Pro Pulse™ 200

Owner's Manual

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Foreword

Thank you for purchasing an HTP® Pro Pulse™ 200—our advanced process, full synergic, pulse MIG welder. The Pro Pulse 200 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 200, 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 200. 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 200. HTP provides this manual and a few videos to familiarize you with, and help you weld successfully with, the Pro Pulse 200.

Customers interested in the Pro Pulse 200 often ask us the following questions: *If I buy the Pro Pulse 200, will I be able to weld aluminum right out of the box?* and *Why do some customers find welding with the Pro Pulse 200 difficult? Why do some customers, including customers with decades of regular MIG welding experience, struggle when welding with the Pro Pulse 200 even after reading the entire manual twice and watching several videos?* First, the majority of our customers successfully weld aluminum with the Pro Pulse 200 within hours, not days. Second, experienced welders struggle when welding with the Pro Pulse 200 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 200 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 ¾" to 1" stick-out.

⇒ *Old Habits and Frugalness*. For aluminum welding (all spray arc transfer and pulse), 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 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 200.

⇒ *Unrealistic Expectations*. No matter what, MIG welds will never look identical to TIG welds. Although, with double pulse and when the settings on your machine and the movement of your hand are in perfect harmony, they can come pretty close.

Also, when everything works right, welding aluminum is a lot like welding steel, though there are a few differences—from the gas, to the torch, to the consumables, to 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.

Birds nesting is not an issue with the Pro Pulse 200. However, burn back may occur and must be addressed immediately—failure to do so will result in EXCESSIVE tip usage! When burn back occurs, the damaged tip becomes useless and must be replaced. Furthermore, run about 10' of wire through your MIG gun to discard any wire damaged by slipping in the drive roll (which occurs due to burn back into the contact tip).

⇒ *Material Thickness Rating 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 200, enjoy finding out all of the details by reading the rest of the manual and watching the videos.

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 defective materials or workmanship as follows:

HTP America, Inc. warrants each new welding machine to be free from defects in material 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 liabilities 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 way 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 warranty card is sent to HTP America, Inc. within Fifteen (15) Business Days from the date of purchase.

Exclusions to Warranty:

1. The MIG Welding Torch is warranted for a period of Ninety (90) Days against defects in material and workmanship.
2. The contact tips, tip holders, gas diffusers, gas nozzles, and liner are consumable items, WHICH CARRY NO WARRANTY.

Note: 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 or 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.
- 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 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 during 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 a wet surface when welding.

- Disconnect the power supply before working on the welding machine.
- Do not work with deteriorated or damaged cables.
- Frequently inspect cables for wear, cracks, and 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 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 American 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.
6. CGA Pamphlet P-1 SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 500 Fifth Ave., New York, NY 10036.
7. OSHA Standard 29 CFR, Part 1910, Subpart Q WELDING, CUTTING, AND BRAZING.

Fig. 1

Electrical Connection

Your Pro Pulse 200 operates on single-phase, 230 volt power (208-240 volt). The machine draws 35 amps out of the wall when operating at a welding output of 200 amps. If you operate the machine on a generator, it needs to be a clean power generator with a minimum of 8500 watts (8500 watts must be the continuous rating or running watts rating of the generator, NOT the peak rating or starting watts rating of the generator.

General Characteristics

Our new pulsed process MIG welding machine, which features electronic adjustments controlled through a microprocessor, allows you to achieve excellent welding quality, thanks to the advanced technologies applied. The microprocessor circuit controls optimize the transfer of the arc, irrespective of the load variation and of the impedance of the welding cables.

This machine 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 200, this information is preprogrammed, readily available, and displayed to you. The Pro Pulse 200 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 welded. 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 200 gives you the option to adjust the weld either colder or hotter by reducing or increasing the voltage.

The Pro Pulse 200 also offers, as the first in its class, ST-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 and uniform 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?

Pulsed process welding is a form of welding that happens in spray arc transfer, while classic MIG welding is done in short arc transfer and sounds somewhat like frying bacon. Spray arc welding is a lot hotter, has excellent penetration, 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 give you the option to run the process out of position while retaining the same desirable characteristics of deep penetration—a virtually spatter-free weld with excellent bead appearance—but does so while enabling you to join materials of different thicknesses at increased travel speed, all while lowering the heat input and distortion.

Pulsed process MIG welding is different than pulsed TIG welding. In the MIG process, filler material has to be added constantly to maintain the welding arc, and this sets the ground rules for the pulse function. When pulsing with TIG, you have the ability to adjust peak current, background current, pulse-on time, and pulse frequency. When using pulsed process MIG, on the other hand, you typically only have the choice of pulse-on or pulse-off. However, the Pro Pulse 200 offers peak pulse (in some programs, under certain conditions, and up to 300 amps), pulse-on time, as well as background current—all preprogrammed, according to scientific studies for best results, at the factory. The pulse frequency adjusts with the wire speed; slower wire speeds have a lower frequency, while higher wire speeds have a higher frequency.

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 200. 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 or security cameras within close proximity to the

Pro Pulse 200, when welding in a pulse program, show the interference in the recorded picture.

Although the spray arc 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 welder. If you are used to the classic MIG frying bacon sound, the sounds the Pro Pulse 200 makes will take a little adjustment time to get used to.

Welding guns compatible with the Pro Pulse 200 include:

HTP 15 Series MIG Welding Gun
HTP 24 Series MIG Welding Gun
HTP 26 Series MIG Welding Gun

Below, we discuss the capabilities and limitations of each of these guns.

HTP 15 Series MIG Welding Gun—The smallest of the guns. Excellent for reaching into tight spaces (e.g., work on cars). Also, lightweight for less operator fatigue. Available in 10', 12', and 15' lengths. Best for use on steel (non-pulse).

HTP 24 Series MIG Welding Gun—Slightly larger than the 15 Series MIG Welding Gun. Still 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 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')

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). Comes in an 8' length with M8 size CuCrZr tips. The 26 Series MIG Welding Gun can be used for:

- Steel (all diameters and thicknesses; both pulse and non-pulse)
- Flux-cored (all thicknesses; with and without gas)
- Stainless Steel and Silicon Bronze (all thicknesses)
- Aluminum (EVERY wire diameter from .030" to .047" (3/64"); EVERY alloy (5356 and 4043 namely))

Front Panel Controls

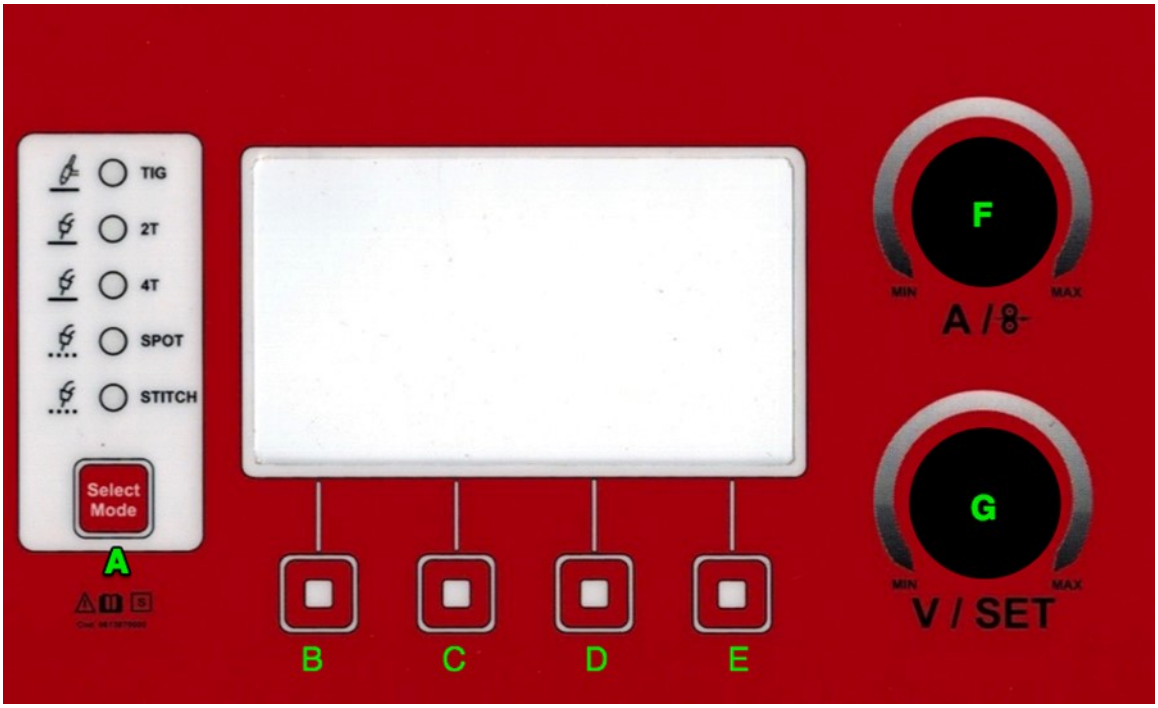


Fig. 2

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

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 (Upper Encoder)—Turning the upper encoder in manual mode adjusts the wire feed speed, while turning the upper 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 (Lower Encoder)—Turning the lower encoder in manual mode sets the voltage, while turning the lower 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 while welding). If the machine is in a setup menu screen, you may use the lower 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 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 encoder **F** to set the desired material thickness. **Note:** If button **B** is pressed twice within a short time, the machine will go into manual mode. In the manual mode, simply use encoder **F** to set the wire feed speed and encoder **G** to set the arc voltage.
3. Pull the trigger and weld.

The Programs—Overview

The Pro Pulse 200 offers 21 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 629) 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 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. On inverter-based machines, changing the arc characteristics is a desired feature, while on classic transformer-based machines, adjustments like this are not offered.

The pulse programs are also synergic, but they sound different than classic MIG welding; the sound when pulse welding changes with the material thickness (wire feed speed). These programs offer a slope down function, which can be used to fill craters at the end of aluminum welds.

Both pulse and non-pulse programs offer adjustment in start speed (wire run-in), speed and duration, along with burn back and pinch. The start speed offers the ability to set a crisp arc ignition without "machine gun" start. Burn back determines how long the wire sticks out of the contact tip when the weld is completed and the machine has stopped welding. The lower the number on burn back, the longer the stick out (**ATTENTION: High numbers can cause the wire to burn back into the contact tip, destroying it**). 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 the ball off with a pair of pliers. However, the Pro Pulse 200 can do that 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 by type and diameter of wire. Also, numbers higher than 75 can cause burn back when welding with aluminum wire**).

Regardless of whether you are running a synergic or a pulsed program, the pre– and post– gas flow can also be adjusted. Pre-flow ensures shielding gas is already in place when the welding arc starts, 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 the torch is kept in place for the post-flow duration after the weld is completed). This function is extremely helpful when welding stainless steel and aluminum.

Welding Aluminum with the Pro Pulse 200

The Pro Pulse 200 offers several different programs for welding aluminum. All of the programs are designed to get the best results using 100% Argon gas. For aluminum welding, the use of a U-shaped drive roll is required, and the tension on the wire feed unit has to be properly adjusted. Aluminum wire requires very little tension. A setting just less than 1 will be absolutely sufficient. If higher settings are chosen, 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 the liner, which will clog up the liner.

The use of CuCrZr contact tips is strongly recommended. Regular contact tips can be used, but need to be .005" bigger than normal (e.g., .040" tips for .035" wire). Nevertheless, regular tips are not designed to withstand the extreme heat of pulsed spray arc MIG aluminum welding. The result will be a limited range of operation; the Pro Pulse 200 cannot run to its full potential and the life span of the contact tips will be severely limited.

Aluminum wire should be fed through a designated gun if cross contamination is a concern. While 5356 alloy aluminum wire may be fed through a 10' torch cable (providing the liner is in good condition and the cable is held as straight as possible), 4043 wire needs to be fed through an 8' torch cable. In most cases, aluminum wire can be fed successfully through a steel liner. However, Teflon and Graphite liners are available for critical applications.

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 you aluminum wire for shielding gas flow rates and CTWD. A good gas flow rate starting point for welding aluminum is about 35-50 CFH, but depends on wire diameter, nozzle shape, nozzle size, etc., and a good CTWD starting point for welding aluminum is about 3/4" to 1". The pinch function needs to be set to 75 or lower to prevent burn backs (our suggestion is to start 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 is and the larger the diameter, 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, the slope down (t2) may be set (a slope down time between 2.5 and 4 seconds should suffice, but again, this number depends on material thickness and type of filler wire).

Everybody knows that aluminum is supposed to be preheated before welding. There are a few situations in which preheating the material is not possible, practical, or safe. If you choose not to preheat the part(s) that you are welding, for whatever reason, there is a hot start function built into the Pro Pulse 200 that will reduce the effects of starting an aluminum MIG weld on a cold part.

The hot start function will boost the welding current by about 35% above the selected settings. As the chosen settings reach 200 amps, that boost will be reduced because the machine is only capable of putting out 220 amps for a very short period of time. There are two ways to access hot start:

1. Through time (0.2 to 4 seconds) that can be pre-selected in the MIG 2T mode Start Menu:
    a. Set the start speed between 90% and 100% and the start time to 0.1 seconds for no hot start. This will still give you 0.2 seconds of hot start time, but, in reality, that is the time it takes to ignite the arc so you will not notice any hot start.
    b. Set the time to 2 seconds to get 4 seconds of hot start time. During the first 2 seconds you will get 35% hot start, the following 2 seconds (seconds 3 and 4) you will get hot start tapering down from +35% to the selected welding current.

2. Fully controlled by you with no time limit (as needed) through trigger motion in MIG 4T mode:
    a. Pull and hold the trigger; 35% added hot start in addition to the selected welding settings.
    b. Let go of the trigger; the selected settings are being run, the arc stays lit, and welding is in progress.
    c. 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 stops automatically
    d. Let go of the trigger; welding completed, gas flow stopped.

Note: The 4T trigger was reprogrammed in the aluminum 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 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 the upper encoder counter-clockwise.

Because this is not always practical while welding, there is a second way to control the 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, though only for a very short time, and then lay off 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.

Fig. 3

How to Weld—Step by Step

TIG Welding

Press and release button **A** as many times as needed to select the desired welding mode.

TIG is DC TIG lift-arc ignition. This welding process requires DCEN (electrode negative). Please turn the power off, disconnect the machine from the power outlet, open the compartment where the wire spool is located, and ensure that the polarity is correct.

In the case shown in **Fig. 4** below, the polarity needs to be changed for TIG welding. Please use the wrench on the backside of the machine, if needed, to loosen and tighten the nuts. For TIG welding, the RED cable needs to be attached to the lower terminal (the negative side), and the BLACK cable needs to be attached to the upper terminal (the positive side).

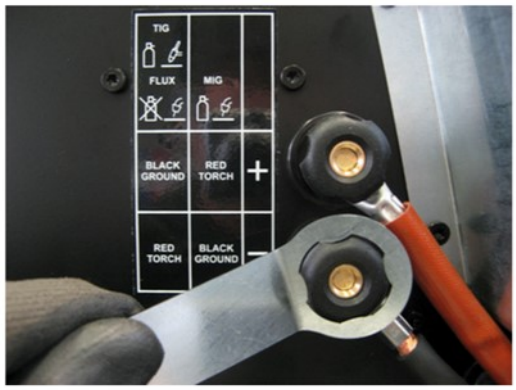


Fig. 4

This welding process uses 100% Argon gas. Install the flow meter on the tank and connect the flow meter to the machine with the supplied gas hose. To connect the gas hose, fasten one end of the gas hose to the flow meter and the other to the back of the welding machine. These connections need to be a little bit more than finger tight, but be careful not to over-tighten them. About 15-20 CFH flow rate is a good starting point (although this ultimately depends on the cup style and size). Plug the TIG torch into connector **X** (**Fig. 3**) and the ground cable into connector **Z** (**Fig. 3**). If a torch with a switch is used, the setup is complete at this point; if a foot pedal is used, please remove the dust cap from connector **Y** (**Fig. 3**) and install the plug for the foot pedal into connector **Y**.

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

By pressing and releasing button **E**, you can access the setup menu (**Fig. 5**; **Note: The gear symbol refers to setup**).

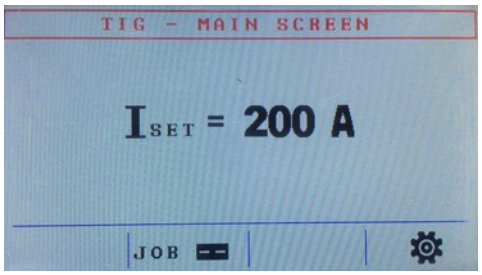


Fig. 5

If a torch switch is used, the slope down time (t2) may be set between 3 and 5 seconds, a good starting point for terminating a weld using a lower amperage, while having more control at the same time.

If a foot pedal is used, we recommend setting the slope down time to 0.1 seconds.

These adjustments are made by turning encoder **G** until the display shows the desired duration (**Fig. 6**).

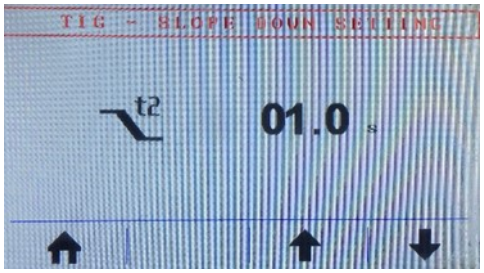


Fig. 6

To get to the next screen, press and release button **E**. This screen shows the gas flow options (**Fig. 7**).

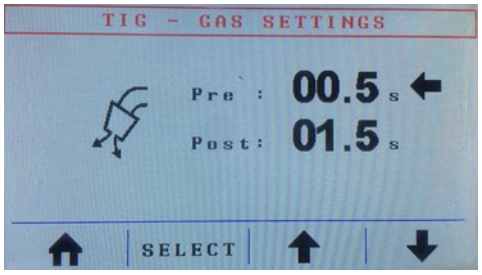


Fig. 7

By turning encoder **G**, you can adjust the pre-flow. Pressing and releasing button **C** moves the arrow from pre– to post-flow and encoder **G** now adjusts the post-flow.

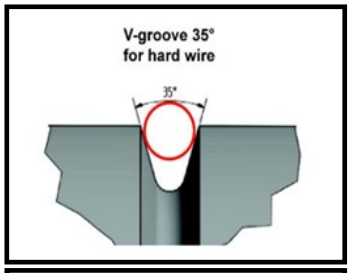
To weld, attach the ground clamp to the work piece and also set the torch on the work piece, allowing the tungsten to make contact with the work surface. Now press and hold the torch switch or depress the foot pedal and lift the tungsten off the work piece about 1/8". The machine senses that the tungsten lifted and initiates an arc. Now the weld can be made. If a foot pedal is used, the amperage can be varied during welding. When you finish welding, let go of the torch

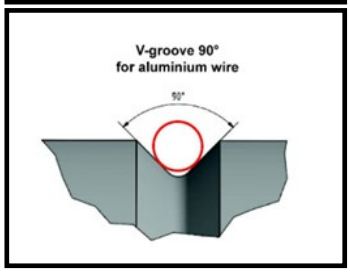
switch. The machine goes into slope down, and the arc will terminate by itself. If a foot pedal is used, gently lift your foot off the pedal to extinguish the arc.

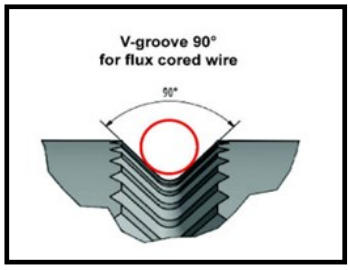
MIG Welding—General Information

MIG welding with the Pro Pulse 200 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 the correct gas, at the correct flow rate, for the wire.
⇒ Use the drive roll 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:** Drive rolls are reversible; there are two different size grooves on the same drive roll, and the marking has to face you.) Also, different materials require different drive roll grove shapes. For instance, mild steel wire, stainless steel wire, and silicon bronze wire typically use a standard V shaped drive roll (**Fig. 8**). Softer aluminum wire uses a U shaped, or V90 degree, drive roll (**Fig. 9**). Flux-cored wire, whether used with or without gas, and most hard-faced wire requires the use of a knurled drive roll—the little teeth provide extra traction on these wires (**Fig. 10**).







Top: Fig. 8; Middle: Fig. 9; Bottom: Fig. 10

⇒ 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 wire to not feed smoothly. When welding flux-cored wire, the 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 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 1. 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, which results in birds nesting).
⇒ 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, we strongly recommend the use of CuCrZr contact tips. If CuCrZr tips are not available, standard tips can be used but the tip size must be .005" larger than the wire size. For example, .035" aluminum wire would require the standard .040" tip, and 3/64" aluminum wire would require the standard .052" tip. (**Note:** Using standard tips when welding aluminum results in shorter tip life and limited performance.)
⇒ 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 bought 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

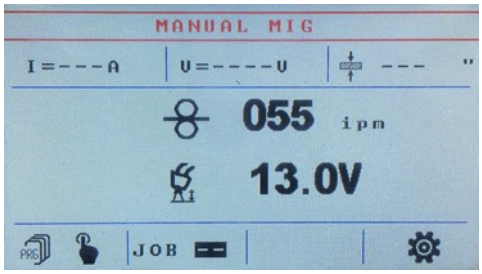


Fig. 11

Press and release Select Mode button **A** as many times as needed until the green LED next to 2T illuminates. If welding in the manual mode is desired, press and release button **B** twice quickly. The machine is now in manual mode (**Fig. 11**). Turn encoder **F** to set the wire feed speed, and turn encoder **G** to set the voltage.

If welding with synergic or pulse programs is desired, press and release button **B** once to display the program list (**Fig. 12**).

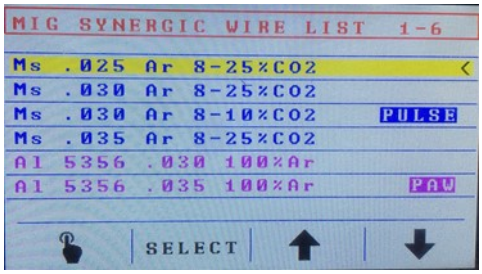


Fig. 12

Use encoder **G** 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 encoder **G**).

There are 21 programs in the Pro Pulse 200. To see a complete list of the programs installed on your Pro Pulse 200, please see Appendix I on page 22. Each program in the list includes a short description. Please see a few examples of what you will see below:

1. Ms—ER70S6 Alloy 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.

All of the programs listed are synergic. **PULSE** means that the program runs in pulse mode. The sound of the machine changes and the spray arc transfer is used. **PAW** means Precision Aluminum Welding, which is a special process for very thin aluminum (as it is commonly found in the automotive industry). The weldable material thickness in this program is approximate—material thicknesses range from .030" to .080". **DOUBLE PULSE** means that the pulse weld (the pulse frequency changes with the material thickness) is overlaid with a second lower pulse frequency (that stays constant no matter the material thickness), which reduces the heat input even farther when welding and produces MIG welds that look like TIG welds.

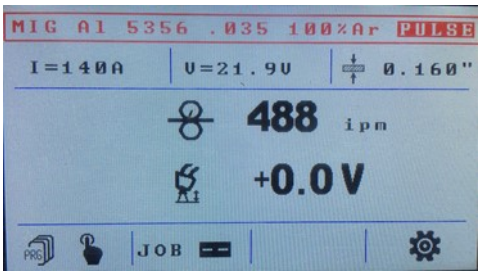


Fig. 13

Once you select a program, the program list disappears and the program is displayed (**Fig. 13**). 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 material, wire speed, wire diameter, and other variables), arc voltage, and material thickness. By turning encoder **F**, 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 0.0V at most times, for most welding operations. You can adjust this value by turning encoder **G**. If an adjustment is made, the absolute arc voltage changes and the color 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 encoder **F** by setting material thickness. The voltage deviation made with encoder **G** is considered

fine-tuning or a personal preference adjustment. You will find the function buttons (**B**, **C**, **D**, and **E**) on the bottom of the display. In this case (**Fig. 13**), button **B**, if pressed and release once, brings up the program list, or, if pressed and released twice quickly, 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.

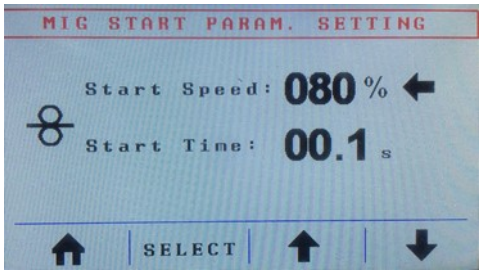


Fig. 14

By pressing and releasing button **E** once, you enter the setup menu (**Fig. 14**). The first screen in the setup menu gives you the option to adjust the run-in speed. Typically, numbers between 70% and 100% are suitable for the run in speed. The start time determines how long the machine runs at the selected wire speed until it switches to 100% wire speed. Start times between 0.1 and 0.5 seconds are common. Correct adjustment of the start parameter allows for a spatter-free and smooth arc initiation. To set the start speed, turn encoder **G**; to set the start time, press and release button **C** (the little, left-pointing arrow will move down from start speed to start time). Turning encoder **G** now adjusts the start time.

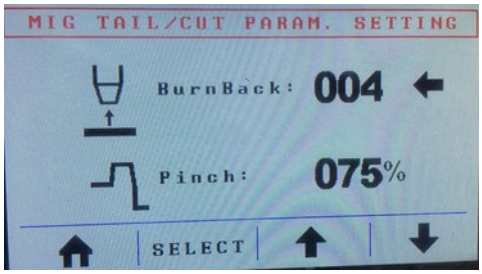


Fig. 15

To go to the next screen, press and release button **E**. The new screen (**Fig. 15**) allows you to make adjustments to 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** once, and then turn encoder **G** to the desired setting. Different wire types need 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 cause burn backs near or into the tip, which causes damage to the tip). Steel wire needs 100% pinch to get the desired result.

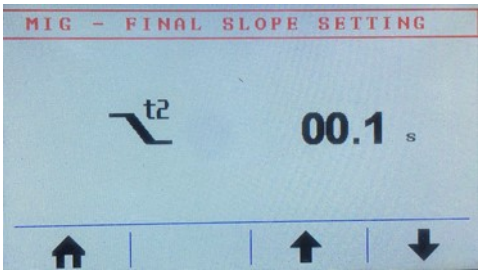


Fig. 16

After adjusting the burn back and pinch, press and release button **E** again to get to the next screen. This screen (**Fig. 16**) 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 encoder **G**. 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 change). If no slope down is desired, set t2 to 0.1 seconds.

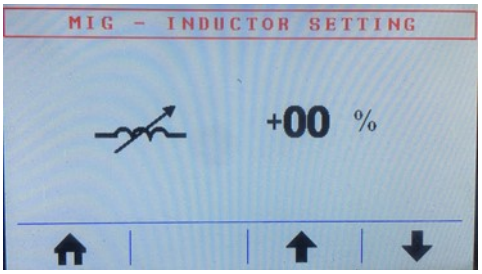


Fig. 17

The slope down feature is only available in pulse programs. Synergic, non-pulse programs have an option to adjust inductance (**Fig. 17**). By turning encoder **G**, 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.

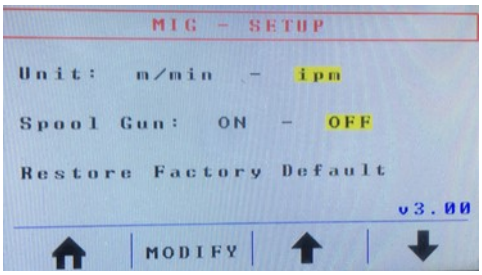


Fig. 18

You can access the final screen (**Fig. 18**) by pressing and releasing button **E** once again. Options on the final screen should not be adjusted by you unless previously instructed by HTP America, Inc. technical service.

MIG 4T

The selection and setup of MIG 4T works identically to MIG 2T. The only difference between MIG 2T and MIG 4T is trigger function. In MIG 2T, pressing and holding the trigger will make the weld, and releasing the trigger will stop the weld. In MIG 4T, pressing the trigger will make the gas flow, releasing the trigger will make the weld start, pressing the trigger again will make the weld stop, and releasing the trigger will make 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 200** (pages 8 and 9) to fully understand the hot start function.

Spot Welding

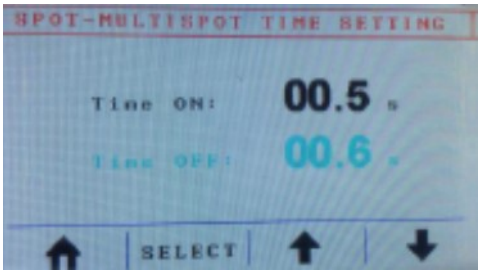


Fig. 19

Press and release button **A** (Select Mode) until the LED next to **SPOT** illuminates, and then press button **E** to access the menu. The new screen (**Fig. 19**) gives you the option to adjust the duration time of the spot weld. Turning encoder **G** 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

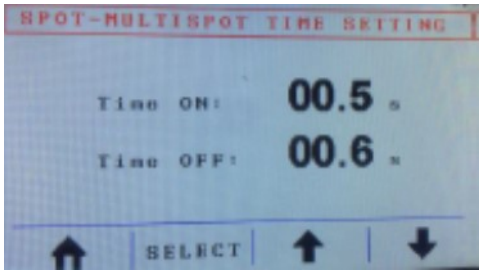


Fig. 20

Press and release button **A** (Select Mode) until the LED next to **STITCH** illuminates, and then press and release button **E** to enter the menu. The new screen (**Fig. 20**) lets you adjust Time ON and Time OFF for stitch welding. To adjust Time ON, turn encoder **G** to the desired time, and then press and release button **C**. Now encoder **G** will adjust Time OFF. When initially setting up the stitch feature, set the start speed to 100% and the 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 the 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.

NOTE: Try to avoid turning the Pro Pulse 200 off when in spot or stitch mode. If you turn the machine off in spot or stitch mode, you will encounter an overheat message when you turn the machine back on. If you turn the machine off and encounter the overheat message, turn the machine off again and then back on. When you turn the machine back on, press the button A (Select Mode) three (3) times within 3-5 seconds. This will put the Pro Pulse back into MIG 2T mode. At this point, the machine should be operational, but we suggest that you once again turn the machine off and then power back on.

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 (Welding Parameter Settings)

1. Press the JOB button **C** to pull up the JOB LIST page.
2. Use the ↑ button **D**, the ↓ button **E**, or the V/SET encoder **G** to select the program in which you want to save the welding parameter settings.
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 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 longer beep, after which the * symbol next to the JOB you were using clears. Wait an additional three (3) seconds, and the Pro Pulse 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 the V/SET 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 WILL 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 your 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 (Welding Parameter Settings)** instructions on page 15 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 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 torch 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 200, 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 welding 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, 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 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 diameters 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 16) 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 the third JOB as a stitch weld function to more easily fill gaps on less than perfect fit up.

TIPS:

If you program a JOB for stainless steel, we suggest using a long post-flow time (5 to 10 seconds) to shield the weld.

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 Options

The Pro Pulse 200 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 settings 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 as short as or as long as you want, as well as fill craters as slow as or as fast 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.

Trouble Shooting Burn Back Issues

Set the burn back to 004, and then lower the pinch to zero (the pinch snips the wire by sending a final electrical current to trim the ball off of the end of the wire). When setting pinch, start at zero and increase the pinch by increments of 10. Then, to fine tune, increase the pinch by increments of 5.

If you are experiencing burn back issues at start-up, then the start speed is set too low. The start speed determines how crisp the arc ignition will be—high speeds cause machine gunning and/or a sluggish arc start. The start speed should be .3 or less (never above .5). Start speeds vary depending on the material you are welding; thicker or harder wire requires a slower start speed, and thinner or softer wire requires a higher start speed.

If you are experiencing burn back issues in the middle of the weld, the issue may stem from the contact tip, wear on the liner, drive roll pressure, or wire brake pressure. When welding aluminum, insufficient gas flow may be causing the issue or your voltage compensation could be set too high (e.g., on +8).

If you are experiencing burn back issues at the end of the weld, then the pinch is set too high. Go into the settings and change the pinch back to 0. Increase the pinch by 5-10 until the Pro Pulse electrically snips the ball from the end of the wire. For 4043 aluminum, the prime pinch setting falls in the 40 to 50 range, 5356 aluminum falls around 75, and 5554 aluminum falls around 100. For steel, the prime pinch setting falls around 100, and for silicon bronze, the prime pinch setting falls between 50-75. Please note: The above ranges are approximate.

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

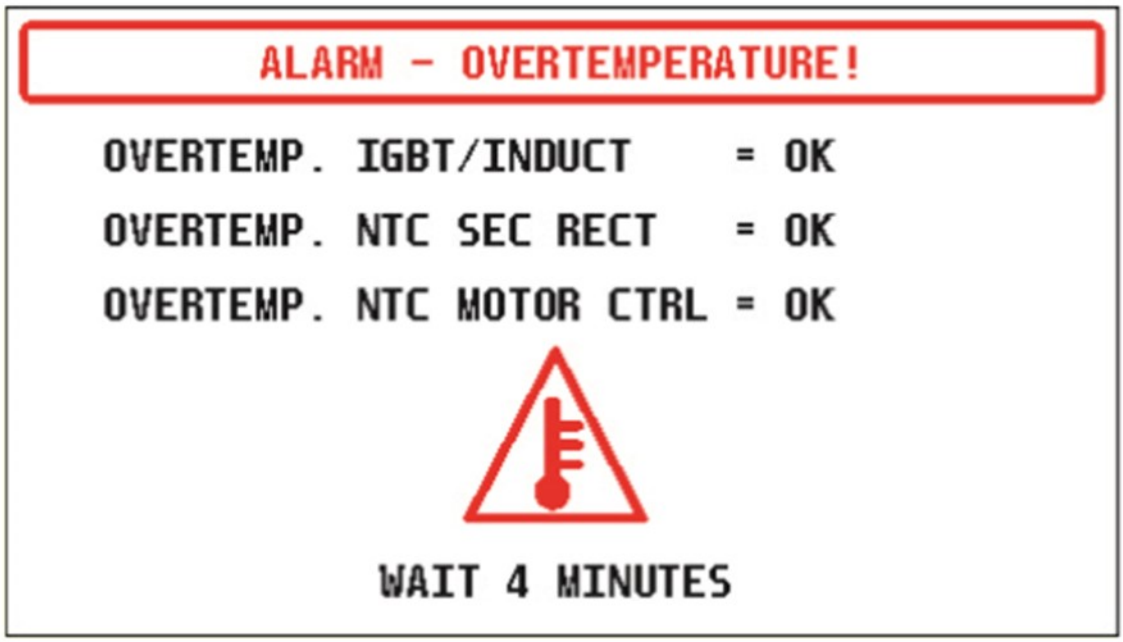


Fig. 21

The Pro Pulse 200 is designed for the maintenance welder. It has the ability to weld a lot of different materials and a great variety of thicknesses. Thicker material, depending on type, temperature, etc. may require multi-pass welds.

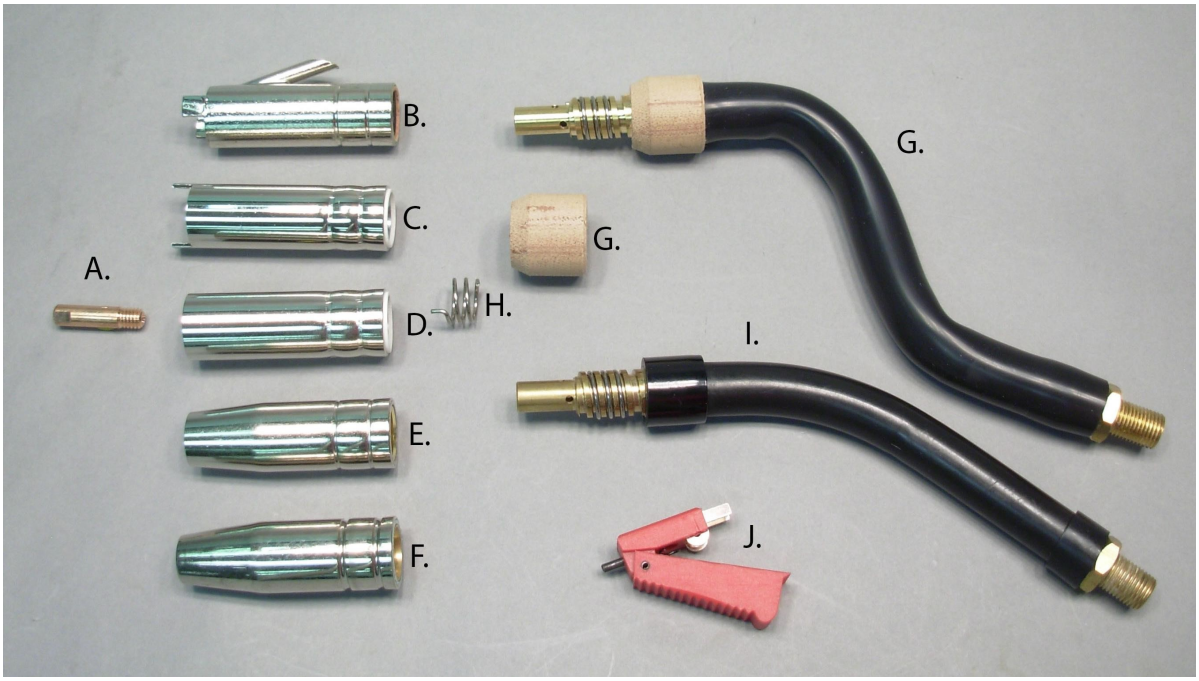
Duty cycle ratings can be confusing, but we want to make duty cycle less confusing. An 80% duty cycle means that, out of a 10-minute time span (duty cycle is always a 10-minute time span, per definition, and this never changes), the machine can weld for eight (8) minutes and then needs to idle with the 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 200 with a very 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 200 is a machine in the 200 amp class; it is designed for welding operations up to 200 amps. Depending on the selected program and the welding material, the peak pulse can be as high as 300 amps (**Note:** This will not show in the display; the display shows an average amperage, comparable to a classic MIG machine). For a very short time, the Pro Pulse 200 can run at 220 amps. If its capabilities are exceeded, the machine automatically lowers the settings for protection purposes. This happens only rarely in the 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 welding parameters lower, the wire speed symbol color changes from black to red, and the value (number in IPM) for the wire speed flashes in black and red (normally the value is shown in solid black). 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 slightly lower settings than previously selected.

HTP 15 Series MIG Welding Gun

The smallest of the Pro Pulse 200 compatible guns. Excellent for reaching into tight spaces (e.g., work on cars). Also, lightweight for less operator fatigue. Available in 10', 12', and 15' lengths. Best for use on steel (non-pulse).

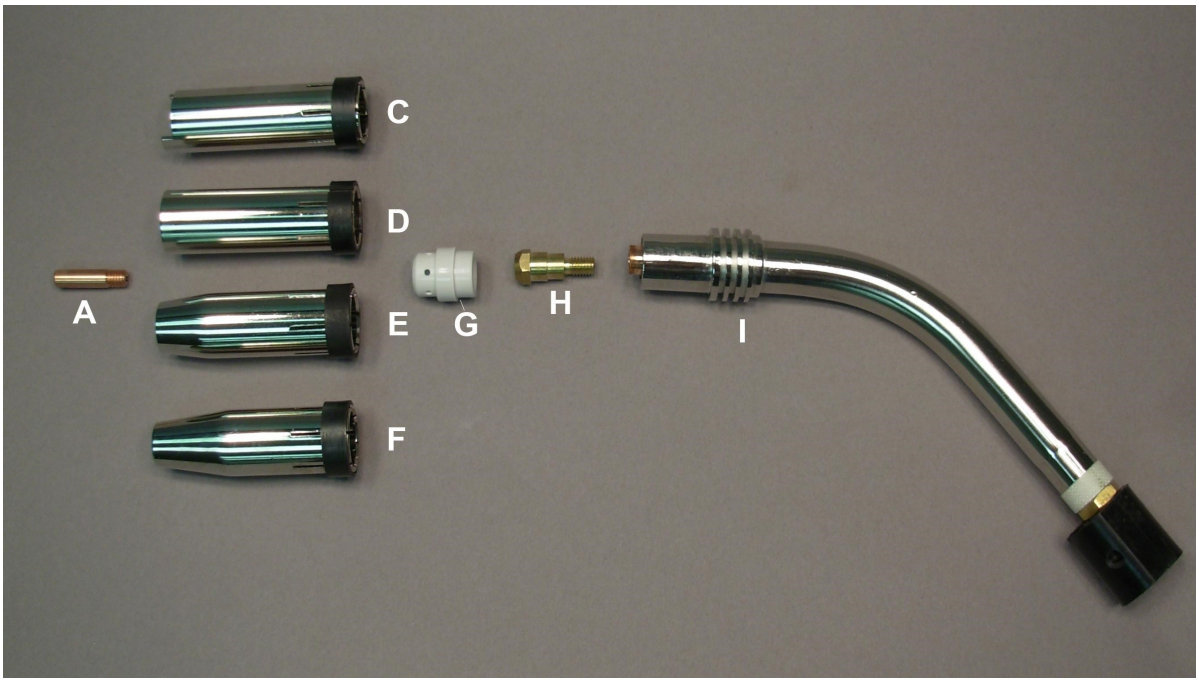


	Part#	Description		Part#	Description
A.	15023-10	.023" Contact Tip, 10-Pack	I.	13002-DLT	Gas Diffuser
A.	15030-10	.030" Contact Tip, 10-Pack	J.	14009	Trigger Switch
A.	15035-10	.035" Contact Tip, 10-Pack	L.	15100	10' MIG Gun
C.	15106	Spot Weld Nozzle	L.	15120	12' MIG Gun
D.	15104	Cylindrical Nozzle	L.	15150	15' MIG Gun
E.	15105B	Conical Nozzle, 3-Pack	M.	15040-16	16' Steel Liner
F.	15108	Small Conical Nozzle	N.	50013	Consumable Kit
G.	15058	Head Insulator f/Flex Neck	O.	63160	Drive Roll f/Steel, .023"-.030"
G.	15500	Flexible Swan Neck	P.	63498	Drive Roll f/Flux-Cored Wire
H.	15062B	Nozzle Retaining Spring, 4-Pack	Q.	15510	10' Flex Neck MIG Gun
I.	14058	Head Insulator	Q.	15512	12' Flex Neck MIG Gun
I.	15002	Swan Neck, Standard Rigid Neck	Q.	15515	15' Flex Neck MIG Gun

HTP 24 Series MIG Welding Gun

Slightly larger than the 15 Series MIG Welding Gun. Still 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 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')

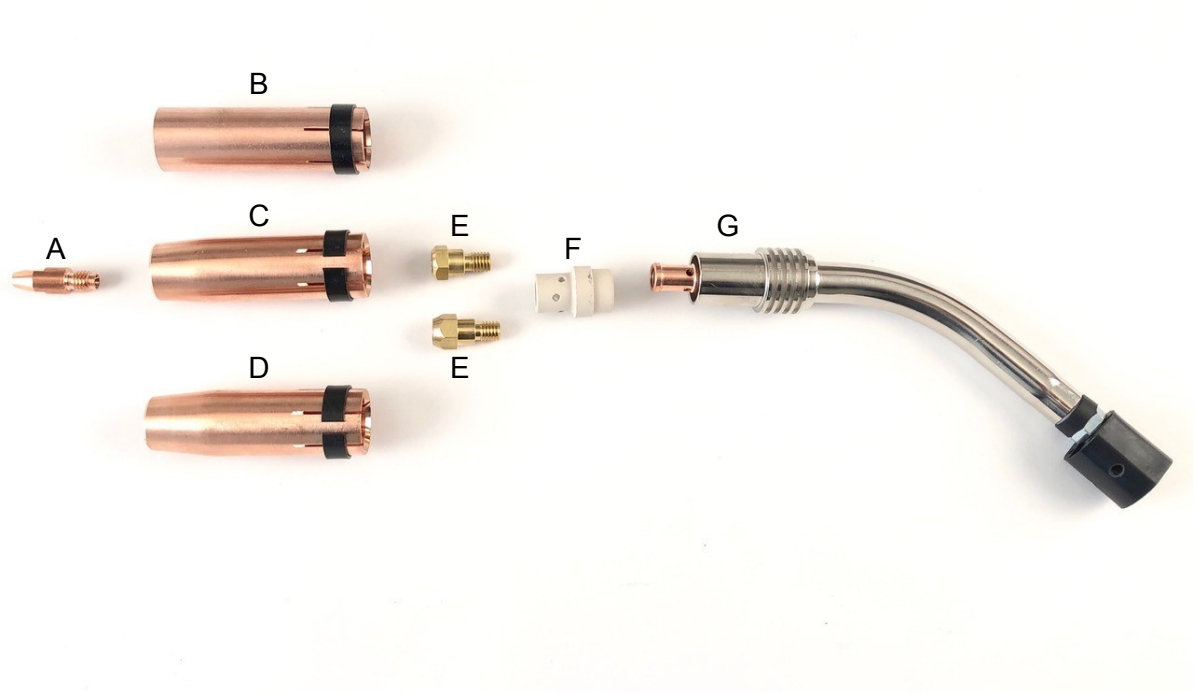


	Part#	Description		Part#	Description
A.	24023-10	.023" Contact Tip, 10-Pack	E.	24105B	Conical Nozzle, 3-Pack
A.	24030-10	.030" Contact Tip, 10-Parck	F.	24108B	Small Conical Nozzle, 3-Pack
A.	24035-10	.035" Contact Tip, 10-Pack	G.	24002-DIF	Gas Diffuser
A.	24045-10	.045" Contact Tip, 10-Pack	H.	24002-TH	Tip Holder
A.	24030-10CR	.030" Long-Life Contact Tip	I.	24002	Swan Neck
A.	24035-10CR	.035" Long-Life Contact Tip	J.	24100	10' MIG Gun
A.	24040-10CR	.040" Long Life Contact Tip	J.	24120	12' MIG Gun
A.	24045-10CR	.045" Long Life Contact Tip	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.	634980	Drive Roll f/Flux-Cored Wire

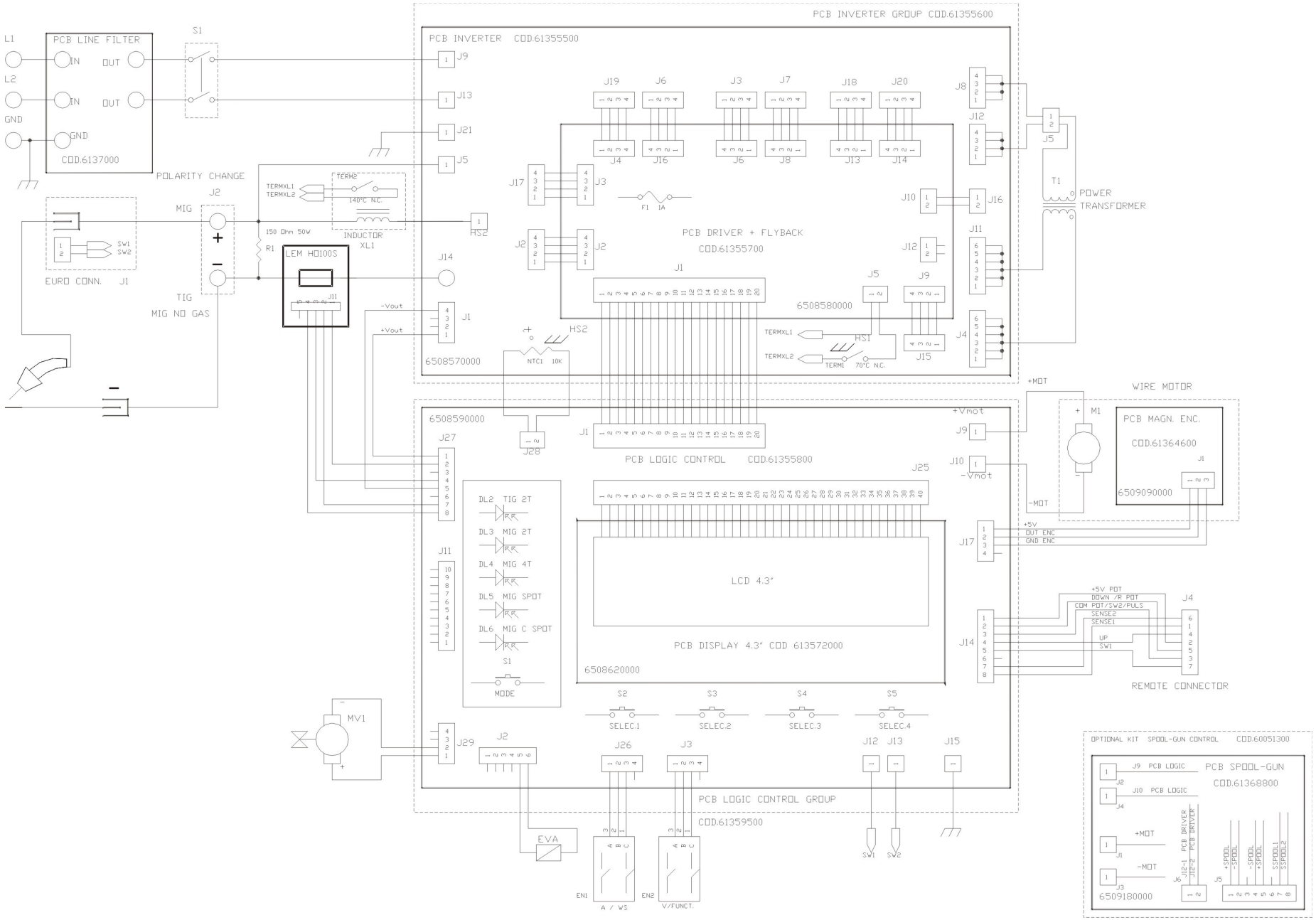
HTP 26 Series MIG Welding Gun

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). Comes in an 8’ length with M8 size CuCrZr tips. The 26 Series MIG Welding Gun can be used for:

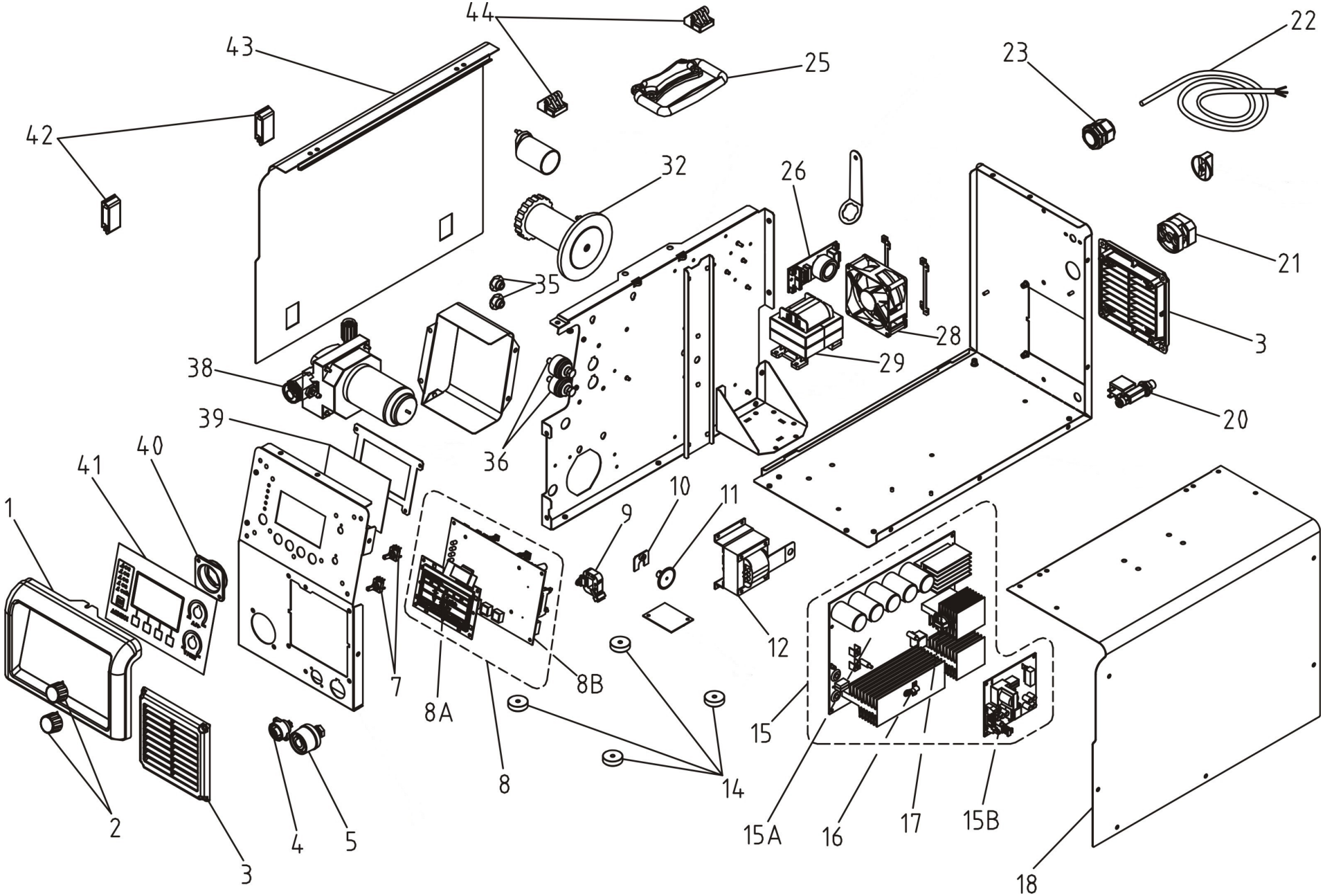
- Steel (all diameters and thicknesses; both pulse and non-pulse)
- Flux-cored (all thicknesses; with and without gas)
- Stainless Steel and Silicon Bronze (all thicknesses)
- Aluminum (EVERY wire diameter from .030” to .047” (3/64”); EVERY alloy (5356 and 4043 namely))



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



Pro Pulse 200 Wiring Diagram

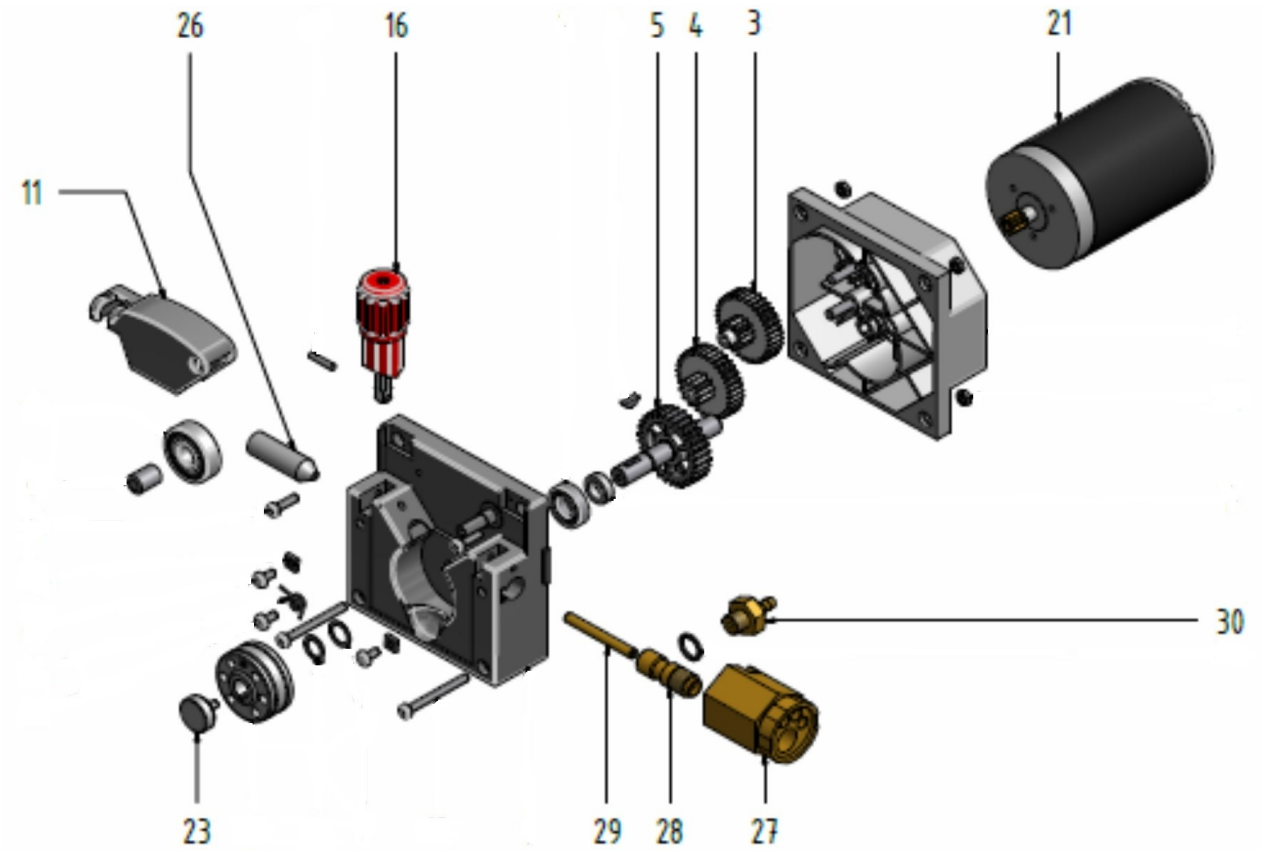


Pro Pulse 200 Parts Diagram

Parts List

Position	Part#	Description
1	661157	Plastic Frame
2	661062	Knob
3	661043	Fan Cover
4	600512	Remote Control Receptacle
5	642740	Ground Receptacle
7	611902	Encoder
8	613772	Front Panel Assembly
8a	613572	Display PCB
8b	613773	Logic PCB
9	650897	Lem Probe
10	613646	Magnetic Encoder PCB
11	636210	Wheel
12	613653	Output Inductance
14	635880	Foot
15	613556	Inverter/Flyback/Driver PCB
15a	613555	Inverter PCB
15b	613557	Flyback & Driver PCB
16	612475	NTC Thermal Sensor
17	650697	Thermal Switch
18	620738	Cover
20	617030	Solenoid Valve
21	647240	Power Switch
22	647610	Input Power Cable
23	660785	Cable Strain Relief
25	661034	Handle
26	619350	Line Filter PCB
28	647460	Fan
29	613593	Power Transformer
32	664860	Spool Holder
35	666320	Polarity Nut
36	642800	Polarity Stud Assembly
38	613635	Wire Feed Assembly
39	661319	Screen Protector
40	664620	Euro MIG Gun Connector Flange
41	661387	Control Panel Label
42	664710	Sliding Latch
43	620739	Door
44	664680	Hinge

Pro Pulse 200 Wire Feed Assembly
Parts Diagram



Position	Part#	Description
3	661311	Gear to Motor
4	661312	Intermediary Gear
5	636210	Gear w/Main Axle
11	636350	Pressure Arm
16	636360	Pressure Adjustment Knob
21	648020	Wire Feed Motor (24V/50W)
23	634690	Retaining Screw
26	634700	Inlet Wire Guide
27	637990	Euro MIG Gun Adapter
28	636250	Connecting Screw M12 x 1.5 x 35mm, Brass
29	636370	Wire Guide Tube 5 x 2 x 57mm, Brass
30	636260	Gas Connection Screw, Brass

Appendix I

Programs

No.	Material	Wire Diameter	Shield Gas	Program Name	Gas Flow Rate (Approx.)	Min. Thickness
1	Mild Steel	.023” - .025”	AR 8-25%CO2	Ms .025 Ar 8-25%CO2	Between 20-25 CFH	.019”
2	Mild Steel	.030”	AR 8-25%CO2	Ms .030 Ar 8-25%CO2	Between 20-25 CFH	.023”
3	Mild Steel	.030”	92% AR 8% CO2	Ms .030 Ar 8%CO2 PULSE	Between 30-35 CFH	.023”
4	Mild Steel	.035”	AR 8-25%CO2	Ms .035 Ar 8-25% CO2	Between 30-35 CFH	.032”
5	Aluminum 5356	.030”	100% AR	Al 5356 .030 100%Ar		.040”
6	Aluminum 5356	.035”	100% AR	Al 5356 .035 100%Ar PAW		.032”
7	Aluminum 5356	.035”	100% AR	Al 5356 .035 100%Ar PULSE	Between 40-50 CFH	.059”
8	Aluminum 5356	.035”	100% AR	Al 5356 .035 100%Ar DoubPULSE	Between 40-50 CFH	.059”
9	Aluminum 5356	.047” or 3/64”	100% AR	Al 5356 3/64 100%Ar		.059”
10	Aluminum 5554	.047” or 3/64”	100% AR	Al 5554 3/64 100%Ar PAW	Between 40-50 CFH	.040”
11	Aluminum 5554	.047” or 3/64”	100% AR	Al 5554 3/64 100%AR PULSE	Between 40-50 CFH	.059”
12	Aluminum 4043	.035”	100% AR	Al 4043 .035 100%Ar PAW		.032”
13	Aluminum 4043	.035”	100% AR	Al 4043 .035 100%Ar PULSE	Between 40-50 CFH	.079”
14	Aluminum 4043	.035”	100% AR	Al 4043 .035 100%Ar DoubPULSE	Between 40-50 CFH	.079”
15	Aluminum 4043	.045” or 3/64”	100% AR	Al 4043 3/64 100%Ar		.079”
16	Stainless Steel	.030”	98% AR 2% CO2	SS308 .030 Ar 2%CO2 PULSE	Between 30-35 CFH	.023”
17	Stainless Steel	.035”	98% AR 2% CO2	SS308 .035 Ar 2%CO2 PULSE	Between 30-35 CFH	.040”
18	Silicon Bronze	.030”	100% AR	SiBro .030 100%Ar PULSE		.032”
19	Silicon Bronze	.030”	100% AR	SiBro .030 100%Ar		.032”
20	Silicon Bronze	.035”	100% AR	SiBro .035 100%Ar PULSE		.059”
21	Flux-Cored	.035”	No Gas	Flux-Cored .035 Gas-less	**Attn: Reverse Polarity**	.048”
22	Flux-Cored	.035”	75% AR 25% CO2	Flux-Cored .035 25%CO2		.079”