 50% setting has proven to be an all-around good setting for most rods and most situations. For you, a good start point is to keep the duty-cycle and Ibase current values at 50% and adjust from there.

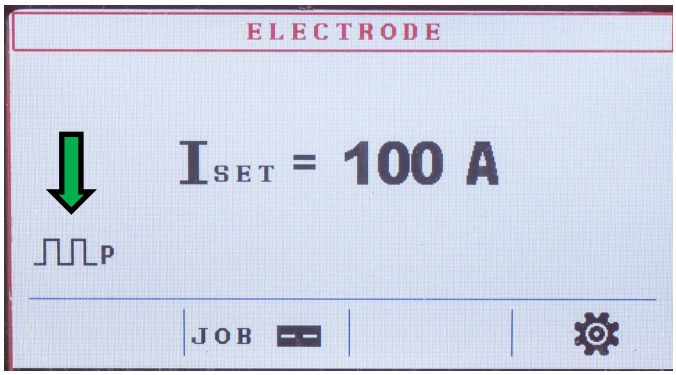


Fig. 10

The Pulse symbol in **Fig. 10** indicates that the Pro Pulse 300 is now in SMAW-P (pulsed Stick) mode. To turn the pulse feature off, go back into the advanced pulse settings menu, and turn the Pulse option OFF.

In stick welding mode, you can also activate and deactivate the V.R.D, or the Voltage Reduction Device—a system which reduces the no load voltage. For more information on the V.R.D. please reference the **Glossary**, which begins on **Page 34**.

TIG Welding

Press and release button **A** (**Fig. 4)** as many times as needed to select the TIG welding mode.

TIG is DC TIG lift-arc ignition. This welding process requires DCEN (electrode negative). Plug the ground cable and clamp assembly into the positive female Dinse receptacle (**Fig. 2, Pos. Y**), plug the TIG welding torch into the negative female Dinse receptacle (**Fig. 2, Pos. Z**), and connect the TIG welding torch gas hose to the gas outlet (**Fig. 2, Pos. V**).

In order to initiate an arc and vary the amperage while welding, a remote control, such as a foot pedal or a hand control, is required. The remote control should be plugged into the remote control and accessory receptacle (**Fig. 2, Pos. X**).

The TIG welding process requires the use of 100% Argon gas. Install the flowmeter on your tank, and connect the flowmeter to the Pro Pulse 300 with the supplied gas hose. To connect the gas hose, fasten one end of the gas hose to the flowmeter and the other to the back of the welding machine (**Fig. 3, Pos. Q**). The gas hose connections should be a little bit more than finger tight; however, be careful not to over-tighten the connections. About a 15-20 CFH flow rate is a good starting point; although this ultimately depends on the cup style and size you are using.

When the machine is turned on and in TIG mode, the display will read an amperage number (e.g., 200 A).

By pressing and releasing button **E** (**Fig. 4**) you can access the setup menu (**Fig. 11; Note: The gear symbol refers to setup**).

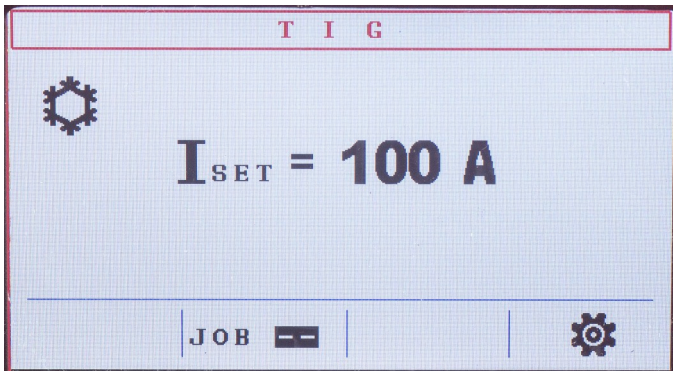


Fig. 11

If a foot pedal is used, we recommend setting the slope down time to 0.1 seconds. To adjust the slope down time, turn right encoder **G** (**Fig. 4**) until the display shows the desired duration (**Fig. 12**).

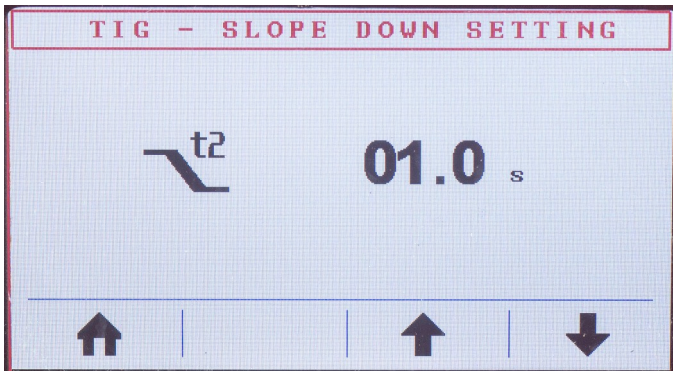


Fig. 12

To adjust pre– and post-flow gas options, press and release button **E** (**Fig. 4**) to enter the next screen (**Fig. 13**).

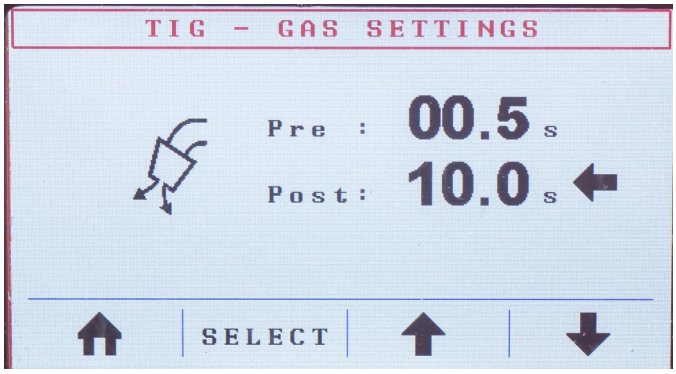


Fig. 13

By turning right encoder **G** (**Fig. 4**), you can adjust the pre-flow gas duration. Pressing and releasing button **C** (**Fig. 4**) moves the arrow from pre– to post-flow and right encoder **G** now adjusts the post-flow gas duration.

In most TIG applications, 5-10 seconds of post-flow gas is recommended.

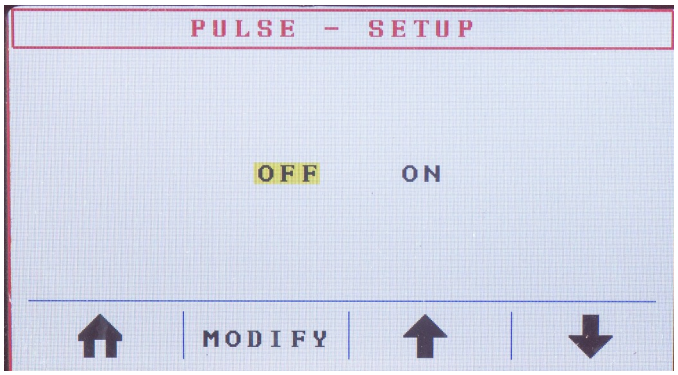


Fig. 14

Press button **E** (**Fig. 4**) again to return to the screen where you can turn pulse on or off.

To turn on the pulse function, press button **C** (**Fig. 4; MODIFY**) and then press button **E** (**the green check mark**) to confirm.

If you choose to turn pulse on, you will consequently enter the TIG pulse parameters menu (**Fig. 15**). In the TIG pulse parameters menu, you can set your frequency between, as well as set your pulse on time (Duty-Cycle) and your background current (Ibase Cur.).

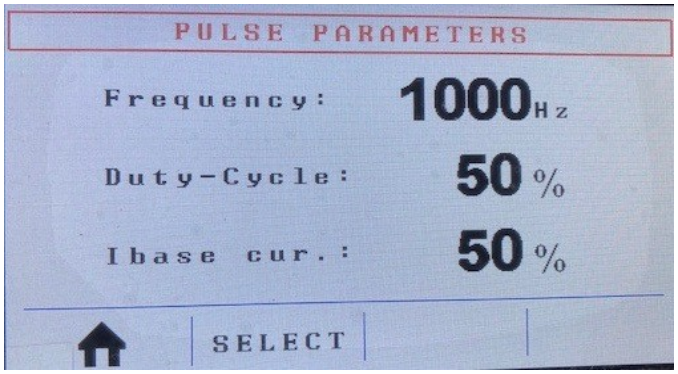


Fig. 15

Turning right encoder **G** (**Fig. 4**) will now change the pulse frequency; you can adjust the pulse frequency from 0.4Hz to 1000Hz. Adjust your pulse frequency according to your application needs.

Press button **C** (**Fig. 4; SELECT**) to change the Duty-Cycle setting, and then press **C** again to change the Ibase current. Duty-Cycle refers to pulse-on time or the percentage of time that you weld at peak current (the previously adjusted welding current) over the background current. Ibase current, a percentage of the peak/welding current, refers to the background current.

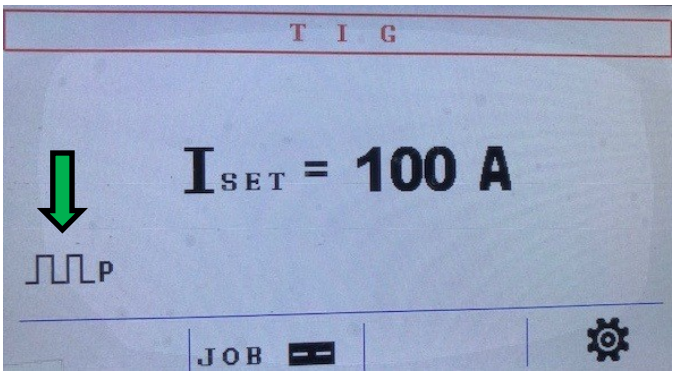


Fig. 16

The Pulse symbol in **Fig. 16** indicates that the Pro Pulse 300 is now in GTAW-P (pulsed TIG) mode. To turn the pulse feature off, go back into the advanced pulse settings menu, and turn the Pulse option OFF.

To weld, attach the ground clamp to the work piece, and also set the torch on the work piece—allowing the tungsten to contact the work surface. Next, press and hold the torch switch or depress the foot pedal (whichever you are using) and lift the tungsten off the work piece by about 1/8". The machine senses that the tungsten lifted and initiates the arc. Now, the weld can be made. If a foot pedal or hand control (rotary or slider) is used, the amperage can be varied while you weld. When you finish welding, gently lift your finger off the torch switch or your foot off the pedal to extinguish the arc.

MIG Welding—General Information

MIG welding with the Pro Pulse 300 can be done three different ways: manual, synergic, and pulse. In any case, the following things are critical to making good welds:

⇒ Use the correct wire for the material being welded.

⇒ Use contact tips that match the diameter of the wire selected. For example, use .030" contact tips with .030" wire, use .035" contact tips with .035" wire, and so on. Follow these instructions for all wire types, no matter the metal or alloy. However, on aluminum wire, especially when welding with an air-cooled MIG welding gun, we strongly recommend the use of CuCrZr contact tips. If CuCrZr tips are not available, or a water-cooled MIG welding gun or push-pull gun is used, standard tips can be used. The tip size, however, must be .005" larger than the wire size. For example, .035" aluminum wire would require a .040" contact tip, and 3/64" aluminum wire would require a .052" contact tip. (Note: Using standard contact tips when welding aluminum results in shorter contact tip life and limited performance.)

⇒ Use the correct gas, at the correct flow rate, for the wire.

⇒ Use drive rolls with a groove that matches the wire diameter chosen. There are different sizes and shapes of drive rolls. For .023”, .024”, and .025” diameter wire, use a drive roll marked 0.6; for .030” wire, use a drive roll marked 0.8; for .035” wire, use a drive roll marked 0.9 or 1.0; for .045”, .047”, and 3/64” wire, use a drive roll marked 1.2. (**Note:** Some drive rolls are reversible, meaning there are two different size grooves on the same drive roll—simply flip the drive roll so that the marking for the size you need faces you.)

Also, different materials require different drive roll shapes. For instance, mild steel wire, stainless steel wire, and silicon bronze wire typically use a standard V-shaped drive roll (**Fig. 17**). Softer aluminum wire uses a U-shaped, or V90 degree, drive roll (**Fig. 18**). Flux-cored wire, whether used with or without gas, and most hard surfacing wires, require the use of a knurled drive roll—the little teeth provide extra traction on these wires (**Fig. 19**).

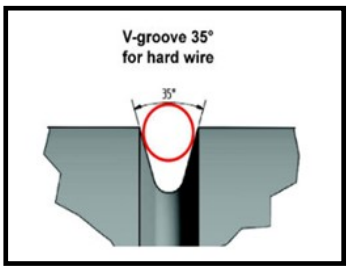


Fig. 17

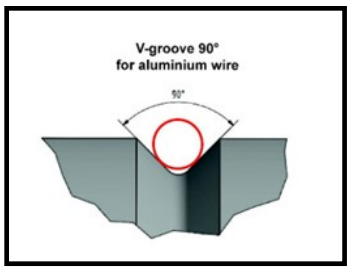


Fig. 18

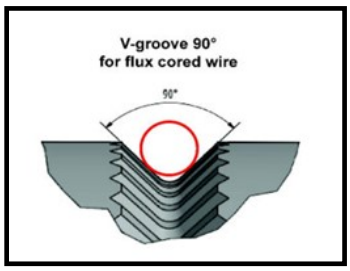


Fig. 19

⇒ Use the proper wire tension. When welding with mild steel or stainless steel, feed tension is important but a little forgiving. Generally, the wire tension should be set around 3. If that does not give you good results, there is most likely a problem unrelated to wire tension present. For example, a bad contact tip, a bad liner, a defective welding gun, etc. can cause the wire to not feed smoothly.

When welding flux-cored wire, then tension should be set lower than 2. If flux-cored wire is being fed through a wire feeder with too much tension, the tubular flux-cored wire will deform and its shape will change; the wire will become oblong and too big to fit through the contact tip. Improper electrical contact, poor weld quality, burned contact tips, and other issues will follow. Also, over-tightened drive roll tension and deformed wire will cause metal particles to separate from the wire. Those particles will, over time (sometimes a very short time, such as after welding only several pounds of wire), deposit themselves in the liner as the wire is transported through the gun, ultimately clogging the liner and rendering it useless.

When welding aluminum, the drive roll tension should be less than, or much less than, 1! Please make sure that both pressure adjusters are backed way off. This minimizes the chances of the wire birds nesting (**Note:** If there is burn back or another issue that jams the wire feed, the setting should be so low that the drive rolls slip on the wire rather than continue to feed—continued feeding results in birds nesting).

⇒ Use the correct polarity. Most MIG wires are welded DCEP (electrode positive), and there are very few exceptions to this rule (gasless flux-cored wire and some specialty hard-surfacing wires are exceptions). If in doubt, please consult the data sheet that came with the wire, the box the wire came in, or contact the distributor you purchased the wire from.

⇒ Use the correct welding gun. For welding stainless steel wire or aluminum wire, a cylindrical gas nozzle provides better gas coverage.

⇒ If welding in synergic or pulse mode, select the correct material thickness (reduce the material thickness if you need to fill big gaps or if the material you are welding is very hot) and observe the wire manufacturer’s recommended CTDW.

MIG 2T

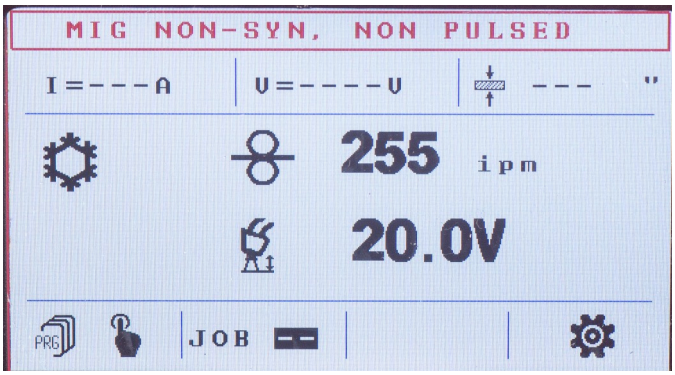


Fig. 20

Press and release Select Mode button **A** (**Fig. 4**) as many times as needed until the green LED next to MIG 2T illuminates. If welding in the manual mode is desired, quickly press and release button **B** (**Fig. 4**) twice. The machine is now in manual mode (**Fig. 20**). Turn left encoder **F** to set the wire feed speed and turn right encoder **G** (**Fig. 4**) to set the voltage.

If welding with synergic or pulse programs is desired, press and release button **B** once to display the program list. (**Figs. 21** & **22**).

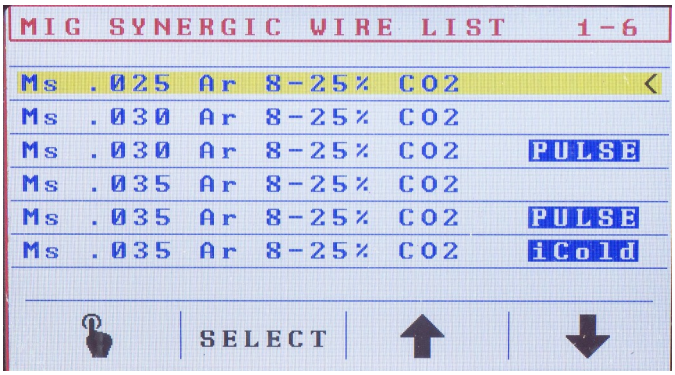


Fig. 21

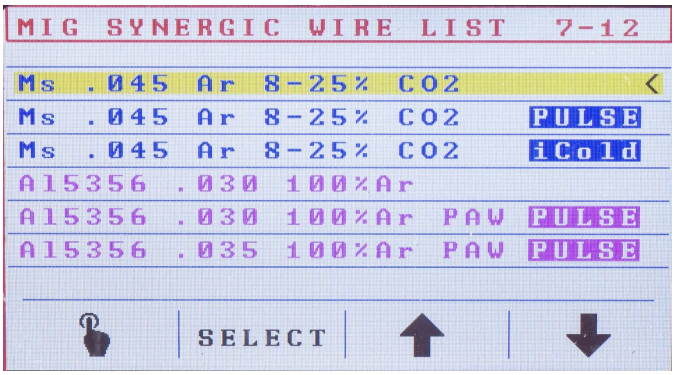


Fig. 22

Use right encoder **G** (**Fig. 4**) to scroll through the program list and select the program that best fits your current job (the yellow bar that highlights the program will move as you turn right encoder **G**).

There are 32 programs in the Pro Pulse 300. To see a complete list of the programs installed on your Pro Pulse 300, please see **Appendix I** on **Page 33**. Each program listed includes a short description. The list below shows examples of what you will see in the program list:

1) Ms—ER70S3 or ER70S6 Mild Steel

2) Al 5356—5356 Alloy Aluminum

3) Al 5554—5554 Alloy Aluminum

4) Al 4043—4043 Alloy Aluminum

5) SS308—308 Alloy Stainless Steel

6) SiBro—Silicon Bronze (brazing wire)

7) Flux-Cored Gasless—E71T-11 or E71TGS

8) Flux-Cored—E71T1

9) .025, .030, .035, 3/64—These numbers refer to the wire diameter required for the selected program.

10) Ar 8-25%CO2—Indicates the welding gas required. This program requires a mixed gas with the majority being Argon and the balance being CO2. Mixtures from 92% Argon and 8% CO2 to 75% Argon and 25% CO2 are acceptable.

11) Ar 8-10%CO2—Indicates that either a 92% Argon and 8% CO2 or a 90% Argon and 10% CO2 gas mixture is required.

12) Ar 2%CO2—Indicates that a 98% Argon and 2% CO2 gas mixture is required.

13) Ar 25%CO2—Indicates that a 75% Argon and 25% CO2 gas mixture is required.

14) 100%Ar—Indicates that 100% Argon is required.

How Pulse Works (All alloys and all programs)

All of the programs labeled either **PULSE**, **PAW**, or **iCold** are pulse programs in one form or another. **PULSE** is a regular synergic program with synergic pulse. **PAW** is a synergic program with synergic pulse that is especially designed to weld very thin material. **iCold** is a synergic program with synergic pulse especially designed for production welding (higher travel speeds, less heat input, and less distortion). Each of these programs feature the option of standard synergic single pulse, a factory preprogrammed double pulse, and

a fully manual adjustable double pulse. These options are available regardless of the material (mild steel, stainless steel, silicon bronze, or aluminum) and wire diameter. These pulse features work regardless of which MIG gun you use; air-cooled, water-cooled, spool gun, or push-pull gun all work equally well with these pulse features.

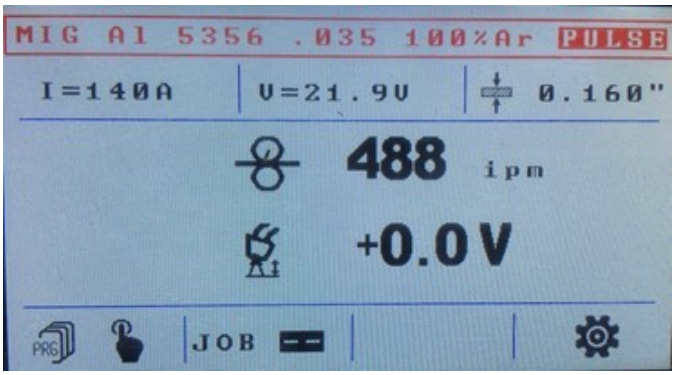


Fig. 23

Once you select a program, the program list disappears, and the program is displayed (**Fig. 23**). The top line in the display shows the name of the program, the wire diameter, and the required gas/gas mixture. It also indicates if it is a synergic or a pulse program. The line below displays, starting from the left, the approximate amperage (calculated based on the material, wire speed, wire diameter, and other variables), arc voltage, and material thickness. By turning left encoder **F** (**Fig. 4**), you can adjust the material thickness; adjusting the material thickness also adjusts, automatically, the wire speed and the voltage.

In the center of the LCD, the wire speed is displayed in IPM. Below that, the voltage deviation of the synergic curve is displayed. This value is supposed to read 0.0 V at most times, for most welding operations. You can adjust this value by turning right encoder **G** (**Fig. 4**). If an adjustment is made, the absolute arc voltage changes, and the color in the display changes from black to red. A deviation of the synergic arc does two things: it changes the arc length and it makes the weld hotter or colder. However, on a synergic machine, the main heat adjustment is made with left encoder **F** (**Fig. 4**) by setting the material thickness. The voltage deviation made with encoder **G** is considered fine-tuning or a personal preference adjustment.

You will find the function buttons (**Fig. 4; B, C, D, & E**) on the bottom of the display. In this case (**Fig. 23**), button **B**, if pressed and released once, brings up the program list, or, if quickly pressed and released twice, switches the machine into manual mode. Pressing button **C** accesses the Job menu, button **D** has no function at this point, and pressing button **E** accesses the advanced setup menu.

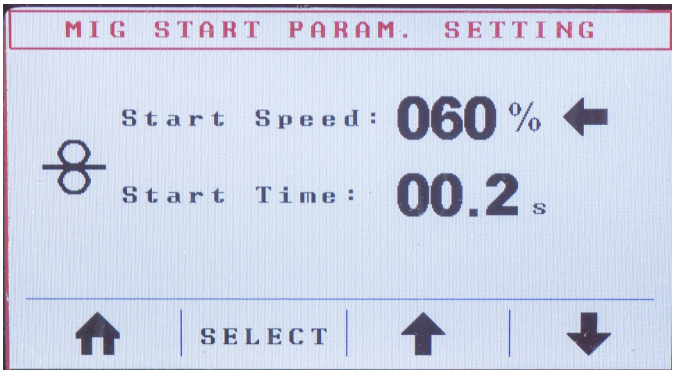


Fig. 24

By pressing and releasing button **E** (**Fig. 4**) once, you enter the setup menu (**Fig. 24**). The first screen in the setup menu gives you the option to adjust the run-in speed (Start Speed). Typically, numbers between 35% and 70% are suitable for the run-in speed. Start Time determines how long the machine runs at the slower run-in speed once the arc is struck and before it switches to 100% wire speed. Start times between 0.1 and 0.3 seconds are common. Correct adjustment of the start parameter allows for a spatter-free and smooth arc initiation. To set the start speed, turn right encoder **G** (**Fig. 4**); to set the start time, press and release button **C** (**Fig. 4; the little arrow will move down from Start Speed to Start Time**). Turning right encoder **G** now adjusts the start time.

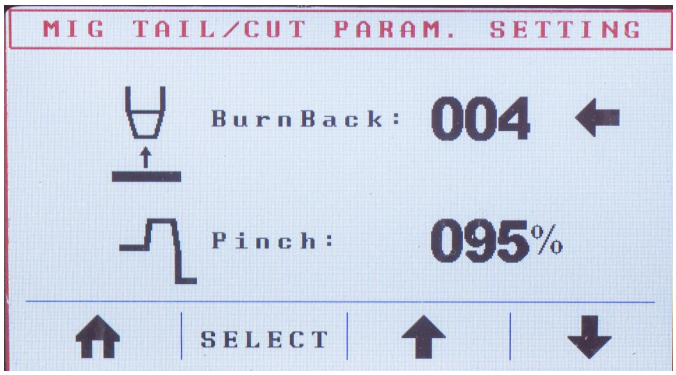


Fig. 25

To go to the next screen, press and release button **E** (**Fig. 4**). The new screen (**Fig. 25**) allows you to adjust what the wire does upon weld completion. Burn back adjusts how long the wire sticks out after you finish welding. A low number allows the wire to stick out as it normally does on a classic MIG welder, without any adjustments. The higher the number, the shorter the stick-out (**Attention:** High burn back numbers create the risk of burning the wire back into the contact tip. We recommend starting out with very low numbers). Different wires react differently. For example, aluminum reacts differently than steel; when welding aluminum, set burn back to 004. The pinch function clips wire electrically. Right before you finish the weld, the machine sends a burst of current that shapes the end of

the wire. Depending on the setting, there might not be a ball on the end of the wire that needs to be clipped off before re-striking an arc. To set the pinch, push and release button **C** (**Fig. 4**) once, and then turn right encoder **G** (**Fig. 4**) to the desired setting. Different wire types require different settings. For instance, flux-cored wire doesn't need much pinch, while aluminum wire tends to work well with 30 to 60% pinch, depending on the alloy and diameter (high pinch rates, such as more than 75% pinch, can cause burn backs near or into the contact tip, which causes permanent damage to the tip). Steel wire typically requires 100% pinch to get the desired result.

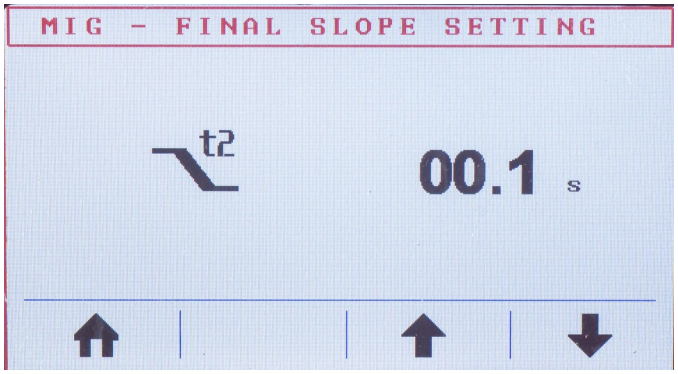


Fig. 26

After adjusting burn back and pinch, press and release button **E** (**Fig. 4**) again to get to the next screen. This screen (**Fig. 26**) allows you to adjust the slope down setting for pulse welding. The slope down feature allows you to fill the crater at the end of an aluminum weld or allows you to neatly feather out a stainless steel weld. On aluminum, set t2 between 3 and 5 seconds by turning right encoder **G** (**Fig. 4**). After you release the trigger, the machine still runs for the amount of time selected, but tapers down automatically during the slope down time. The tapering is visual in the arc and is also audible (the frequency and the sound of the machine changes). If no slope down is desired, set t2 to 0.1 seconds. The slope down feature is only available in pulse programs.

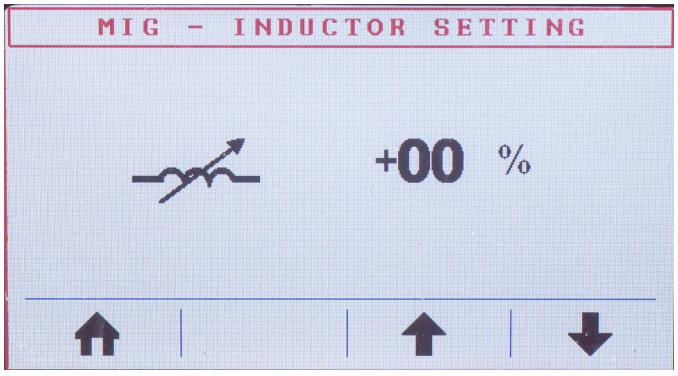


Fig. 27

Synergic, non-pulse programs have an option to adjust inductance (**Fig. 27**). By turning right encoder **G** (**Fig. 4**), you can adjust the inductance of the machine. Typically, this feature is not available on transformer machines or budget inverter machines. The inductance feature allows you to set the arc characteristics from stiff/crisp to soft.

All pulse programs have a feature for Standard Double Pulse and Manual Double Pulse. To get into the Double Pulse setup menu, press button **E** (**Fig. 4**) as many times as necessary until the screen in **Fig. 28** appears.

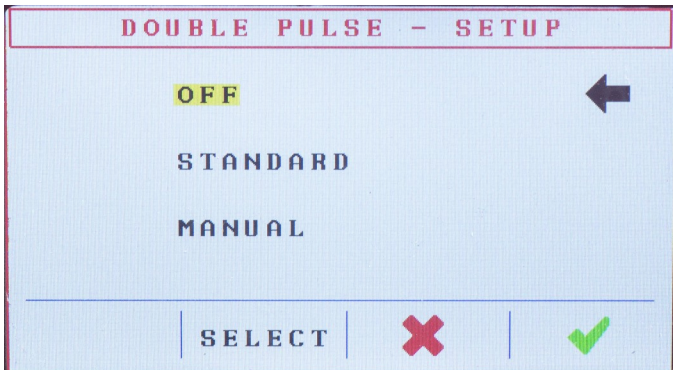


Fig. 28

Then press button **C** (**Fig. 4**) to move the arrow to the function you intend to select. When you are in the line you wish to select, press button **E** (**Fig. 4; the green check mark**).

If you chose Standard Double Pulse, the next screen will display your weld settings as shown in **Fig. 29 (**the green arrow in **Fig. 29** points to the Standard Double Pulse symbol).

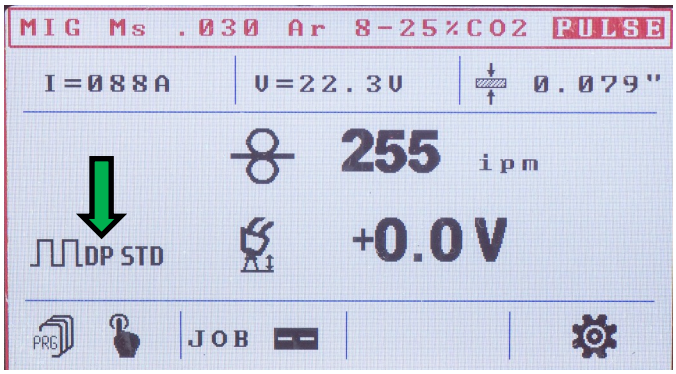


Fig. 29

If you chose the Manual Double Pulse function, the Manual Double Pulse menu, as shown in **Fig. 30** will open.

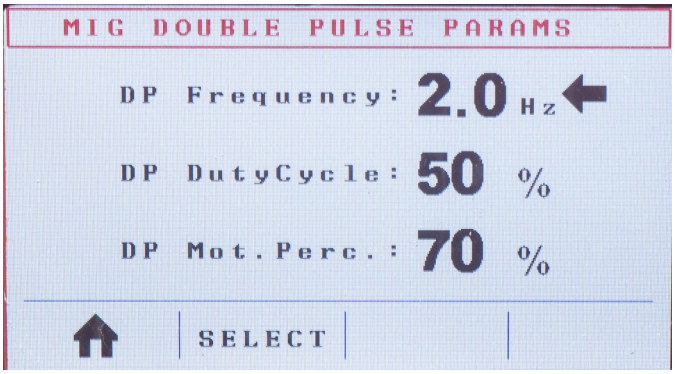


Fig. 30

In Manual Double Pulse, you can adjust the frequency from 0.4Hz to 4Hz. **DP DutyCycle** refers to the (peak) pulse-on time. The peak settings are the weld settings displayed when you press the **B** (**Home**) button. **DP Mot. Perc.** refers to the background wire speed. In the case of **Fig. 30**, where the DP Mot. Perc. is set to 70%, if the peak wire speed is set at 300 IPM, the background IPM is set to 210 IPM, along with whatever amperage and voltage that works out to be. Since the Pro Pulse 300 is a full synergic welding machine, the voltage is also adjusted to match the background wire speed.

Pro Tip: Generally speaking, lower Double Pulse frequencies, duty-cycle percentages (i.e., shorter pulse-on times), and Motor Percentages (i.e., lower background amperages and voltage due to lower wire speed) make for a more pronounced and defined bead appearance and ripples. Lower settings also dramatically reduce heat input, warpage, and distortion to base metal!

Very extreme double pulse settings may necessitate an increase in voltage; in some cases, depending on the settings and the alloy used, you may need to increase the voltage by as much as +4.0 Volts. You will know when you achieve sufficient arc voltage when the crackling in the background disappears.

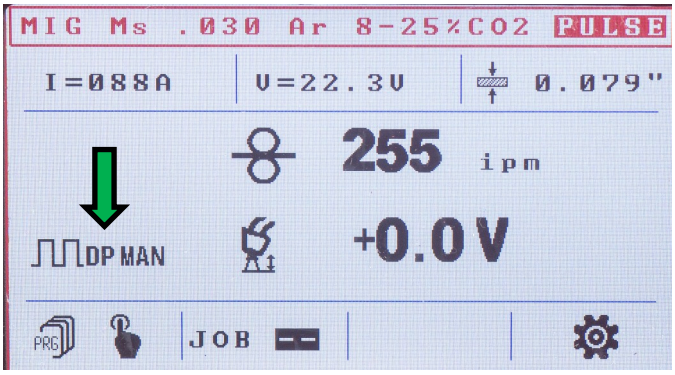


Fig. 31

The green arrow in **Fig. 31** points to the Manual Double Pulse symbol.

Pro Tip: During hot start, slope down, or final current, there is no double pulse. If double pulse is desired during hot start or slope down, please use a remote control (e.g., sliders on MIG welding guns and potentiometers on spool or push-pull guns) to achieve the desired effect manually.

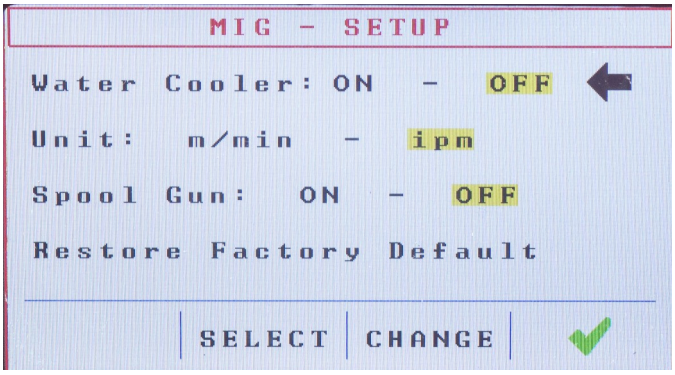


Fig. 32

Fig. 32 shows the final screen in the settings menu.

The first line gives the operator the option to turn the smart water-cooler on and off. The water-cooler is NOT activated and deactivated with the switch on the front of the cooler—the switch on the front of the cooler should always be in the ON position. The welding machine controls the cooler. The smart water-cooler is an on-demand system; the fan and the pump of the cooler only run when necessary. Likewise, the cooler controls the welding output of the Pro Pulse 300. If the smart water-cooler detects a problem, the cooler will shut off the welding output and the wire feed motor. The smart-cooler function protects your expensive water-cooled push-pull gun and cooler pumps. The smart water-cooler plugs into the back of the Pro Pulse 300 (**Fig. 3**, **Pos. P**), and into a separate 220/240 volt, single-phase circuit. The smart water-cooler is NOT powered by the welding machine. The snowflake symbol in **Fig. 33** indicates that the smart water-cooler is ON (since you may not hear it our know otherwise).

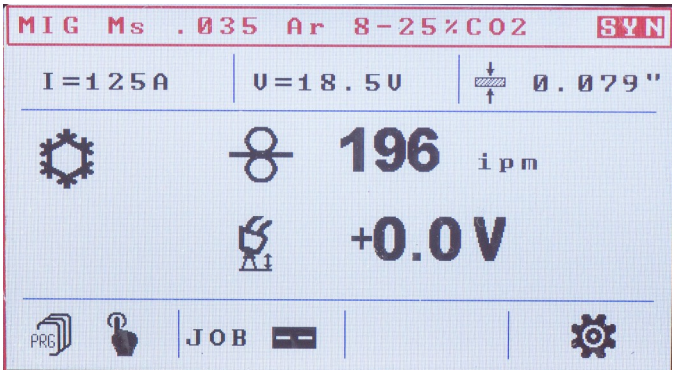


Fig. 33

If you plan on using an economy water-cooler, you need to set the selector to the OFF position since the economy cooler does not communicate with the welding machine.

The second line (Unit) allows you to switch the machine from the Imperial system to the Metric system. For instance, wire speed changes from IPM to m/m and material thickness changes from SAE decimals to millimeters.

The third line allows you to switch between the spool gun and the internal wire feeder. With the Pro Pulse 300, you have the option to run steel wire on the internal wire feeder while running aluminum on a spool gun. If you have a dual tank cart, you can have both gas cylinders (the one for mild steel and the one for aluminum) hooked up at the same time. The machine also allows you to keep the spool gun plugged in at the same time you have a MIG welding gun connected. With this function, you can switch back and forth between the two guns in no time! All you need to do is switch the software and the Dinse plug to the correct positions/ settings (the control plug and the gas hose stay connected). **Fig. 34** shows the Pro Pulse 300 spool gun.

Fig. 34

The fourth line allows you to restore the default factory settings of the Pro Pulse 300. You can use this function if a third party made adjustments that cannot be tracked any longer.

MIG 4T

The selection and setup of MIG 4T works identically to MIG 2T. The only difference is trigger function. In MIG 2T, pressing and holding the trigger makes the weld, and releasing the trigger stops the weld. In MIG 4T, pressing the trigger makes the gas flow, releasing the trigger makes the weld start, pressing the trigger again makes the weld stop, and releasing the trigger again makes the gas stop. The procedure is the same when welding mild steel, stainless steel, silicon bronze, flux-cored, as well as every other kind of welding wire.

Attention: The 4T trigger is reprogrammed for **ALL** pulsed aluminum programs. We assigned a hot start function to the initial pull. Please read **Welding Aluminum with the Pro Pulse 300** (**Pages 11-13**) to fully understand the hot start function.

Spot Welding

Pro Tip: Don't use any slope down with spot or stitch timers unless you are aware of the consequences and are certain that is your desired weld procedure.

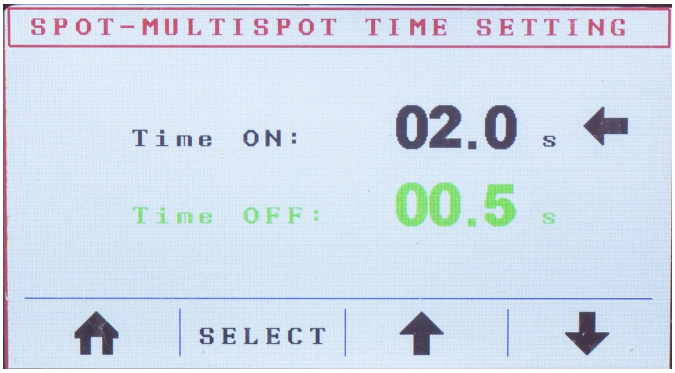


Fig. 35

Press and release button **A** (**Fig. 4**) until the LED next to **SPOT** illuminates, and then press button **E** (**Fig. 4**) to access the menu. The new screen (**Fig. 35**) gives you the option to adjust the duration of the spot weld. Turning right encoder **G** (**Fig. 4**) increases or decreases the time. Keep in mind that the start speed and the start time should be set to 100% and 0.1 seconds initially. You may then experiment with the settings to find those that achieve the best results. If the trigger is pressed and held, the machine makes a spot weld exactly as long as the spot timer is set for. After the timer runs out, the machine stops automatically.

Stitch Welding

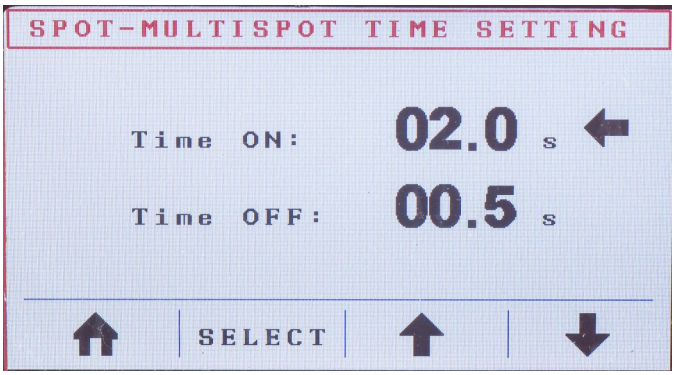


Fig. 36

Press and release button **A** (**Fig. 4**) until the LED next to **STITCH** illuminates, and then press and release button **E** (**Fig. 4**) to enter the menu. The new screen (**Fig. 36**) lets you adjust Time ON and Time OFF for stitch welding.

To adjust Time ON, turn right encoder **G** (**Fig. 4**) to the desired time, and then press and release button **C** (**Fig. 4**). Now right encoder **G** will adjust Time OFF. When initially setting up the stitch feature, set the start speed to 100% and the start time to 0.1 seconds. Later, the settings may be adjusted to yield the best results. Stitch welding can be used to reduce heat input, to fill gaps where fit is less than perfect, or on thin material where burning through is a concern. When you press and hold the trigger, the machine welds for the amount of time that Time ON is set to, then it will stop (while the trigger is still depressed) for the amount of time that Time OFF is set to. The stitch process repeats itself indefinitely until you release the trigger.

JOB Mode

The JOB Mode function, which is active in all welding modes, allows you to store and recall up to 30 JOBS (welding parameter settings).

How to Store JOBs

1) Press the JOB button **C** to pull up the JOB LIST page.
2) Use the ↑ button **D**, the ↓ button **E**, or encoder **G** to select the program in which you want to save the welding parameter setting.
3) Press and hold the SAVE button **C** for about three (**3**) seconds until you hear a double beep. If you hear a triple beep and see "THIS JOB IS PROTECTED, DO YOU WANT TO OVERWRITE IT?" in the display, either press button **E** to proceed or button **D** to cancel.
4) After saving the JOB, the LCD reverts back to the main page where you can see the JOB number above button **C**.

NOTE: An * symbol next to the JOB means the JOB is in use, and a flashing * symbol next to the JOB means the JOB is modified from the original.

To leave the current JOB and return the Pro Pulse 300 into the "regular" welding mode, quickly press and release the JOB button **C**, and then press and hold the Select Mode button **A** for approximately five (**5**) seconds. You should hear five (**5**) short beeps and one (**1**) longer beep, after which the * symbol next to the JOB you were using clears. Wait an additional three (**3**) seconds, and the Pro Pulse 300 will be back in the regular welding mode.

How to Load Stored JOBs

1) Press the JOB button **C** to pull up the JOB LIST page.
2) Use the ↑ button **D**, the ↓ button **E**, or encoder **G** to select the JOB you want to recall.
3) Press and hold the RECALL button **B** for about three (**3**) seconds until you hear a double beep.
4) After recalling the JOB, the LCD reverts back to the main page where you can see the JOB number above button **C**.

ATTENTION: THE PARAMETERS SAVED IN JOBS 1 THROUGH 12 ARE PROTECTED. WHEN YOU RECALL JOBS 1 THROUGH 12, THEY WEILL BE BLOCKED, WHICH MEANS YOU CANNOT ACCIDENTALLY ALTER OR MODIFY THEM. IN ORDER TO INTENTIONALLY MODIFY A SAVED AND PROTECTED JOB, DO THE FOLLOWING:

- Quickly press and release the JOB button **C**, and then press and hold the Select Mode button **A** for about five (**5**) seconds; you will hear five (**5**) short beeps and one (**1**) long beep, and the * symbol next to the JOB you were using disappears. After an additional three (**3**) seconds, the machine will be back in the regular welding mode.
- Make the desired adjustments and modifications to the program.
- Follow the steps from the ***How to Store JOBs*** instructions to overwrite the protected parameters with the new parameters.

Trigger JOB Function

The first three JOBs in the JOB LIST can be loaded and recalled simply by pulling the trigger of the welding gun. The following criteria must be met in order to use the Trigger JOB Function:

- At least two of the first three slots in the JOB LIST need to have welding parameter settings, or a JOB, assigned to them (the slots are empty when the Pro Pulse 300 leaves the factory).
- Each set of parameters (JOB) saved in slots 1 through 3 needs to be MIG 2T. The Trigger JOB Function **does not work** with MIG 4T. In MIG 2T, pressing and holding the trigger makes the machine weld and releasing the trigger makes the machine stop welding.
- Each set of parameters (JOB) saved in slots 1 through 3 needs to have a pre-gas flow time of at least 0.3 seconds or higher.

Follow the instructions below to switch between JOBs 1 through 3 via the Trigger JOB Function:

- Hold the gun in the air; press and immediately release the trigger without striking an arc.
- Watch the display to see the settings change.
- Every time you use the trigger in the manner described above, the machine accesses the next JOB (e.g., running through the instructions the first time activates JOB #1, a second run through activates JOB #2, a third run through activates JOB #3, a fourth run through activates JOB #1 once again, and so on).

Important Things to Know about the JOB Mode

When you receive the Pro Pulse 300, the machine includes some preprogrammed JOBs (typically, slots 20-29). However, you can delete the preprogrammed JOBs, as well as the JOBs you saved on the machine. To delete **all** saved JOBs, press and release the JOB button **C**, and then press and hold the Select Mode button **A** and button **E** at the same time for approximately five (**5**) seconds. After hearing five (**5**) beeps, all JOBs, including the preprogrammed demo JOBs, will be permanently erased from the machine's memory.

When saving a JOB, please note that the machine saves **everything**, which means not just wire speed, material thickness, and voltage, but also any voltage corrections you make, if you made the weld in 2T or 4T mode, induction (when and where applicable), run-in speed and time (or hot start), burn back, pinch, pre– and post-flow gas, t2 slope down (when and where applicable), etc. For different JOBs, these settings can and will be different, and, as you recall each JOB, the JOBs will load with the exact settings used when you saved them.

Why is the JOB Mode Important and How Do You Use It?

We will illustrate the importance of the JOB mode and explain how you use it with an example (more particularly, with an example of using the JOB mode, as well as the Trigger JOB Function). Let's say you weld with a lot of mild steel. You may choose to save two or three JOBs with your favorite or most often used wire diameter in the first three memory slots. To access each of your three most often used JOBs, you simply need to pull the trigger (see ***Trigger JOB Function*** on page 23) to switch from one JOB to the next. Regarding the JOBs themselves, for example, you could set up the first JOB based on the actual material thickness you are welding (for flat work or in-position welding). Then, you could set up the second JOB for vertical welding (so the parameters would be slightly cooler than JOB #1). Lastly, you could set up a third JOB as a stitch weld function to more easily fill gaps on less than perfect fit up.

Pro Tips:

1) ***If you program a JOB for stainless steel, we suggest using a long post-flow time (5 to 10 seconds) to shield the weld.***
2) ***If you program a JOB for aluminum, we recommend setting the pinch low to prevent burn backs. Also, set the t2 slope down between 2.5 and 5 seconds to fill the crater at the end of the weld.***

Remote Control Option

The Pro Pulse 300 features a remote control (foot pedal or hand control) option for MIG welding. The unique feature of using a remote control for MIG welding allows you to change settings (material thickness = wire speed + voltage) while welding—giving you 100% control, 100% of the time. If, for instance, you encounter a section of poor fit-up when welding and need to lower the setting of the machine to bridge the gap, you can do so with a simple movement of the remote control.

The remote control feature is especially handy when welding aluminum because it allows you to adjust hot start as much as or as little as and for as long as or as short as you want. The properties and weld-ability of aluminum change dramatically with increased heat so bridging gaps on poor fit-up can be difficult. However, the remote control feature makes welding aluminum, in every thickness and temperature range and with good or poor fit-up, a breeze.

Over-Load, Over-Temp (Over-Heat), and Duty-Cycle

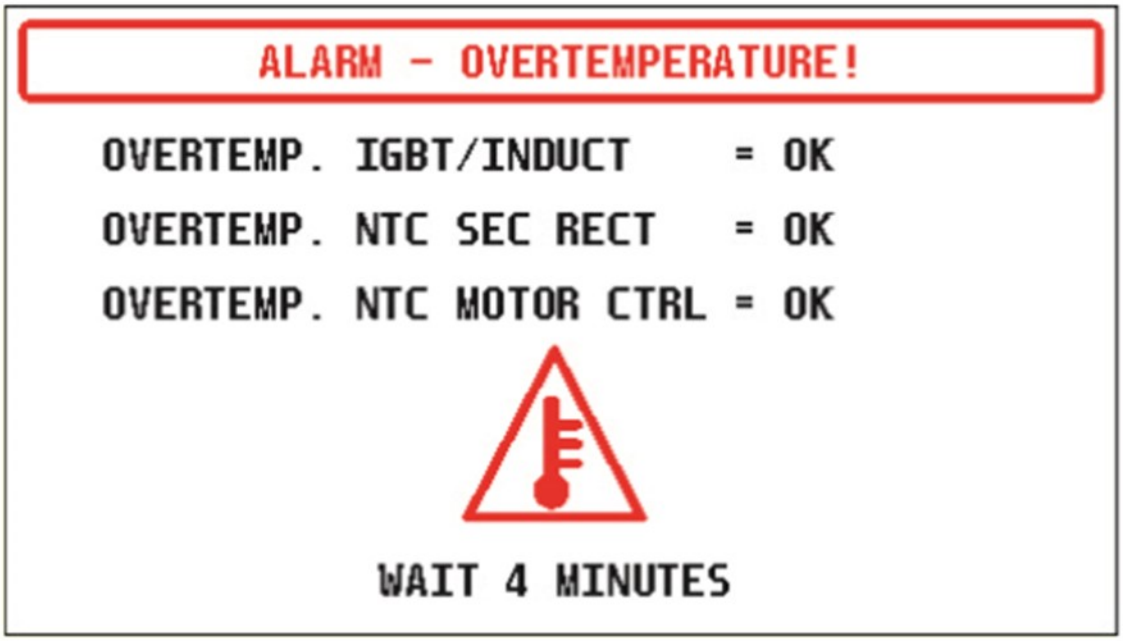


Fig. 37

The Pro Pulse 300 is designed for production welding of thin and medium material thicknesses and repair jobs of almost any material thickness. It has the ability to weld a lot of different materials and a great variety of material thicknesses. Thicker material, typically 1/2" and up, depending on type, temperature, etc. may require multi-pass welds.

Duty-cycle ratings can be confusing, but we want to make duty-cycle less confusing. An 80% duty-cycle means that, out of a 10-minute time span (duty-cycle is always a 10-minute time span, per definition, and this never changes), the machine can weld for eight (**8**) minutes and then needs to idle with the cooling fan running for two (**2**) minutes. Do not turn off or unplug the machine during this time.

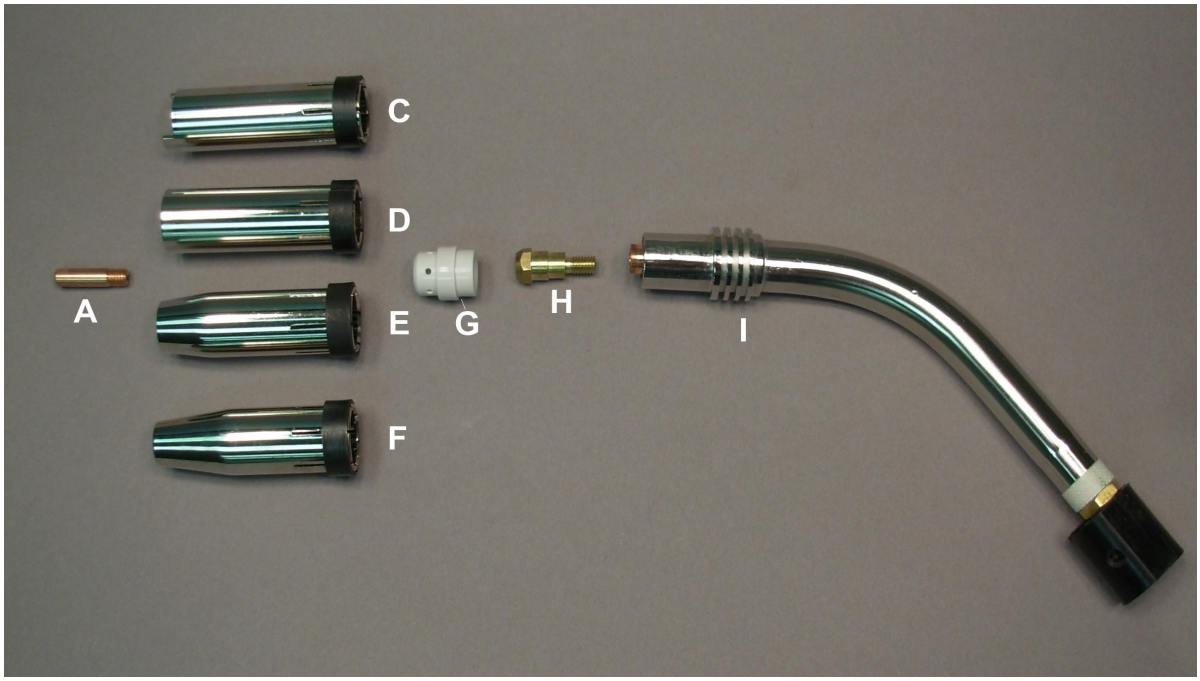
However, these numbers change with the selected welding amperage and the ambient temperature. In reality, very few can keep track of welding time like this, so we equipped the Pro Pulse 300 with a highly sophisticated over-heat protection. The machine monitors the temperature of several vital internal components. Just before temperatures venture outside the safe operating range, the machine displays a message to the operator, the cooling fan continues to run, and the welding output is shut down for four (**4**) minutes. This time allows the machine and internal components to cool down to a safe operating temperature. There is no harm to the machine when the message is displayed, and it does not matter how often this happens. There is no way to override this function.

The Pro Pulse 300 is a machine in the 300 amp class; it is designed for welding operations up to 300 amps in TIG and Stick mode and up to 320 amps in MIG and pulsed MIG mode. Depending on the selected program and the welding material, the peak pulse can be as high as 600 amps (**Note:** This will not show in the display; the display shows an average amperage, comparable to a classic MIG machine). If its capabilities are exceeded, the machine automatically lowers the settings for protection purposes. This happens only rarely in pre-programmed synergic and pulse programs, but it can happen due to CTWD, unclean metal, or wire that is out of specifications (e.g., too big in diameter). In the case of the machine lowering the settings automatically, you will be informed via the LCD. The machine will keep welding but the welding parameters will lower, the wire speed symbol changes from black to red, and the value (number in IPM) for the wire speed flashes black and red (normally, the value is shown in sold black). The LCD will also display the following: OVER CURRENT PROTECTION. There is no harm to the machine when this happens, and you can actually continue welding at the lower settings. To avoid this, you should correct the problem and/or select new, slightly lower settings than you previously set.

HTP 24 Series MIG Welding Gun

Relatively lightweight and fits into most small spaces. Available in 10', 12', and 15' lengths. For pulse welding, we recommend a maximum torch length of 10'. For any kind of pulse welding, CuCrZr contact tips should be used. Failure to do so will result in premature tip wear, poor weld quality, burn backs, birds nesting, and other problems. The 24 Series MIG Welding Gun can be used for:

- Steel (all diameters and thicknesses; both pulse and non-pulse)
- Flux-cored (all thicknesses; with or without gas)
- Stainless Steel and Silicon Bronze (all thicknesses)
- Aluminum (up to 1/4" material thickness; ONLY 5356 wire in .035" wire diameter, and ONLY if the gun length does not exceed 10')



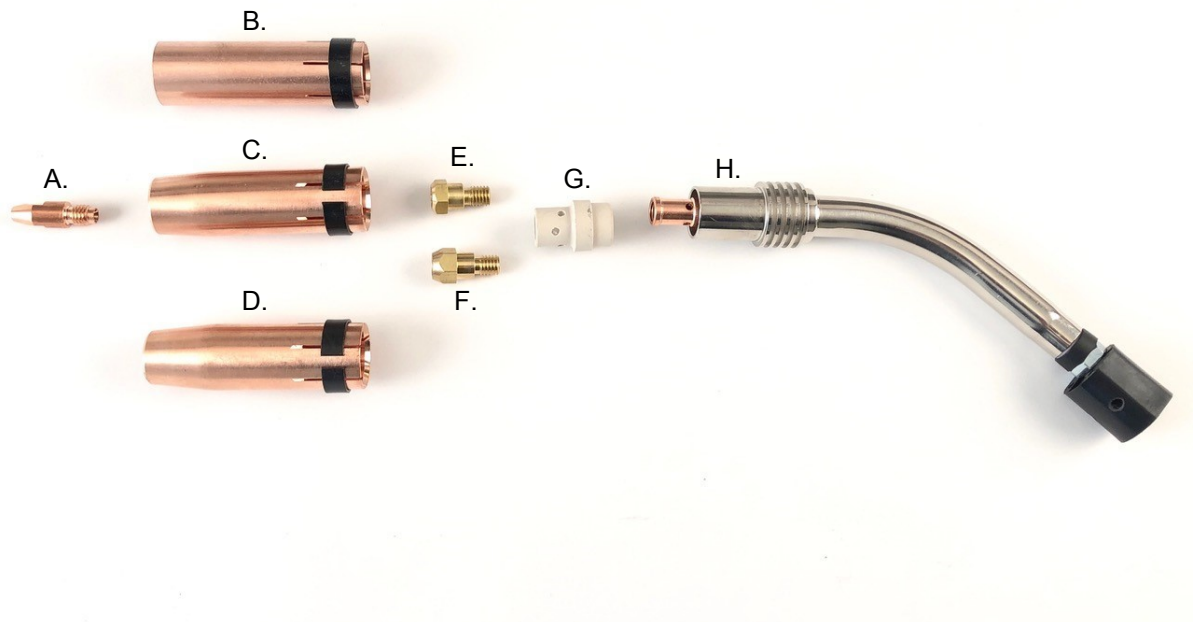
	Part#	Description		Part#	Description
A.	24023-10	.023" Contact Tip, 10-Pack	E.	24105B	Conical Nozzle, 3-Pack
A.	24030-10	.030" Contact Tip, 10-Pack	F.	24108B	Small Conical Nozzle, 3-Pack
A.	24035-10	.035" Contact Tip, 10-Pack	G.	24002-DIF	Gas Diffuser
A.	24045-10	.045" Contact Tip, 10-Pack	H.	24002-TH	Tip Holder
A.	24030-10CR	.030" CRZR Contact Tip, 10-Pack	I.	24002	Swan Neck
A.	24035-10CR	.035" CRZR Contact Tip, 10-Pack	J.	24100	10' MIG Gun
A.	24040-10CR	.040" CRZR Contact Tip, 10-Pack	J.	24120	12' MIG Gun
A.	24045-10CR	.045" CRZR Contact Tip, 10-Pack	K.	15040-16	16' Steel Liner
C.	24106B	Spot Weld Nozzle, 3-Pack	L.	63160	Drive Roll f/Steel, .023"-.030"
D.	24104B	Cylindrical Nozzle, 3-Pack	K.	63498	Drive Roll f/Flux-Cored Wire

HTP 26 Series MIG Welding Gun

Noticeably larger than the 24 Series MIG Welding Gun with a thicker torch cable (the thicker torch cable helps the operator keep the gun straight, which is especially important when welding aluminum). Available in 8', 10', and 12' lengths with M8 size CuCrZr contact tips. The 26 Series MIG Welding Gun can be used for:

- Silicon Bronze (all thicknesses)
- Aluminum (EVERY wire diameter from .030" to .047" (3/64"); EVERY alloy (5356, 5554, and 4043 namely))

Note: 8' MIG welding gun suitable for ALL wire diameters; 10' MIG welding gun suitable for .045" and .047" wire diameters only; and 12' MIG welding gun suitable for special applications using .047" 5000 series aluminum wire, such as 5356 and 5554.

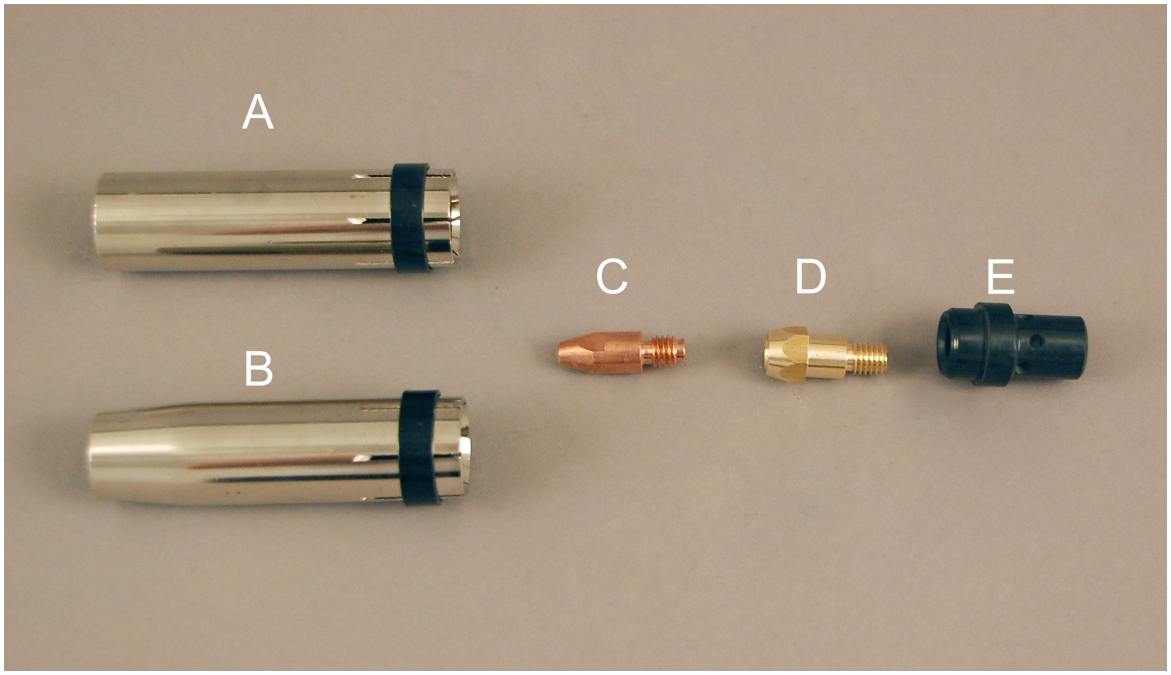


	Part#	Description		Part#	Description
A.	26030-10CR	.030" CRZR Contact Tip, 10-Pack	G.	26002-DIF	Gas Diffuser
A.	26035-10CR	.035" CRZR Contact Tip, 10-Pack	H.	26002	Swan Neck
A.	26045-10CR	.045" CRZR Contact Tip, 10-Pack	I.	26080	8' MIG Welding Gun
B.	26104-3	Cylindrical Nozzle, 3-Pack	I.	26100	10' MIG Welding Gun
C.	26105-3	Conical Nozzle, 3-Pack	I.	26120	12' MIG Welding Gun
D.	26108-3	Small Conical Nozzle, 3-Pack	J.	63464	Drive Roll f/Aluminum
E.	26002-THM8S	Tip Holder, Recessed (Short)	K.	26040-11	Graphite Liner
F.	26002-THM8L	Tip Holder, Flush (Long)	L.	50026	Consumable Kit

HTP 36 Series MIG Welding Gun

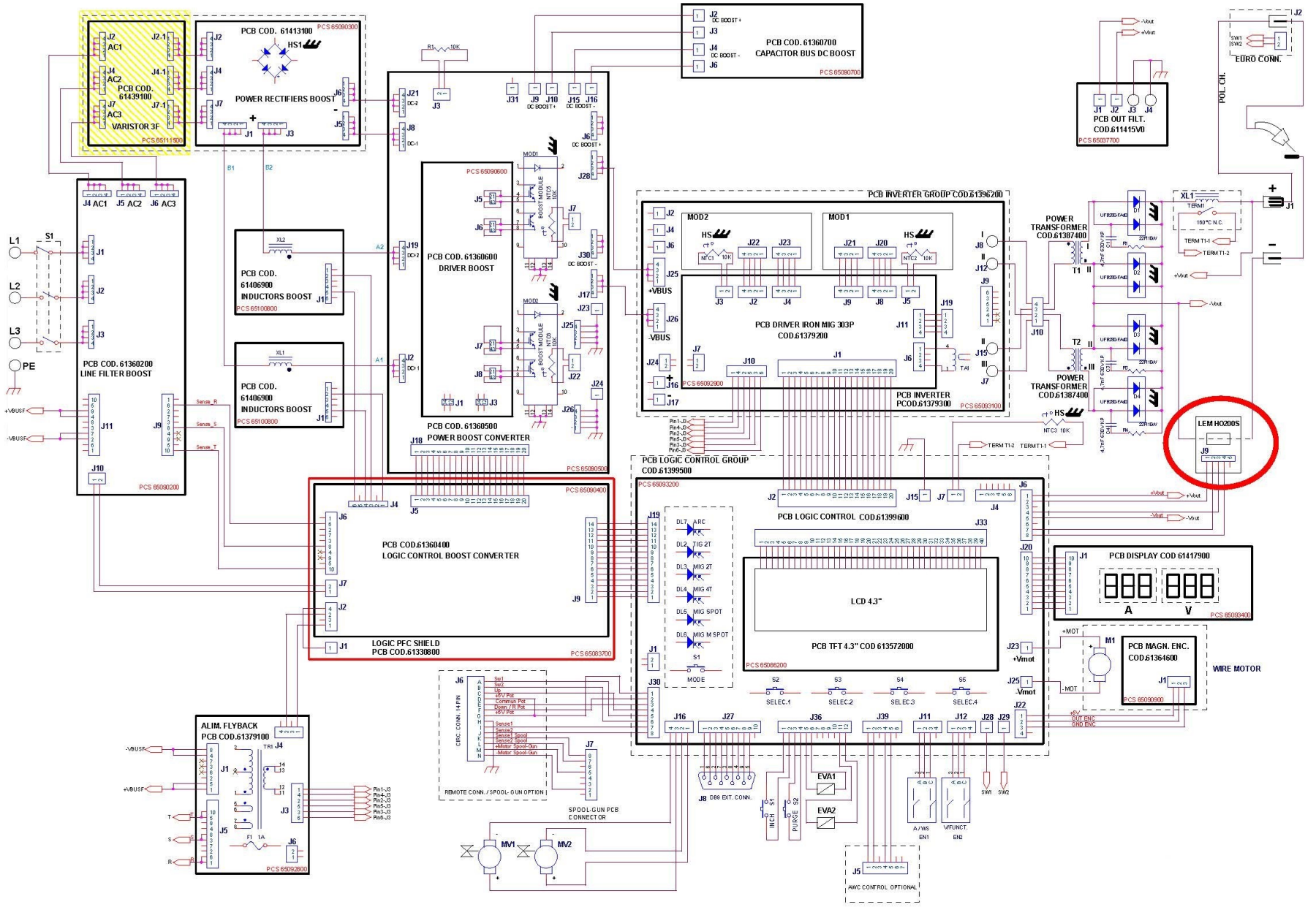
Air-cooled gun that can handle the full output of the Pro Pulse 300. For pulse and high amperage welding applications, we recommend the use of CRZR contact tips. Available in 10', 12', and 15' lengths, but pulse applications typically produce the best results with 10' or 12' guns. The 36 Series MIG Welding Gun can be used for:

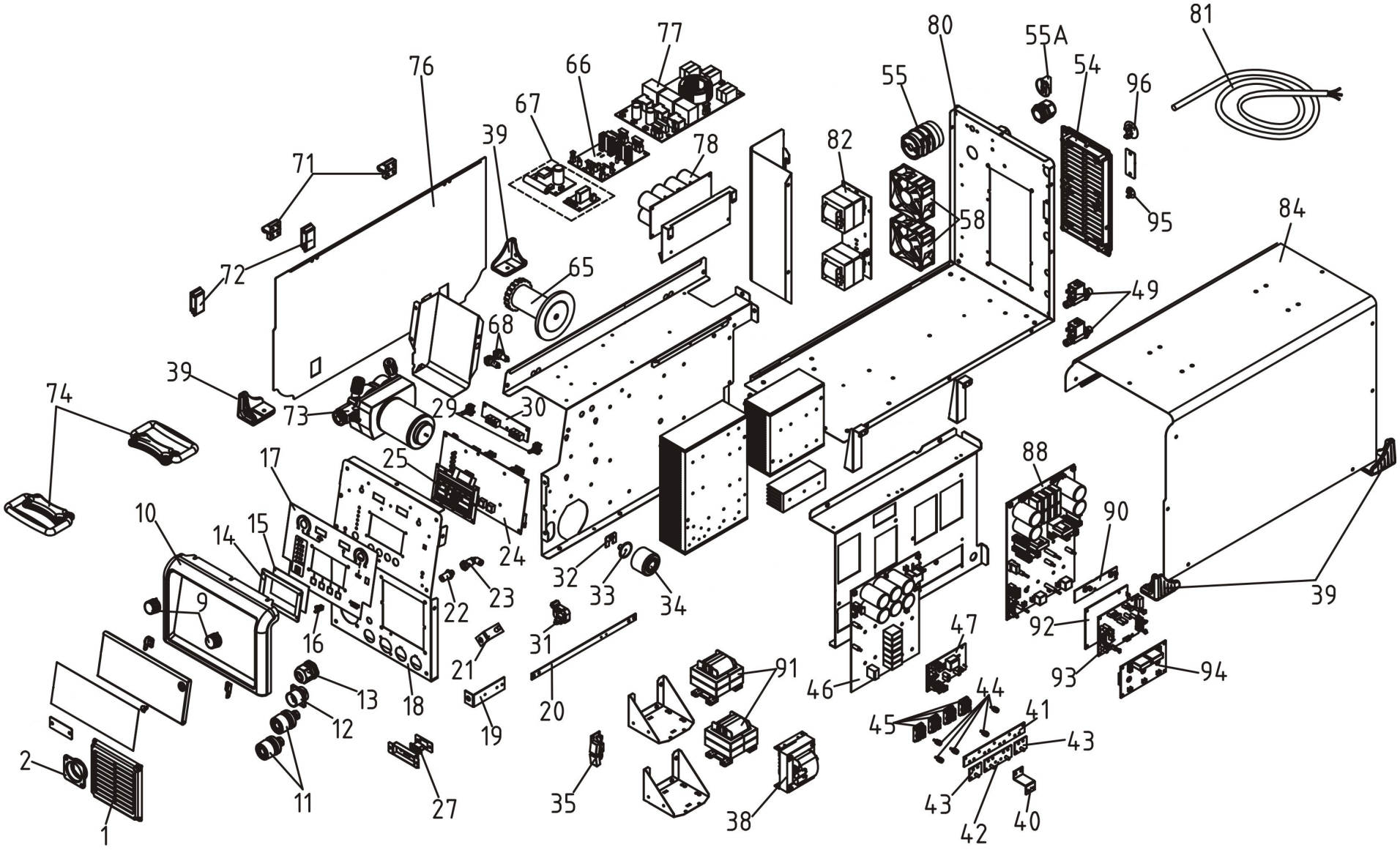
- Flux-Cored (from .030" to .047")
- Mild Steel (from .030" to .047")
- Stainless Steel (from .030" to .047")



	Part#	Description		Part#	Description
A.	36104B	Cylindrical Nozzle, 3-Pack	C.	36045-10	.045" Contact Tip, 10-Pack
B.	36105B	Conical Nozzle, 3-Pack	D	36002-THL	Tip Holder, Long
C.	36030CZ-10	.030" CZ Contact Tip, 10-Pack	D.	36002-TH	Tip Holder, Standard
C.	36030-10	.030" Contact Tip, 10-Pack	E.	36002-DIF	Gas Diffuser
C.	36035CZ-10	.035" CZ Contact Tip, 10-Pack	F.	15040-16-035045	Liner
C.	36035-10	.035" Contact Tip, 10-Pack	G.	36100	10' MIG Welding Gun
C.	36040CZ-10	.040" CZ Contact Tip, 10-Pack	G.	36120	12' MIG Welding Gun
C.	36040-10	.040" Contact Tip, 10-Pack	G.	36150	15' MIG Welding Gun
C.	36045CZ-10	.045" CZ Contact Tip, 10-Pack	H.	50036HD	Consumable Kit

Pro Pulse 300 Wiring Diagram



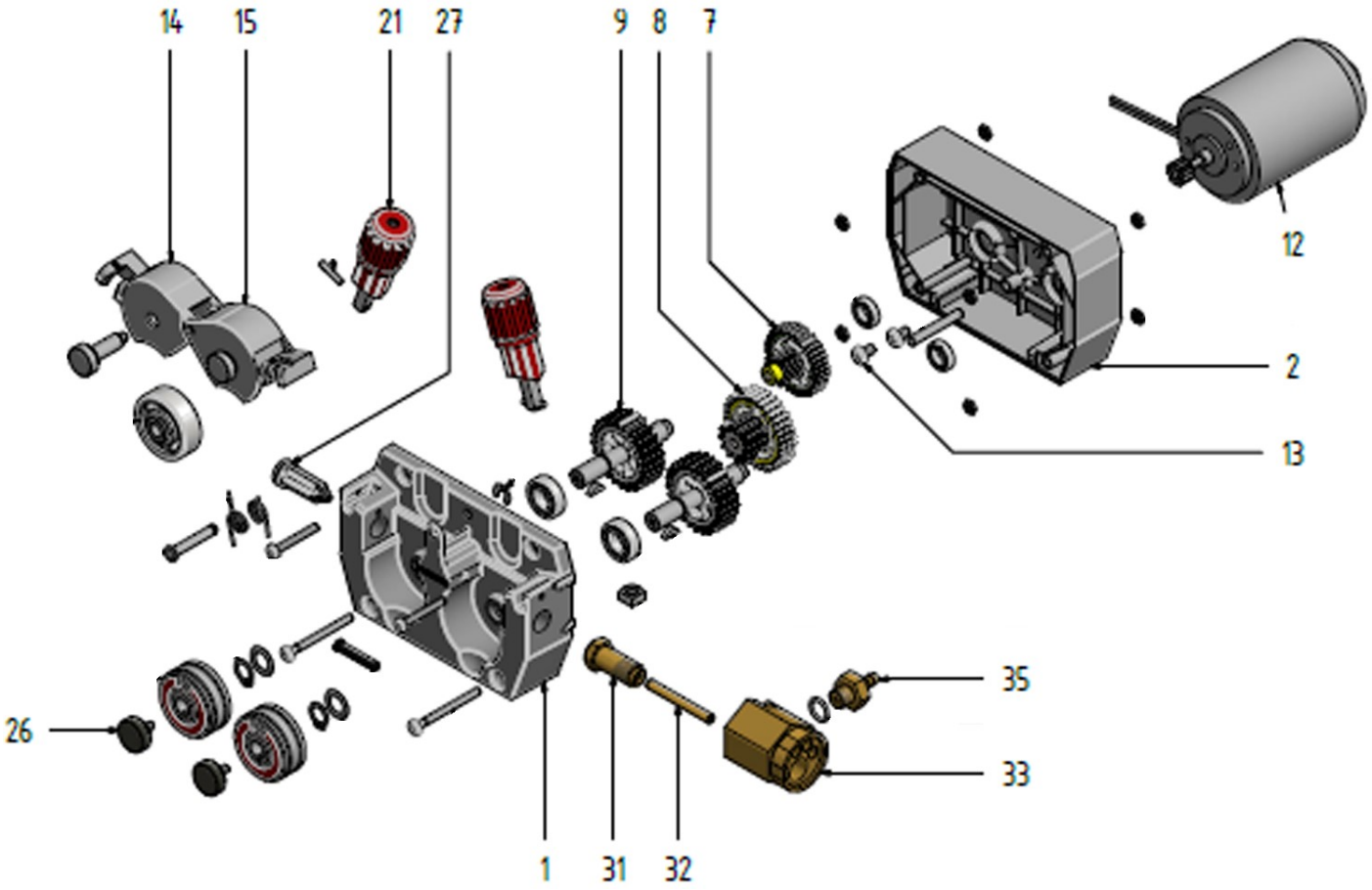


Pro Pulse 300 Parts Diagram

Pro Pulse 300 Parts List

Position	Part #	Description	Position	Part #	Description
1	661043	Front Fan Cover	44	660645	Insulator, H12
2	664620	Euro Gun Connector	45	650302	Secondary Power Diode
9	661062	Knob	46	613793	Primary Inverter PCB
10	661385	Front Panel Frame	47	613792	Driver Inverter PCB
11	642740	Ground Receptacle/Socket	49	617030	Solenoid Valve
12	613885	Remote Control Receptacle/Socket	54	661093	Rear Fan Cover
13	660785	Cable Strain Relief	55	647010	Power Switch
14	620809	Display Frame	55A	660785	Knob
15	661319	Display Protection	58	613166	Fan
16	661392	Door Latch	65	664860	Spool Holder
17	661461	Control Panel Label	66	613791	Flyback PCB
18	620783	Front Panel	67	601526	Optional PCB Kit f/Push-Pull Gun
19	620502	Copper Connector, 30 x 2		601525	Optional PCB Kit f/Spool Gun
20	620806	Copper Connector, 15 x 2 x 310	68	641590	Switch
21	620503	Copper Connector, 20 x 3	71	644680	Hinge
22	631970	Gas Connector	72	664710	Sliding Latch
23	635730	Gas Joint	73	613839	Wire Feed Assembly
24	613995	Front Panel Group PCB	74	661034	Handle
25	613572	Display PCB, 4.3”	76	620785	Door
27	650775	Programming Connector	77	613602	Line Filter PCB
29	611902	Encoder	78	613607	Capacitor Bus PCB
30	613795	Display PCB, 7 seg.	80	620782	Base
31	650977	Lem Probe	81	613032	Power Cable
32	613646	Magnetic Encoder PCB	82	613608	Inductor PCB
33	636210	Encoder Wheel	84	620784	Cover
34	661347	Encoder Cover	88	613605	Power PCB
35	611689	Output Filter PCB	90	613606	Driver PCB
38	613843	Output Inductance	91	613874	Power Transformer
39	661418	Plastic Foot	92	613308	Shield Logic PCB
40	620808	Copper Connector, 26 x 2	93	613604	Logic Control PCB
41	620505	Copper Connector Diodes 2	94	613603	Primary Rectifier PCB
42	620807	Copper Connector, 80 x 30 x 2	95	660079	Plastic Plug, D. 22-32.5
43	620504	Copper Connector Diodes	96	660378	Plastic Plug, D. 15-21.5

Pro Pulse 300 Wire Feed Assembly Parts Diagram & List



Position	Part#	Description	Position	Part#	Description
1	613933	Wire Drive Front Housing	15	636550	Pressure Arm, Right, 37mm
2	613934	Wire Drive Rear Housing	21	636560	Pressure Adjustment Unit, 2mm
7	661423	Gear to Motor	26	634690	Retaining Screw
8	661424	Intermediary Gear	27	636570	Wire Inlet Guide
9	661425	Gear w/Main Axle	31	636580	Connection Screw, Brass
12	648110	Motor, 24V/75W, 5500RPM,	32	636590	Wire Guide Tube, 5 x 2 x 48mm
12C	661347	Encoder Cover, Nylon, 48mm	33	634820	Torch Adapter
14	636540	Pressure Arm, Left, 37mm	35	632370	Current/Gas Connection Screw

Appendix I—Pro Pulse 300 Program List

Program #	Material	Wire Diameter	Shield Gas	Program Name	Type	Min. IPM	Max. IPM	Wire Speed (m/m)	Wire Speed (m/m)	Min. Thickness (mm)	Max. Thickness (mm)
1	Mild Steel	.023" - .025"	AR 8-25%CO2	Ms .023 Ar 8-25%CO2	Synergic	55	787	1.4	20.0	0.5	4.0
2	Mild Steel	.030"	AR 8-25%CO2	Ms .030 Ar 8-25%CO2	Synergic	55	787	1.4	20.0	0.6	8.0
3	Mild Steel	.030"	AR 8-25%CO2	Ms .030 Ar 8-25%CO2 PULSE	Pulse	137	787	3.5	20.0	1.5	10.0
4	Mild Steel	035"	AR 8-25%CO2	Ms .035 Ar 8-25%CO2	Synergic	55	649	1.4	16.5	0.8	10.0
5	Mild Steel	.035"	AR 8-25%CO2	Ms .035 Ar 8-25%CO2 PULSE	Pulse	55	669	1.4	17.0	1.0	15.0
6	Mild Steel	.035"	AR 8-25%CO2	Ms .035 Ar 8-25%CO2 iCOLD	Pulse	55	669	1.4	17.0	1.0	15.0
7	Mild Steel	.045"	AR 8-25%CO2	Ms .045 Ar 8-25%CO2	Synergic	55	413	1.4	10.5	1.0	8.0
8	Mild Steel	.045"	AR 8-25%CO2	Ms .045 Ar 8-25%CO2 PULSE	Pulse	55	413	1.4	10.5	1.5	12.0
9	Mild Steel	.045"	AR 8-25%CO2	Ms .045 Ar 8-25%CO2 iCOLD	Pulse	55	413	1.4	10.5	1.5	12.0
10	Aluminum 5356	.030"	100% AR	Al 5356 .030 100%Ar	Synergic	196	787	5.0	20.0	0.8	4.0
11	Aluminum 5356	.030"	100% AR	Al 5356 .030 100%Ar PAW PULSE	Pulse	118	354	3.0	9.0	0.8	2.0
12	Aluminum 5356	.035"	100% AR	Al 5356 .035 100%Ar PAW PULSE	Pulse	78	295	2.0	7.5	0.8	2.0
13	Aluminum 5356	.035"	100% AR	Al 5356 .035 100%Ar PULSE	Pulse	177	787	4.5	20.0	1.5	8.0
14	Aluminum 5356	3/64"	100% AR	Al 5356 3/64 100%Ar PAW PULSE	Pulse	78	177	2.0	4.5	1.0	2.0
15	Aluminum 5356	3/64"	100% AR	Al 5356 3/64 100%Ar PULSE	Pulse	157	669	4.0	17.0	2.0	12.0
16	Aluminum 5554	3/64"	100% AR	Al 5554 3/64 100%Ar PAW PULSE	Pulse	62	236	1.6	6.0	1.0	3.0
17	Aluminum 4043	.035"	100% AR	Al 4043 .035 100%Ar PAW PULSE	Pulse	78	177	2.0	4.5	0.8	2.0
18	Aluminum 4043	.035"	100% AR	Al 4043 .035 100%Ar PULSE	Pulse	177	708	4.5	18.0	2.0	10.0
19	Aluminum 4043	3/64"	100% AR	Al 4043 3/64 100%Ar PAW PULSE	Pulse	78	236	2.0	6.0	1.0	3.0
20	Aluminum 4043	3/64"	100% AR	Al 4043 3/64 100%Ar PULSE	Pulse	196	472	5.0	12.0	2.5	10.0
21	Stainless Steel	.030"	98% AR 2% CO2	SS308 .030 Ar 2%CO2 PULSE	Pulse	55	787	1.4	20.0	0.8	10.0
22	Stainless Steel	.035"	98% AR 2% CO2	SS308 .035 Ar 2%CO2 PULSE	Pulse	55	590	1.4	15.0	1.0	10.00
23	Stainless Steel	.035"	98% AR 2% CO2	SS316 .035 Ar 2%CO2 PULSE	Pulse	55	708	1.4	18.0	1.0	12.0
24	Stainless Steel	.045"	98% AR 2% CO2	SS308 .045 Ar 2%CO2 PULSE	Pulse	55	452	1.4	11.5	1.0	10.0
25	Silicon Bronze	.030"	100% AR	CuSi3 .030 100%Ar PULSE	Synergic	78	787	2.0	20.0	0.8	6.0
26	Silicon Bronze	.030"	100% AR	CuSi3 .030 100%Ar	Pulse	55	787	1.4	20.0	0.6	5.0
27	Silicon Bronze	.035"	100% AR	CuSi3 .035 100%Ar PULSE	Pulse	78	590	2.0	15.0	1.0	6.0
28	Flux-Cored	.035"	No Gas	Flux-Cored .035 Gas-less	Synergic	55	708	1.4	18.0	1.5	10.0
29	Flux-Cored	.035"	75% AR 25% CO2	E71T1 .035 25%CO2	Synergic	255	708	6.5	18.0	2.0	12.0
30	Flux-Cored	.045"	No Gas	Flux-Cored .045 Gas-less	Synergic	55	492	1.4	12.5	1.5	15.0
31	Flux-Cored	.045"	75% AR 25% CO2	E71T1 .045 25%CO2	Synergic	157	452	4.0	11.5	3.8	12.0
32	Flux-Cored	.045"	75% AR 25% CO2	E30XLT1 .045 25%CO2	Synergic	157	334	4.0	8.5	3.8	6.0

Appendix II—Glossary

Arc Force Related to amps and volts when welding. When stick welding, the Pro Pulse 300 power source produces a CC, or constant current, output; in other words, the machine holds a constant amperage level, while the voltage varies according to the arc length, or the distance between the rod and the work surface—longer arc lengths increase voltage and shorter arc lengths decrease voltage. Increased voltage (a long arc length) keeps the puddle more fluid and the arc more stable, while decreased voltage (a short arc length) allows you to achieve better metal transfer and a wetter weld quality. The decrease in arc voltage, however, does pose the risk of extinguishing the rod, which is where arc force comes into play.

When you set arc force and your arc voltage begins to drop while welding due to a short arc length, arc force increases your amperage (not you voltage) to give the weld puddle more drive and to keep the rod lit, and burn in (or burn through) deeper, without snuffing out the arc. Arc force is an adaptive-dynamic process. If, for instance, you select 50% arc force and set your welding machine to 100 amps, a decrease in arc voltage will cause the amperage to increase automatically up to 150 amps (as needed and only when you meet certain voltage drop conditions; you will NOT run at 150 amps continually). Likewise, if you weld at 100 amps and set arc force to 200%, the amperage can increase, under certain conditions, up to 300 amps. At a 200% setting, drops in arc voltage will cause the amperage to climb faster than if would if set at 50% arc force. Essentially, with arc force set, you will not see the voltage go up at all if you hold the correct arc length, and if you hold the arc length too tightly, your amperage will increase, as needed, so the rod stays lit. Of course, you cannot watch the machine's display and weld at the same time, but you will hear the difference if/when arc force kicks in—our inverter welding machines sound unique, especially when arc force kicks in.

Hot Start A burst of amperage for a very short time—typically less than one (**1**) second to help light the rod, or start the arc. When you set hot start, you select a percentage of the welding current. For instance, if you set the machine to weld at 100 amps and then set hot start to 30%, for a fraction of a second the machine puts out 130 amps to help light the rod and start the arc.

i-Cold Pulse™ Spray arc transfer welding is hot, which causes metal distortion and issues with welding speed. i-Cold Pulse technology reduces thermal heat, and, in turn, increases the welding speed by 35%. In i-Cold Pulse programs, the arc becomes more concentrated and intense. The i-Cold Pulse programs preinstalled on the Pro Pulse 300 are especially designed for production welding where higher travel speeds, less heat input, and less distortion are desired.

P.A.W.™ Stands for Precision Aluminum Welding. Designed for use on very thin aluminum (1 to 2mm thick) with a standard MIG welding gun. P.A.W. programs offer a short and concentrated welding arc.

Pulsed Process MIG Welding Pulsed process MIG welding happens in spray arc transfer as opposed to classic MIG welding, which happens in short arc transfer and sounds like frying bacon. In short arc transfer, the wire literally shortens out in the puddle, burns back, and then shortens out again. Spray arc welding is much hotter than short arc welding, has excellent penetration, virtually no spatter, and is typically very quiet (mostly a quiet hissing with an occasional crackle). This form of welding is so hot that it typically can only be used in flat position, though sometimes in horizontal position as well. Pulse gives you the option to run the process out of position while retaining the same desirable characteristics of deep penetration and a virtually spatter-free weld with excellent bead appearance—but does so while enabling you to join materials of different thicknesses at an increased travel speed, all while lowering heat input and distortion.

Pulsed process MIG welding is different than pulsed process TIG welding. In the MIG process, filler material has to be added constantly to maintain the welding arc, and this sets the ground rules of the pulse function. When pulsing in TIG welding mode, you have the ability to adjust peak current, background current, pulse-on time, and pulse frequency. When pulsing in MIG welding mode, on the other hand, you typically only have the choice of pulse-on and pulse-off. High end pulsed process MIG welding machines, like the Pro Pulse 300, typically have what is referred to as synergic pulse, which means the pulse frequency and other welding parameters are preprogrammed into the machine, and change automatically when you adjust the wire feed speed. The pulse frequency adjusts with the wire feed speed; slower wire feed speeds have a lower frequency, while higher wire feed speeds have a higher frequency. However, the Pro Pulse 300 also offers peak pulse (in some programs, under certain conditions, and up to 600 amps).

Because of the pulse frequency, electronic interferences may occur. For this reason, **it is forbidden for people with PACEMAKERS to use or come near the machine**. During the research and development process at HTP, we found that some brands/models of auto-darkening welding helmets experience interference issues with the Pro Pulse 300. Since the frequency changes according to wire speed, we noticed that a wire speed adjustment of +/-20 IPM typically alleviates the issues. We also noticed that video cameras within close proximity to the Pro Pulse 300, when welding in a pulse program, show the interference in the recorded picture.

Although the spray arc transfer itself is almost silent (just a slight hiss), the sound of the pulse is well noticeable. It sounds, at times, much like an AC TIG welding machine. If you are used to the classic MIG frying bacon sound, the sounds the Pro Pulse 300 makes will take a little adjustment time to get used to.

Pulsed Stick Welding (Rod Pulse) An ideal process for pipe welding. Advantages of pulsed Stick welding include: better arc stability, ability to use large diameter electrodes on thin plate metal, burn through reduction, better drop transfer control, better weld bead appearance—especially when welding in high frequency (4 to 5 Hz), better gap coverage, excellent penetration, and ideal for welding pipe with cellulosic electrodes in vertical down position.

V.R.D Stands for Voltage Reduction Device. V.R.D. is a system which reduces the no-load voltage (OCV). When you activate the V.R.D., the Pro Pulse 300 reduces the maximum no-load voltage to a lower and safer voltage—normally less than 18 volts. Used as an additional aid for operator safety and for when safety procedures at work require extra protection. The V.R.D. function not only makes the welding machine safer, but also makes the stick welding rods harder, or even very hard in some cases, to light.

To activate the V.R.D., please do the following:

1) Switch the welding machine on.
2) Hold down the Select Mode button (**Fig. 4, Pos. A**) for approximately four (**4**) seconds, and then release the button; the LED indicating Stick welding mode starts blinking. The V.R.D. is now activated.

Once activated, the V.R.D. mode remains activated even when you turn the machine off and then on again.

To deactivate the V.R.D., please do the following:

1) Switch the welding machine on.
2) Hold down the Select Mode button (**Fig. 4, Pos. A**) for approximately four (**4**) seconds, and then release the button; the LED indicating the Stick welding mode illuminates solidly (goes from blinking illumination to solid illumination). The V.R.D. is now deactivated.

Once deactivated, the V.R.D. mode remains deactivated when you turn the machine off and then on again.