Revolution™ 2500

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Elk Grove Village, IL 60007-1304
Ph.: (847) 357-0700 Fax: (847) 357-0744
Web: www.usaweld.com

1) FOREWARD

Thank you for purchasing an HTP America® Revolution™ 2500—our advanced, multi-process welder. The Revolution 2500 is a versatile, high-quality, and feature-rich machine that offers pulse features in every welding process. With the Revolution 2500 you can run the following processes: SMAW (Stick), SMAW-P (Pulse Stick), GTAW (TIG), GTAW-P (Pulse TIG). All TIG processes offer both AC and DC options.
In MIG mode you will find a manual mode ad well as several synergic programs as well as single and even double pulse programs . These features give you 100% control over the bead appearance and heat input at any given time.

In the AC TIG mode, the following wave forms are available: square wave, and triangular wave. The Revolution 2500 offers the ability to run on single-phase power, from 110Volt* (with output limitations) and 208 to 240V without output limitations. For crisp arc starts and excellent arc stability we also recommend the use of 2% ceriated (U.S. Color Code: Gray; European Color Code: Orange) tungsten electrodes as our inverter is designed to work best with them.

2) 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 or 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 the warranty card is sent to HTP America, Inc. within Fifteen (15) Business Days from the date of purchase.

EXCLUSIONS TO WARRANTY:
1) MIG guns and TIG welding torches are warranted for a period of Ninety (90) Days against defects in material and workmanship.
2) Gas nozzles, contact tips, diffusors etc. as well as tungsten electrodes, collet bodies, collets, and gas lenses 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.

3) SAFETY SUGGESTIONS
It is forbidden for people with PACEMAKERS to use or come near the machine. When welding near sensitive electronics, for example in hospitals or assisted living homes or around computers or computer control modules in vehicles, we STRONGLY recommend turning off HF (high-frequency arc start). Even an AC arc on a modern inverter can be ignited in lift-arc mode! HF travels long distances, 10 to 20 feet are very common in some instances, and HF can interfere with electronics in neighboring buildings if they are on the same transformer! Unlike regular welding currents, that travel the path of least resistance, HF is unpredictable.
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.

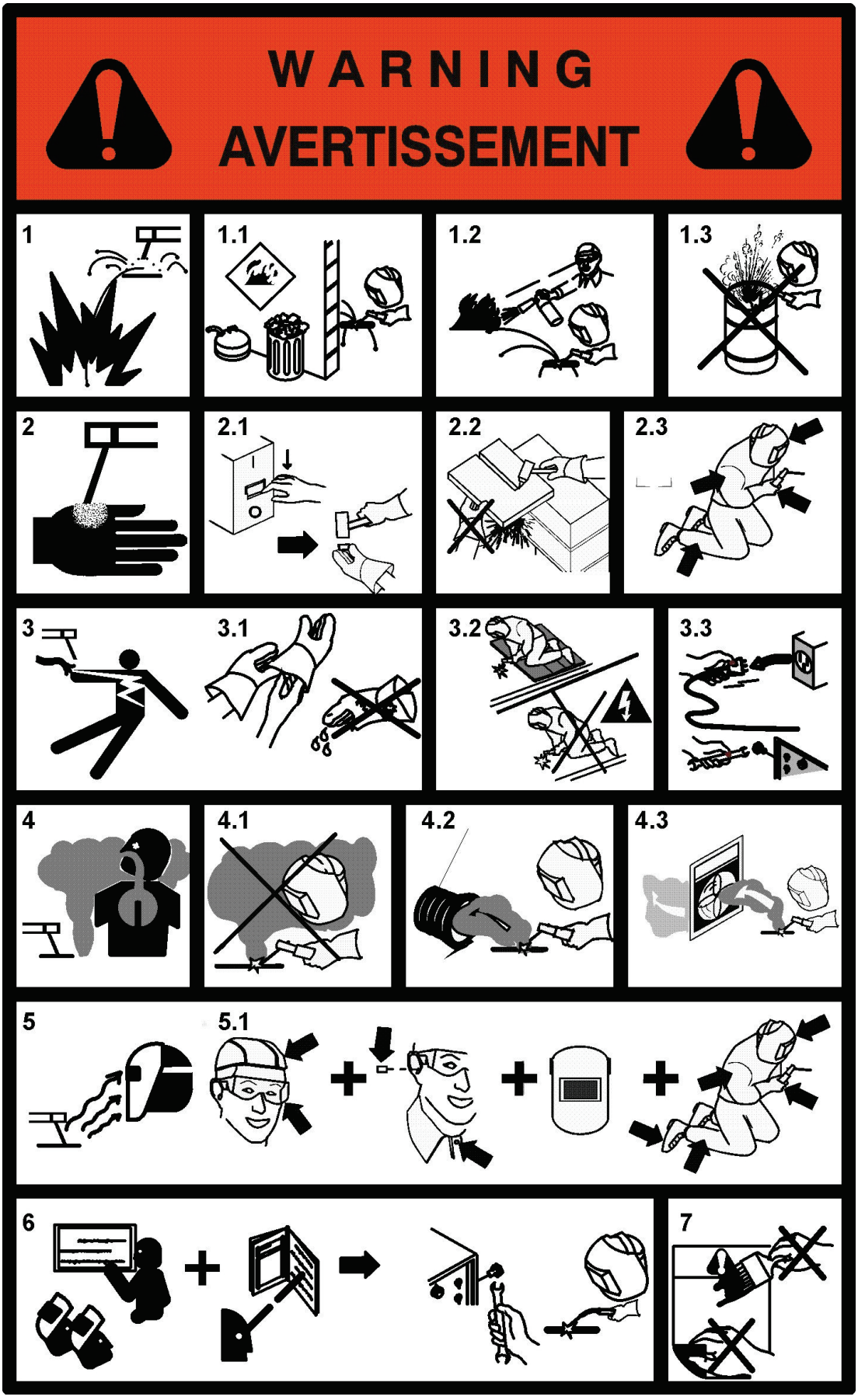
Electric arc welding produces toxic fumes.
- Provide adequate ventilation in the welding area at all times.
- Do not weld on galvanized zinc, cadmium, or lead beryllium materials unless you are POSITIVE that sufficient ventilation is provided. These materials produce toxic fumes.
- Do no weld in areas 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 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 and then 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.

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.

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.


WARNING
AVERTISSEMENT
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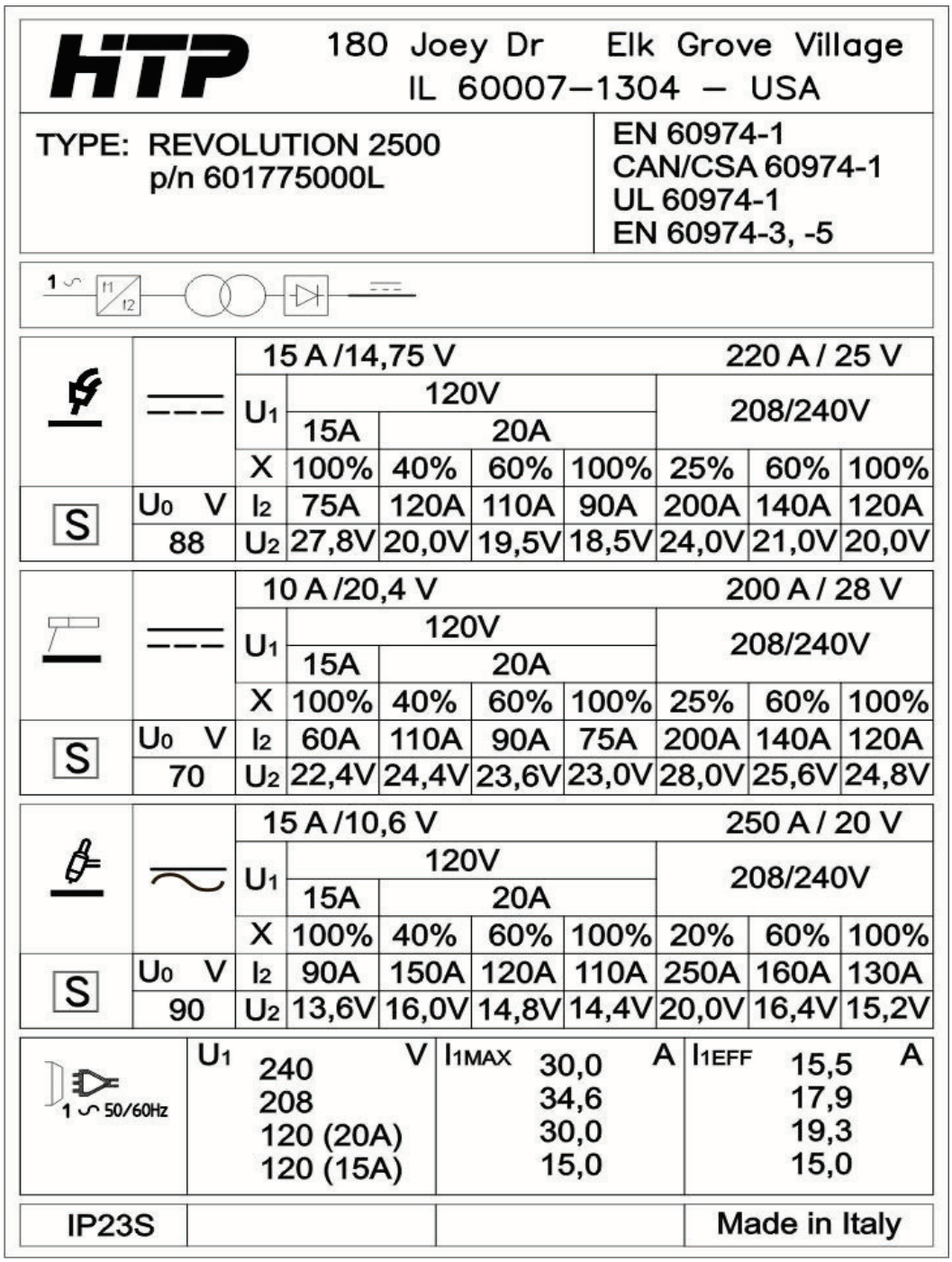
4) SPECIFICATIONS

Revolution 2500 Specifications	
Input Voltage (volts)	Single Phase : 115 – 240 V
Electronic Overload Protection	YES
Welding Modes	STICK (and Pulse Stick) TIG (and Pulse Tig) MIG MANUAL MIG 2T (and Pulse Mig) MIG 4T (and Pulse Mig) MIG 4TS (and Pulse Mig)
Hot-Start Stick (%)	0 to 50
Arc-Force Stick (%)	0 to 500
Wave Forms TIG	Square , Triangular
AC Frequency (Hz)	20 to 400 (Up to 100 Amps) 20 to 200 (Over 100 Amps)
AC Balance (%)	10 to 90
Pre-Flow (Seconds)	TIG : 0,3 – 2 MIG : 0,1 - 2
Post Flow (Seconds)	TIG : 0,1 - 15 MIG : 0,5 – 15
Initial Amps (%)	10 to 90
Final Amps (%)	10 to 90
Wire Diameter *Depends on the material being welded (not all wire can be welded in all sizes)	.023” to .045”
Wire Feed Rate (In/Min.)	55 to 629
Wire Spool Capacity	8”
Pulse Parameters Pulse/Second (PPS) Stick Pulse/Second (PPS) TIG DC Peak Time (%) Background Amps (%)	 0,4 to 5,0 0,4 to 999,9 10 to 90 10 to 90
Dimensions	300 x 420 x 535
Weight (lb)	77,6

DATA PLATE



HTP 180 Joey Dr Elk Grove Village IL 60007–1304 – USA								
TYPE: REVOLUTION 2500 p/n 601775000L						EN 60974-1 CAN/CSA 60974-1 UL 60974-1 EN 60974-3, -5		
		15 A /14,75 V				220 A / 25 V		
		U_1	120V			208/240V		
			15A	20A				
		X	100%	40%	60%	100%	25%	60%	100%
S	U_0 V	I_2	75A	120A	110A	90A	200A	140A	120A
	88	U_2	27,8V	20,0V	19,5V	18,5V	24,0V	21,0V	20,0V
		10 A /20,4 V				200 A / 28 V		
		U_1	120V			208/240V		
			15A	20A				
		X	100%	40%	60%	100%	25%	60%	100%
S	U_0 V	I_2	60A	110A	90A	75A	200A	140A	120A
	70	U_2	22,4V	24,4V	23,6V	23,0V	28,0V	25,6V	24,8V
		15 A /10,6 V				250 A / 20 V		
		U_1	120V			208/240V		
			15A	20A				
		X	100%	40%	60%	100%	20%	60%	100%
S	U_0 V	I_2	90A	150A	120A	110A	250A	160A	130A
	90	U_2	13,6V	16,0V	14,8V	14,4V	20,0V	16,4V	15,2V
1 50/60Hz	U_1 V		I_{1MAX} A		I_{1EFF} A			
	240		30,0		15,5			
	208		34,6		17,9			
	120 (20A)		30,0		19,3			
	120 (15A)		15,0		15,0			
IP23S					Made in Italy			

FRONT PANEL CONNECTIONS

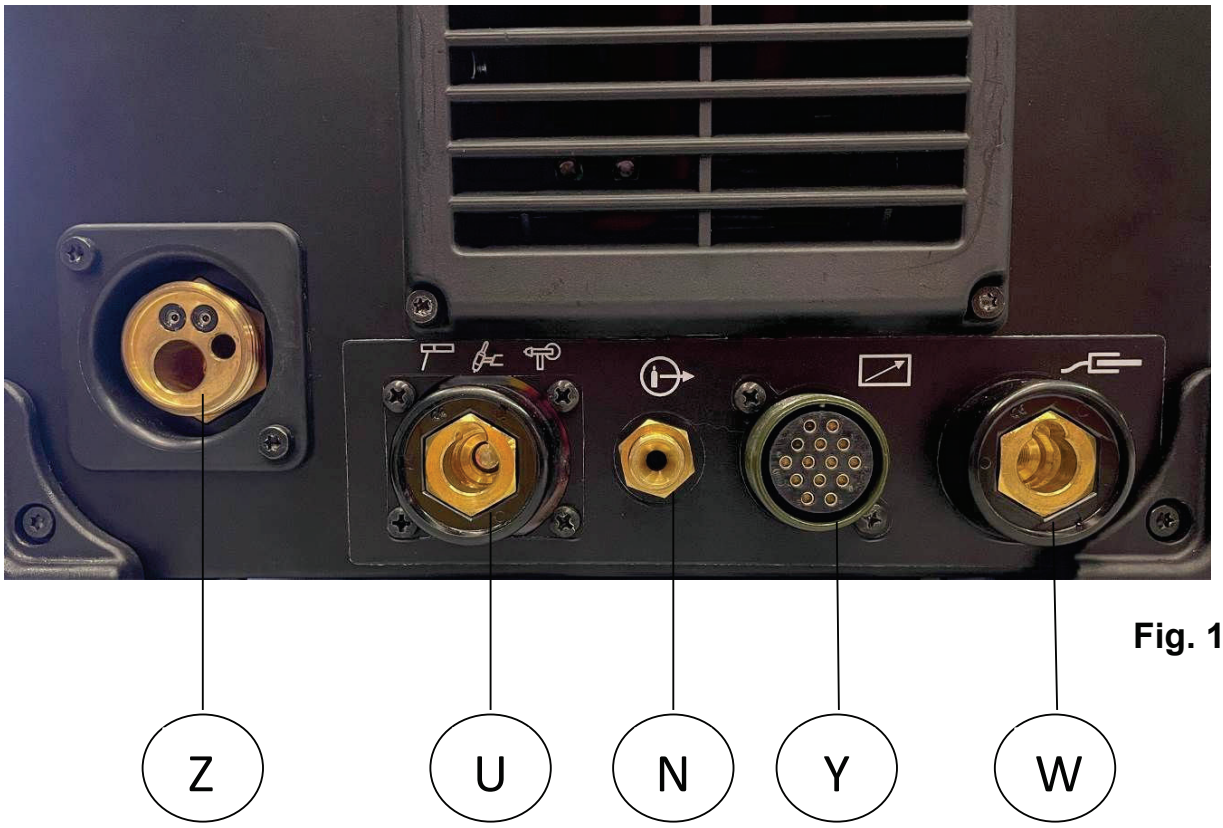


Fig. 1

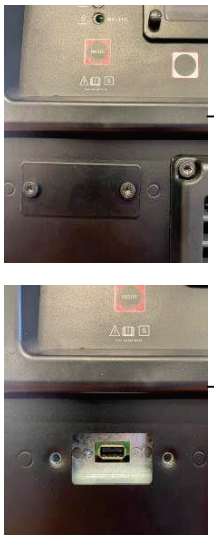
Z – central connector for MIG gun

U – connector for tig torch or electrode holder

N – gas for tig torch

Y – remote control receptacle

W – round clamp, automatic polarity reversal depending on welding process



USB PORT . This USB port is used only for software updates

Fig. 2

BACK PANEL CONNECTIONS

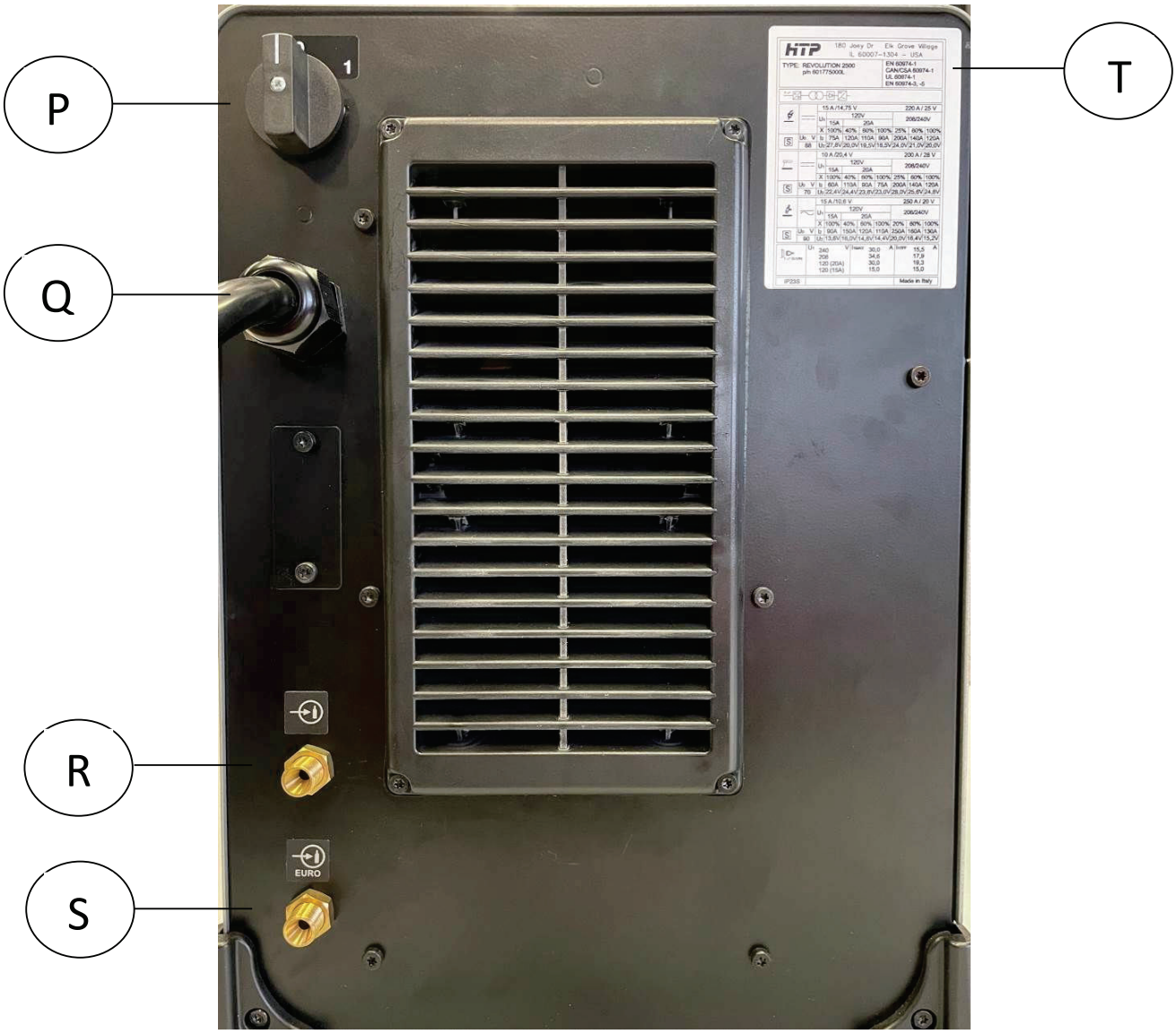


Fig. 3

P – power switch

Q – onnector for tig torch or electrode holder

R – ort for TIG and Spool Gun shielding gas

S – ort for MIG shielding gas

T – ata plate

ELECTRICAL CONNECTIONS

Your REVOLUTION 2500 operates to its full capacity on single-phase, 230V power (208V-240V). IT can be run on 110/120 volt with reduced output. The machine draws 30 amps (230 volts) from of the wall when operating at maximum output. We recommend a 30 Amp breaker for maximum performance. If you operate the machine on a generator, it needs to be a clean power generator with a minimum of 7500 watts. 7500 watts must be the "continuous" rating or "running watts" rating of the generator, NOT the "peak" rating or "starting watts" rating of the generator. If you operate the machine on an extension cord, the wire size of the cord needs to be at least 10AWG and should not exceed a length of 100' regardless if you operate the machine on 110/120 or 220/240 volt.

The machine is from the factory equipped with a NEMA6-50 plug and will plug into a matching receptacle and is "ready to be powered on". For the first few seconds you will see the message PF0 flashing in the display, the machine is now evaluating which voltage is supplied to the machine and will make internal adjustments. After this PF0 message flashes a few times it will go away, and the machine will go to the regular operating screen. The machine is ready to weld now.

To operate the machine on 110/120 volt please use adapter plug (HTP part number 515P650R18) to adapt to 110/120 volt. To operate the machine on 110/120 Volt simply plug machine into the wall outlet, wait for the PF0 message to clear and the machine is ready to be used now. There are no switches to switch, no modifications needed the machine will automatically identify the input voltage and work properly.

When operating this machine on 110/120volt please use a dedicated circuit (no other lights or grinders or any other appliances shall share the circuit with the welding machine). The REVOLUTION 2500 can be operated on a 15amp 110/120volt circuit but with even more limitations in regard on maximum output and duty cycle, for best results welding on 110/120 volt a dedicated 20amp circuit is recommended. On a 120volt 20amp circuit the maximum output of the machine is 120A MIG, 110A Stick and 150A Tig. For more detailed specs please refer to the data plate on your machine.

FRONT PANEL CONTROLS

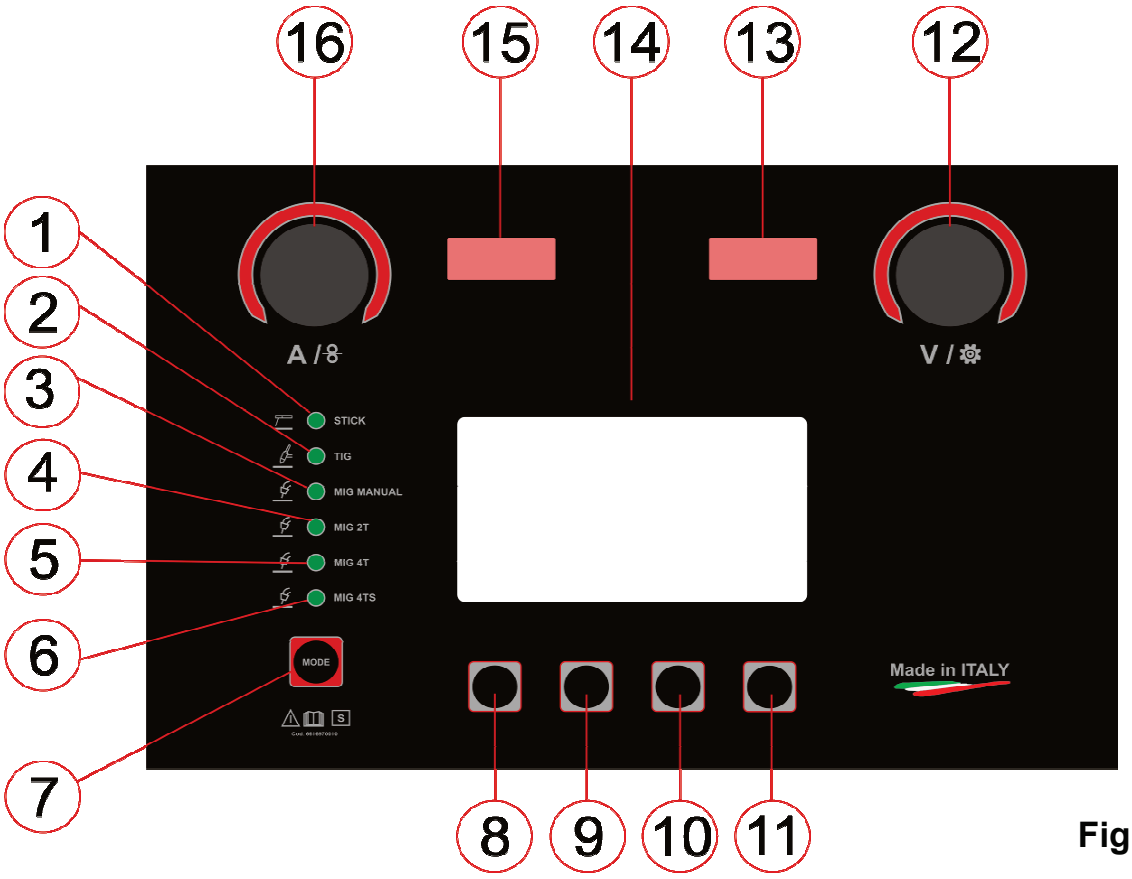


Fig. 4

1 **STICK WELDING LED**
2 **TIG WELDING LED**
3 **MIG MANUAL WELDING LED**
4 **MIG SYNERGIC 2T LED**
5 **MIG SYNERGIC 4T LED**
6 **MIG SYNERGIC 4TS LED**
7 **SELECT MODE** button - Allows you to access different welding modes by pressing repeatedly.

8 9 10 11 **SETUP AND SELECTIONS BUTTON -** 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**.**

12 **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.

13 **RIGHT DISPLAY** - In this display you can see the voltage

14 **MAIN DISPLAY** – In this display you see all welding parameters

15 **LEFT DISPLAY -** Shows wire feed speed,welding amperage or maximum pedal amperage

16 **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).

WAVE FORMS

SQUARE WAVE: The standard wave form for all modern inverter TIG welding machines. The square wave offers excellent power, arc control, and bead appearance. A good choice, all around, for aluminum welding. When in use, some operators may perceive the square wave sound as loud and unpleasant. However, many operators prefer to use a square wave due to its superior performance and features, such as the ability to run pulse.

TRIANGULAR WAVE: The triangular wave form allows you to reach maximum peak current while dramatically reducing the overall heat input. When using a triangular wave form, the machine can be configured to show either the maximum (peak) amperage or the overall (actual) amperage welding output on the LCD. The Amperage display (red numeric; above LCD) always shows the max (nominal/peak) amperage. Rapid formation of melting points reduces the overall welding time, which, in turn, alleviates distortion—especially when welding thin material. The triangular wave creates a fast freezing puddle, which results in superior control and heat input management. Pulse functions are unavailable in Triangular AC.

AC BALANCE: Balance refers to the time the arc spends above or, in the case of HTP machines, below the zero line. What does that mean? Imagine you weld AC and you set your frequency not to 100Hz but to 1Hz (1Hz used for the purpose of easy demonstration; the frequency of the Revolution 2500 cannot be set any lower than 20Hz). Set at 50% balance, your current would come out of the material and go into the torch (your electrode positive (EP) part) for 0.5 seconds. For the next 0.5 seconds, your current would come out of the torch and go into the material. Let's say you weld at 100 amps. For 0.5 seconds, you will see 100 amps come out of the material and go into the torch, and for the following 0.5 seconds, you will see 100 amps come out of the torch and go into the material. Do you need 0.5 seconds of electrode positive (EP)/cleaning/breaking open of the oxide layer? No, most likely not—that is why you typically don't weld with a 50% balance. Do you want more electrode negative (EN)/penetration and to put heat into the material you are welding (rather than the torch)? Yes, absolutely. Most people consider an EN balance between 60 and 80% the sweet spot. With balance set too low, the tungsten balls, and with the balance set too high, the weld bead turns gray, flat, and dull. You may even see some peppering in the weld along with insufficient cleaning of the oxide layer. On the Revolution 2500, you can adjust the balance from 10 to 90%.

AC FREQUENCY: AC frequency does two things, mainly. First, AC frequency focuses the arc. Higher frequencies feature a more focused arc and a narrower frost line, which works really well on thin material. On thick material, higher frequencies tend to make it hard to join two pieces of material, as the focused arc wants to cling to only one piece and not join it to the other piece. Second, AC frequency affects heat input. As previously discussed , higher frequencies result in a lower overall heat input. Lower frequencies result in a higher overall heat input. In other words, thin material prefers higher frequencies (this is why the Revolution 2500 offers an adjustment range from 20 to 400Hz when operating at an output under 100 amps), and thicker material prefers lower frequencies. Although the adjustment above 100 amps lets you choose AC frequencies from 20 to 200Hz, at a material thickness of 1/4", 1/2", or even higher, it is not uncommon to see frequencies of 50Hz or less be used on a regular basis for best results.

Pulse in DC TIG

You typically use the DC pulse function to reduce the heat input when welding to prevent distortion or excessive discoloring of the base metal. The Amperage display shows the maximum amperage, and you set the background amperage and the peak time (pulse-on time or duty) based on that maximum amperage. You set both the background amperage and the peak time as a percentage of the maximum amperage. Peak time refers to the peak pulse current number. The actual duration of the peak time, in seconds or in fractions of a second, depends on the third variable—the pulse frequency. The pulse frequency determines the speed, for lack of a better word, of the time it takes to switch between the higher and the lower amperage. There are two schools of thought:

• Use low-speed pulse frequencies between 0.5 and 2.0 PPS (pulses per second or Hz) to create a ripple effect in the weld bead. The pulsing can easily be seen by the human eye. When using low-speed pulse frequencies, you typically will not experience any interference or other technical difficulties with either fixed shade or auto-darkening welding helmets.

• Use high-speed pulse frequencies between 25 and 100 PPS to create a smooth weld bead, much like DC TIG without pulse. The pulsing usually cannot be seen by the human eye. You typically use high-speed pulse frequencies when welding stainless or mild steel out of position, when heat affected zones need to be kept to a minimum, or when warpage or distortion of parts are a concern. When using auto-darkening welding helmets, depending on the frequency of the cartridge in the welding helmet and the frequency you set the machine to, there may be a very narrow band of specific frequencies where interferences are possible. Whether interferences happen at all, or at what frequency the interferences occur at, depends on the welding helmet you use (make, model, etc.); we cannot predict who will experience interferences. If, when welding, you notice flickering, change your frequency by +/- 20 PPS and try again.

For most applications, we recommend setting the background amperage to 25% and the peak time (pulse-on time or duty) to 25%. Example: You set your max amperage to 100 amps, your background amperage to 25%, and your peak time to 25%. For 25% of the time, you weld at 100 amps, and for 75% of the time, you weld at 25 amps.

Using these settings during a low-speed pulse application (with the right torch movement and either no filler or while using a lay wire technique) allows you to produce nice ripples. Using these settings during a high-speed pulse application allows you to achieve penetration close to what 100 amps of straight DC gives, but with significantly lower heat input and a much more controllable puddle. Even though you only reach 100 amps 25% of the time, and 25 amps 75% of the time, in a high-speed pulse scenario it is NOT safe to assume that the first quarter at 100 amps and the second through fourth quarters at 25 amps equal 43.75 amps of overall heat input (100 + 25 + 25+ 25 = 175/4 = 43.75). While the math does not hold true in high-speed pulse applications, the math comes a lot closer in low-speed pulse applications. In a high-speed pulse application, at a 25 PPS pulse frequency setting, you introduce 100 amps into the base material 25 times per second, and at a 50 PPS pulse frequency setting, you introduce 100 amps into the base material 50 times per second. Even though this occurs for a short or a very short period of time, the time between the 100 amp bursts is not long enough to let the material really cool down to an average of 44 amps of heat input. Nevertheless, a high-speed pulse application is significantly cooler than just DC TIG.

The strongest effects and the best results occur when you set the difference between the peak amperage and the background amperage rather high. With the Revolution 2500, you can adjust the pulse frequency from 0.4 to 1000 PPS, the background amps from 10 to 90%, and the peak time (pulse-on time or duty) from 10 to 90%.

Pulse in Stick

Advantages of Pulse Welding
Pulse welding includes ALL of the following advantages, but **not all at the same time**. At a later point in the manual, we cover, in more detail, suggested settings regarding how, when, and where certain situations apply.
- Visually spatter free (MIG & TIG only, though still reduced spatter when stick welding)
- Higher travel speeds
- Deeper penetration
- Less heat input, which equals less material distortion
- Ability to weld thinner material than you could without pulse
- Superior control of the weld puddle, especially when welding out of position
- Easily join materials of differing thicknesses
- Better gap bridging when welding materials with poor fit up
- Ability to make leak-tight welds
- Improved bead appearance
- Ability to use one size bigger welding rod than normal
- Weld on thinner material without burning through
- Easier for beginner welders

Disadvantages of Pulse Welding
- Pulse welding can interfere with sensitive electronics like pacemakers and auto-darkening welding helmets
- Low pulse frequencies (less than 1.5Hz) can be perceived as unpleasant, sound-wise, by the operator (TIG and Stick only)

HOT-START for Stick
Hot-start when stick welding gives a short burst of current to light hard to strike electrodes.

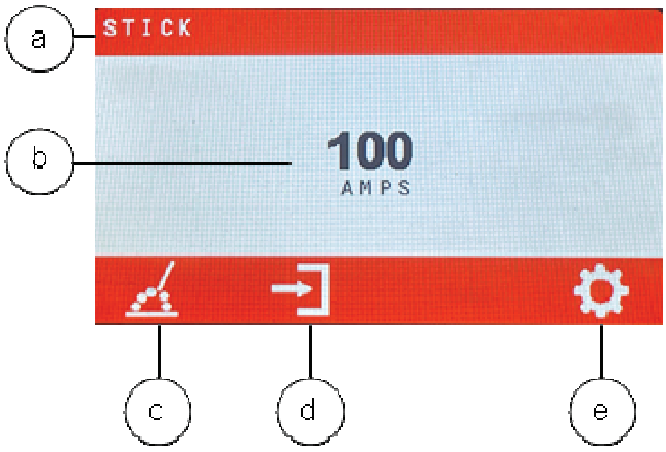
HOT-START for TIG
The hot-start for TIG function is available in AC and in DC. Hot-start provides a short (in the range of milliseconds) burst of current to ignite the arc. Many other welding manufacturers offer hot-start, but they typically don't give the operator the option to adjust hot-start. Hot-start ensures arc starts with tungsten electrodes that are not fresh and pristinely ground, as well as material that is not perfectly prepared. If your material and torch are in mint condition, and you weld on very thin material, you can turn hot-start off. This is very uncommon in the industry because most machines have arc starting difficulties at low or very low amperages. Some machines even include a hidden, non-adjustable hot-start feature. The ability to turn hot-start off allows you to have a true 4 amp arc start, which can be extremely important when welding thin and critical material.

HF, LIFT-ARC, & SCRATCH-START
When welding near sensitive electronics, for example in hospitals or assisted living homes or around computers or computer control modules in vehicles, we STRONGLY recommend turning off HF (high frequency arc start). Even an AC arc on a modern inverter can be ignited in lift-arc mode! HF travels long distances; 10 to 20' traveling distances are very common. In some instances, HF interferes with electronics in neighboring buildings if they are on the same transformer! Unlike regular welding currents that travel the path of least resistance, HF is unpredictable.

Lift start, not to be mistaken for scratch-start, can be used to ignite a DC or an AC welding arc with the Revolution 2500. If you use a foot pedal, turn HF off in the menu, and then touch the clean and cold tungsten electrode to the clean material you plan to weld on. Depress the foot pedal a little bit, at minimum, which activates the contact switch (the more you depress the foot pedal, the easier the arc will ignite). At this point, NO welding current flows through the tungsten, you are not shortening anything out, and only a very small control current flows through the torch, just sensing the short circuit. The moment you lift the torch and break the short circuit, the machine applies the welding current and ignites the arc. Typically, the tungsten electrode does not get contaminated this way, the arc starts smooth (not violent), and everything is very controllable using the foot pedal. To choose between HF start and Lift start is more a matter of personal preference and what a person is used to. When welding longer beads, the difference might appear negligible to some people, but when making a bunch of spot or tack welds, HF is definitely more comfortable.

HOW TO WELD – STEP BY STEP

STICK (SMAW)



a Welding Mode ;
b Amps ;
c Process ;
d Sequence ;
e Settings ;

Use the Select Mode button (**Fig. 4, ref.7**) to toggle through the menu until the LED next to STICK illuminates. You are now in the stick welding mode.

Plug the electrode holder (stinger) into the desired outlet (most stick electrodes use DCEP, which requires the electrode holder to be plugged into the positive output receptacle (**Fig. 2, ref.U**) and the ground clamp into the negative output receptacle (**Fig. 2, ref. W**). Use the encoder **F** (**Fig.4, ref. 16**) to set your welding amperage, which is shown in the LCD.

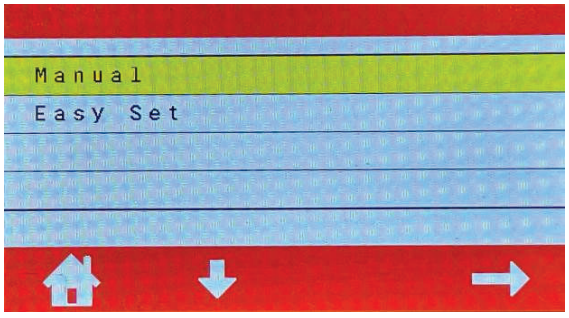
MANUAL / EASY SET

Electrode welding has two types of settings. MANUAL and EASY SET.

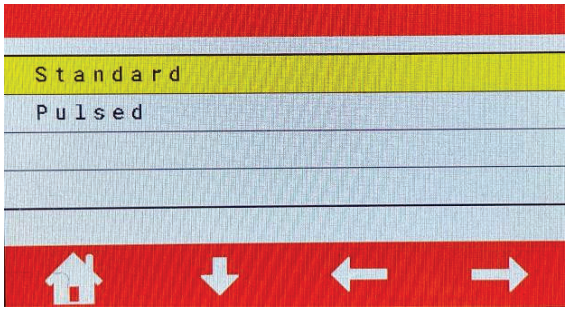
MANUAL In Manual mode it works as with a normal electrode inverter welder by setting the welding current, Arc Force and Hot Start. In this mode you can work in Standard or Pulsed.

EASY SET The Easy Set mode gives the operator the possibility to choose the type of electrode to use and the diameter. The Arc Force and Hot Start values are already set. Also in this mode you can work in Standard or Pulsed.

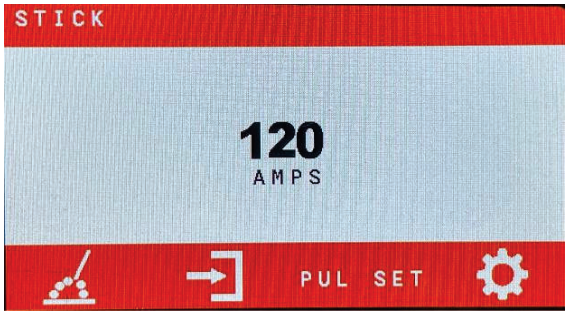
1) Press the button (**Fig. 4, ref.8**)



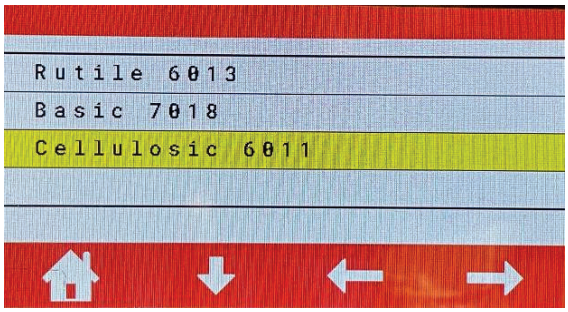
2) Select the Manual or Easy set function through the button (**Fig. 4,ref.9**)or the V / SET encoder
3) To activate the selected function, press the button (**Fig. 4,ref .11**)
4) Then you will go to a new screen:



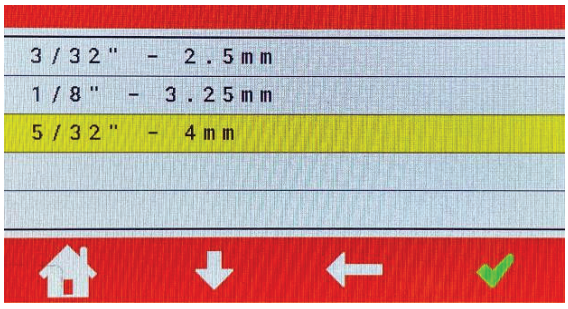
6) Select the Manual or Easy set function through the button (**Fig.4,ref.9**) or the encoder (**Fig.4,ref. 12**)
7) To activate the selected function, press the button (**Fig.4,ref. 11**)
7a) If the pulse is activated, the main screen will look like this:



8) If the EASY SET function was previously selected, the display will show the following screen

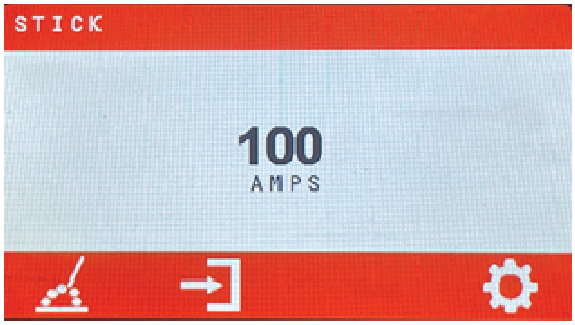


9) Select the type of electrode through the button (**Fig.4 ,ref. 11**) or the encoder (**Fig.4, ref.12**);
10) To confirm the choice, press the button (**Fig.4,ref. 11**)
11) At this point we move on to the choice of the electrode diameter

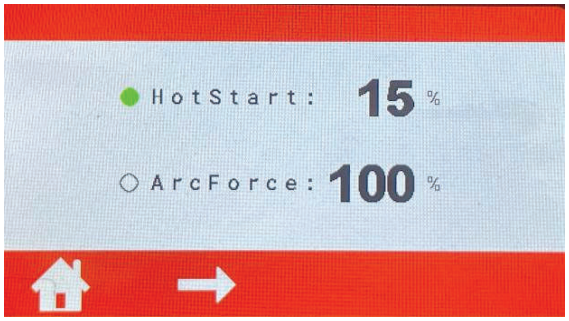


12) Select the size of the electrode through the button (**Fig.4 ,ref. 11**) or the encoder (**Fig.4,ref.12**) ;
13) To confirm the choice, press the button (**Fig.4, ref. 11**)

HOT START / ARC FORCE ADJUSTMENT

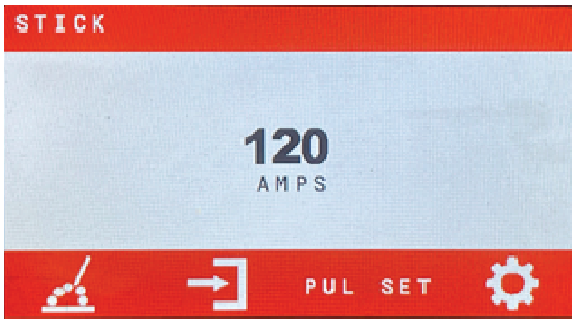


14) To enter in the Arc Force / Hot Start adjustment menu, press the button (**Fig.4, ref. 9**) ;

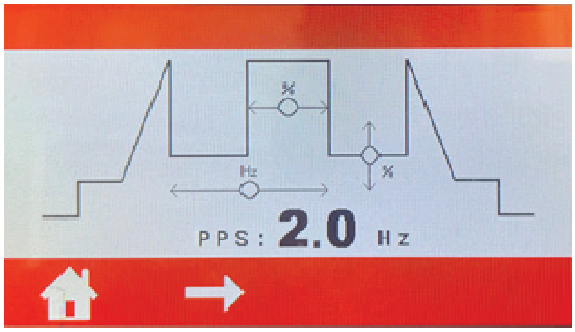


15) To select Arc Force or Hot Start press the button (**Fig.4,ref. 9**)
16) To change the Arc Force or Hot start value move the encoder (**Fig.4,ref. 12**) ;

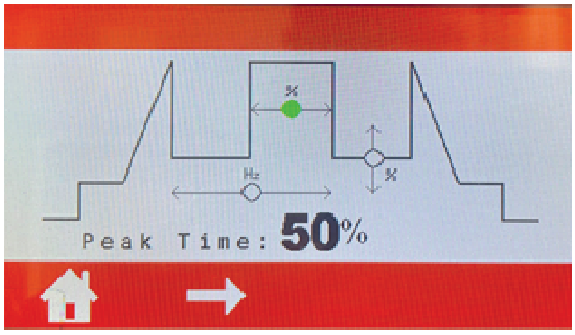
PULSE PARAMETERS ADJUSTMENT
(Only in MANUAL MODE)



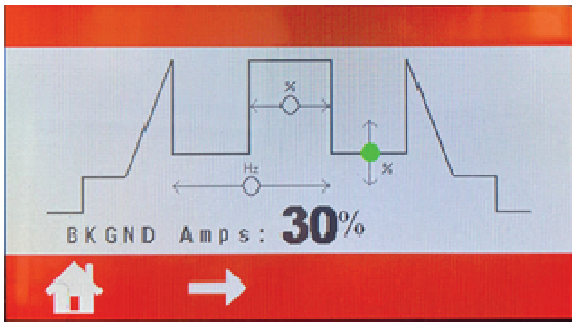
17) Press PUL SET button (**Fig. 4, ref.10**);
18) Pulse Frequency Adjustment (PPS)



19) To change the pulse frequency value, move the encoder (**Fig.4,ref. 12**)
20) Press the button ➡ (**Fig.4,ref. 9**) to go to the Peak time regulation;



21) To change the Peak time value , move the encoder (**Fig.4,ref.12**)
22) Press the button ➡ (**Fig.4,ref. 9**) to go to the Background Amps regulation



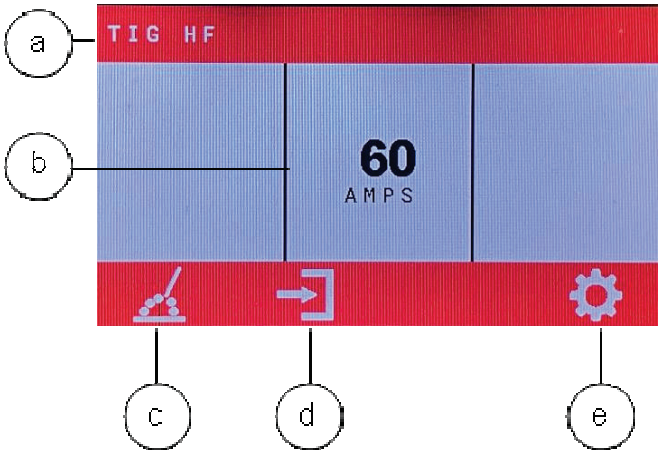
23) To change the Background amps value, move the encoder (**Fig.4,ref.12**)

In EASY MODE the pulse parameters are not adjustable .

TIG WELDING

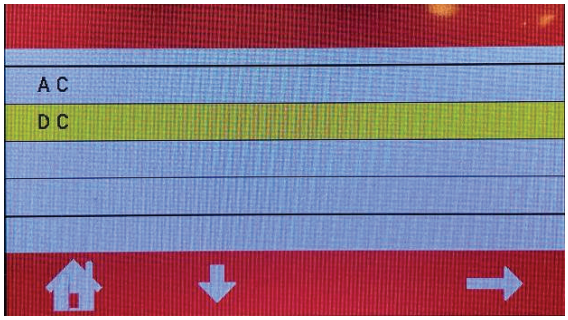
TIG 2T

Use the Select Mode button (**Fig.4,ref 7**) to toggle through the menu until the LED next to 2T illuminates. You are now in the TIG 2T welding mode.

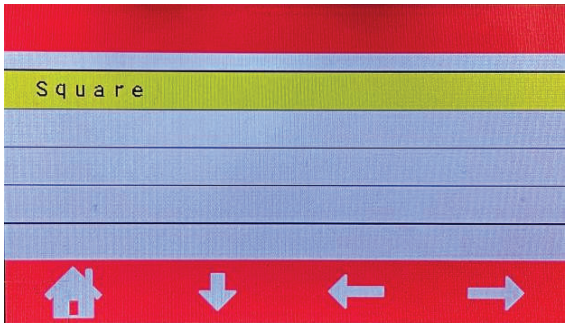


a Welding Mode;
b Amps;
c Process ;
d Sequence ;
e Settings ;

Plug the TIG torch into the output receptacle (**Fig.1, ref.U**) and the ground clamp into the output receptacle (**Fig.1,ref. W**)



1) Press the button (**Fig.4,ref.8**)
2) Select the AC or DC set function through the button ⬇ (**Fig.4,ref.9**) or the encoder (**Fig.4,ref. 12**)
3) To activate the selected function, press the button ➡ (**Fig.4,ref. 11**)
3a) If you activate the AC function the next screen will be this :



SQUARE is the AC Wave Form.
SQUARE WAVE : The standard wave form for all modern inverter TIG welding machines. The square wave offers excellent power, arc control, and bead appearance. A good choice, all around, for aluminum welding. When in use, some operators may perceive the square wave sound as loud and unpleasant. However, many operators prefer to use a square wave due to its superior performance and features, such as the ability to run pulse.

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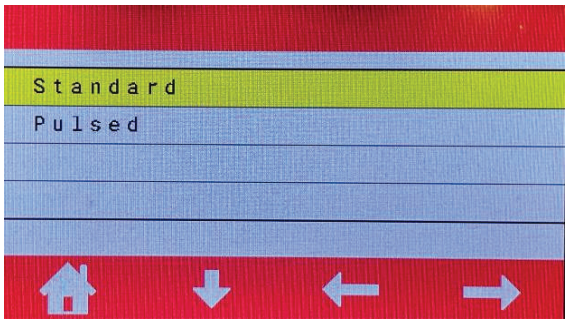
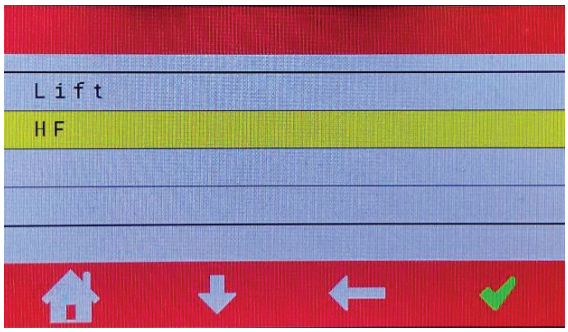
4) Then you will go to a new screen (Only if you select DC mode)



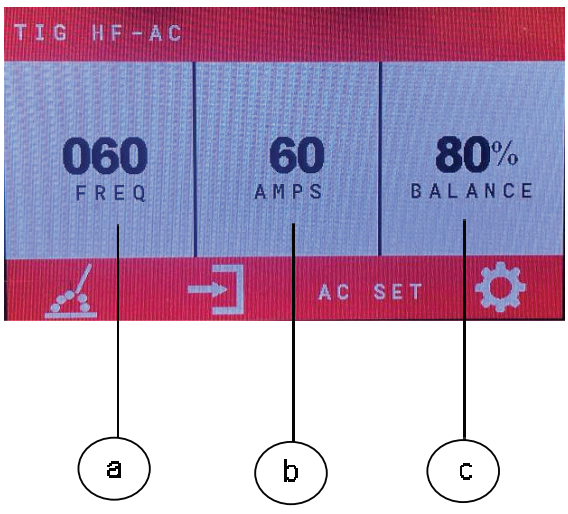
5) Select the Standard or Pulsed set function through the button ⬇ (**Fig.4,ref.9**) or the encoder (**Fig.4,ref.12**)
6) To activate the selected function, press the button ➡ (**Fig.4,ref. 11**)
7) Then you will go to a new screen:



8) Select LIFT or HF through the button (**Fig.4, ref.9**) or the encoder (**Fig.4,ref. 12**)

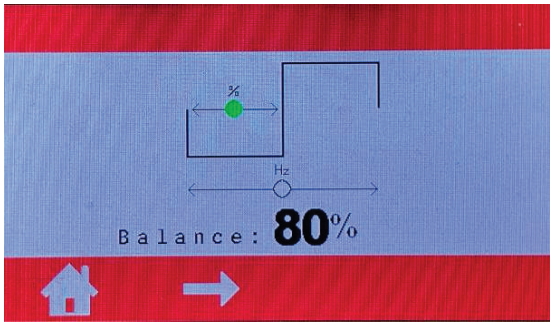
AC MODE

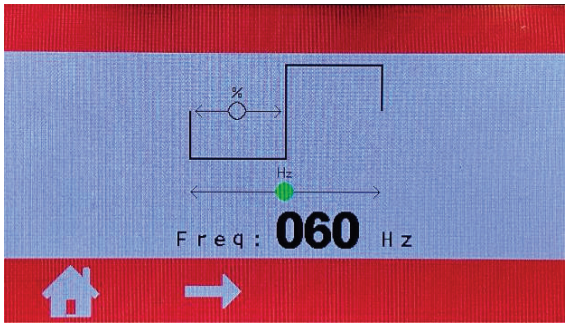
This is the main screen when you activate the AC MODE



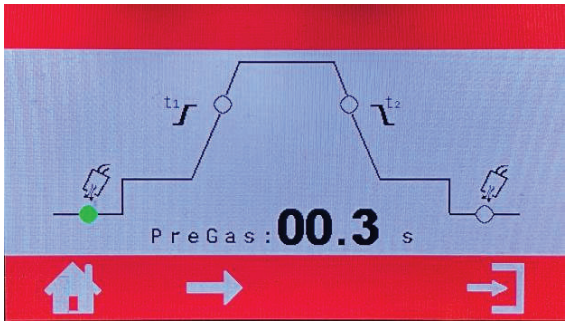
a AC Frequency;
b Amps;
c AC Balance

For regulate the parameters AC FREQUENCY and AC BALANCE press the button AC SET (**Fig.4, ref.10**). With the encoder (**Fig.4, ref. 12**) you can regulate the value .
Press the button ➡ (**Fig.4,ref. 11**) to go to Frequency regulation .



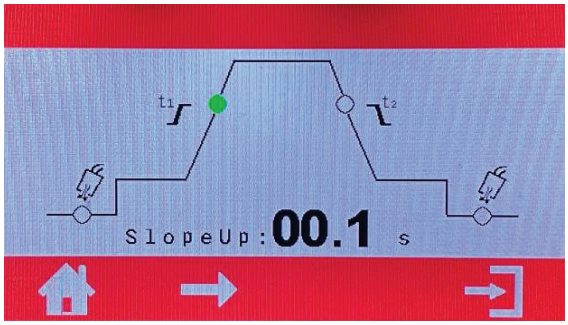


In order to access the TIG - MAIN SETTINGS submenu, press button ➡] (**Fig.4, ref.9**), and the following screen appears

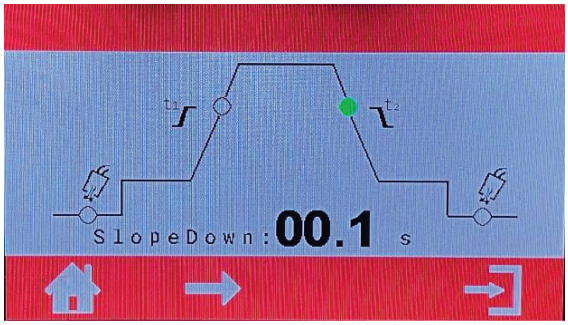


Here you can select your pre-gas flow in seconds by turning encoder (**Fig.4,ref. 12**) until you reach your desired pre-gas flow duration.

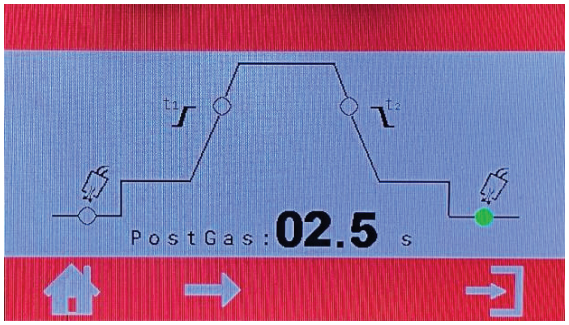
In order to adjust the next value of the sequencer, in this case **t1** (slope up), press button ➡ (**Fig.4,ref.9**);



When using a remote control, the t1 value is fixed (not adjustable) as you typically use the remote control to determine how fast the slope up should be. With a momentary (arc on/off) switch, the t1 adjustment feature is available. Use button ➡ (**Fig.4,ref.9**), to move to t2 (slope down).



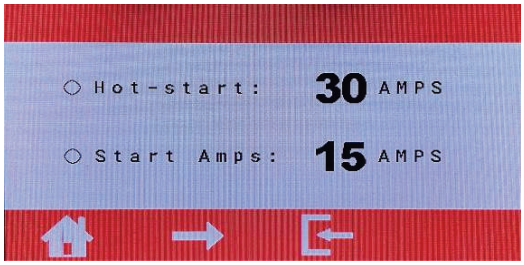
Here, you can adjust the slope down duration in seconds. Like t1 (slope up), it is very uncommon to set slope down when using a foot pedal. However, setting a slope down time may be done to implement a fail safe in an attempt to avoid abrupt termination of the weld and subsequent crater formation, which leads to weld defects. Use button ➡ (**Fig.4,ref.9**) , to move to the final station of the sequencer—post-gas flow .



When setting post-gas flow, more is better—especially when in doubt. How much post-gas flow you need depends on the material you plan to weld, the cup you

plan to use, the amperage you plan to weld at, and the amount of tungsten stick-out you use. Some people advocate that you never need more than 5 seconds of post-gas flow, claiming that more post-gas flow is just a waste of Argon. Well, let's put it this way. At a bare minimum, you need to keep the tungsten electrode shielded until the tungsten is cold enough to where it does not react with the ambient air. What does that mean? If the shielding gas stops when the tungsten electrode is still too hot, you will most likely see gray or even black discoloration of the tungsten, which is very bad! After you finish welding, the tungsten should be the same shiny silver color that it is when it was brand new. If you weld stainless or even titanium, post-gas flow times of 30 or 60 seconds, and sometimes longer depending on the amperage, are not unheard of. In order to achive longer than 15 sec postflow re start the arc at low amperage for a brief moment occasionally before the post flow timer runs out. During post-gas flow time, you also need to hold the torch in position to shield the metal from discoloring**.**

By pressing button ➡ (**Fig.4,ref.9**); you get deeper into the TIG - MAIN SETTINGS submenu.



The Revolution 2500 allows you to adjust TIG Hot start in both AC and DC. Most other TIG welding machines, and all other high-end, brand name welding machines, feature a hot-start function that delivers a factory pre-set amount of hot-start, for a predetermined amount of time (typically in the range of several dozen or several hundred milliseconds). Some competitive machines allow you to preselect a tungsten diameter, which will, in some cases, change the hot-start parameters of the machine. The downside to this is that there is always hot-start, and, although all TIG machines have a minimum amperage listed in the literature, they never actually start an arc at that amperage since hot-start cannot be turned off.

Why is this so important? On very thin material the ability to adjust hot start way down, or even turn it off, can be a huge advantage. Some find it helpful to light the arc on a piece of filler rod resting on the work piece so they don't burn through. Others use run in tabs. With the ability to adjust the hot-start parameters, those tricks become things of the past.

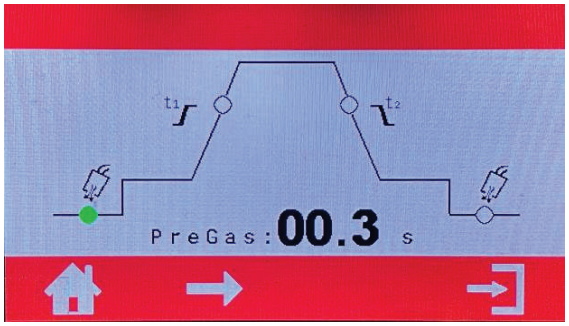
If a low hot-start is such a great thing, then why did we make it adjustable from Off or from 5 to 100 amps?

Sometimes, depending on the size and type of tungsten you use (the Revolution 2500 welds best with 2% Ceriated tungsten), and, depending on whether you are welding in AC or DC and potentially collected a fair amount of aluminum oxide on the tungsten, you may find re-striking an arc hard after welding for awhile. In this case, you might need a higher starting amperage all together. But, first and foremost, you need hot-start, and plenty of it, to initially ignite the arc. With that being said, most competitive machines with non-adjustable hot-start generally have too much hot start rather than not enough, which can make welding thin materials challenging.

Your starting current does not always have to be 4 amps! When working with thicker, colder material (especially aluminum), a higher starting current gives you better arc ignition and arc stability.

DC MODE

To access the TIG - MAIN SETTINGS submenu, press button ➡| (Fig.4,ref.9), and the following screen appears :

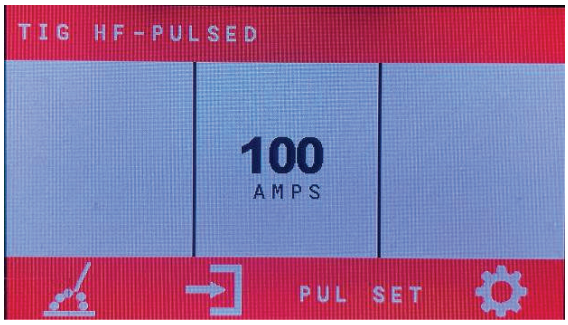


The procedure to regulate the different parameters (Pre Gas , Slope Up , Slope Down , Post Gas) is the same of AC MODE.

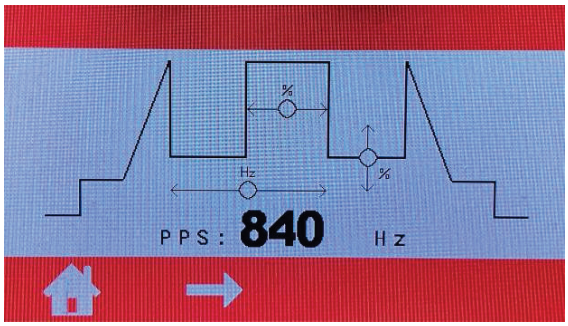
In DC MODE is possible to access to the pulse mode and the pulse mode settings . The procedure to regulate the different parameters of pulsing (PPS , Peak Time, BKGND) is the same of AC MODE.

DC PULSE MODE

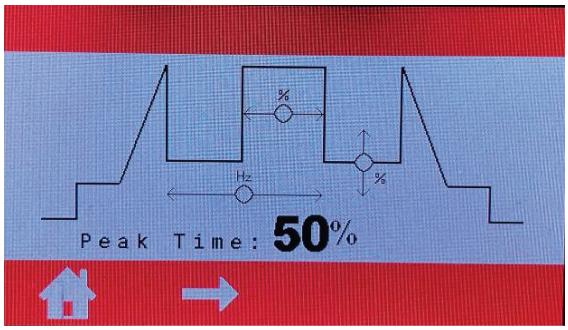
When you select The Pulse mode DC you can regulate three different parameters .



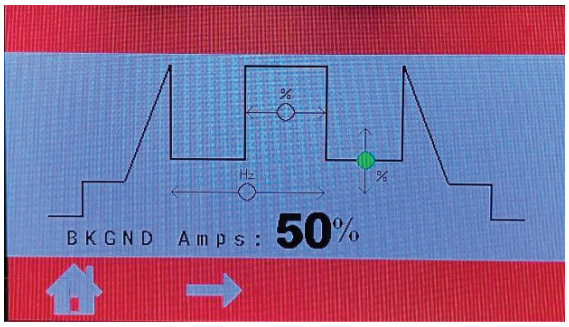
For regulate the pulse parameters press the button PUL SET (**Fig.4,ref. 10**) . With the encoder (**Fig.4,ref. 12**) you can regulate the value of the Frequency (Hz) . The value is adjustbale from 0,4 to 1000 Hz .



Press the button ➡ (ref. 11) to go to Peak Time regulation . The value is adjustable from 10 to 90 % . Peak Time 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.



Press the button ➡ (**Fig.4,ref. 11**) to go to Background amps regulation .Background amp regulation is a percentage of the welding current .

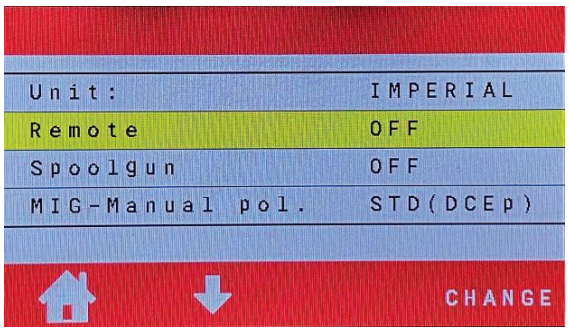


Press the button 🏠 (HOME) (**Fig.4,ref. 8**) to come back to main screen.

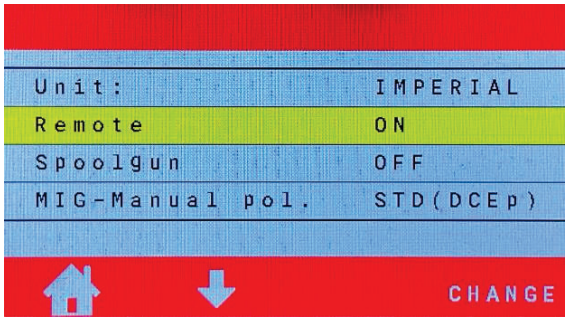
REMOTE CONTROL

When you connect a REMOTE CONTROL it is necessary activate the function from the settings menu.

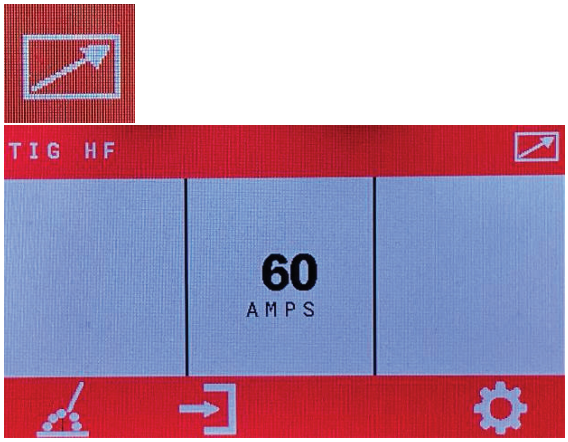
To activate the REMOTE CONTROL press the button ⚙ (**Fig.4,ref.11**)



Select REMOTE with the button ⬇
(**Fig.4,ref.9**)

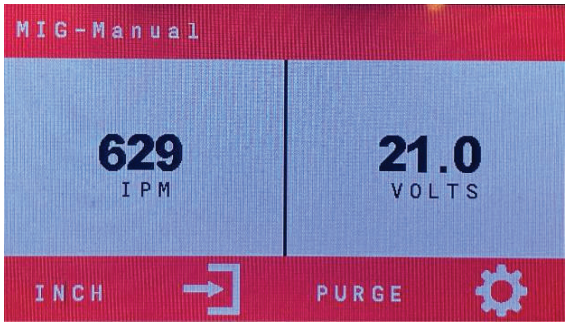


Press the button CHANGE (**Fig.4,ref.11**)
and then the button 🏠 (HOME) (**Fig.4 ref. 8**) to come back to main screen.
Now in the main screen you will see the remote control symbol.



MIG MANUAL MODE

Use the SELECT MODE button (**Fig.4,ref. 7**) to toggle through the menu until the LED next to MIG MANUAL illuminates. You are now in the MIG MANUAL welding mode.

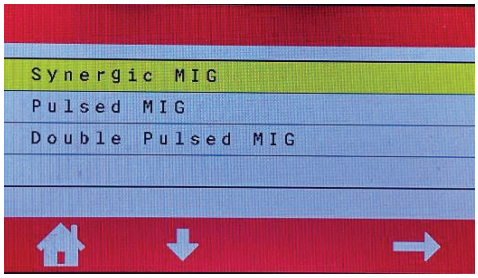


Turn left encoder (**Fig.4,ref. 16**) to set the wire feed speed and turn right encoder (**Fig.4,ref. 12**) to set the voltage.
Press the button INCH (**Fig.4,ref.8**) to momentarily feed welding wire at speed set without energizing welding circuit or shielding gas valve.
Press the button PURGE to flow gas and purge air from gun or adjust gas regulator.
<u>These two functions are available only in MIG MANUAL MODE.</u>

If welding with synergic or pulse programs is desired, press the SELECT MODE (**Fig.4,ref. 7**) button to toggle the MIG 2T mode.

SYNERGIC / PULSED / DOUBLE PULSED MIG

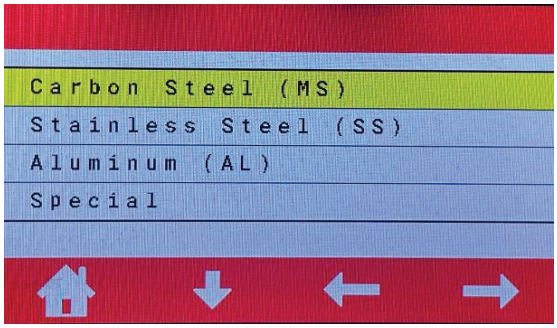
Press the button (**Fig.4,ref. 8**)



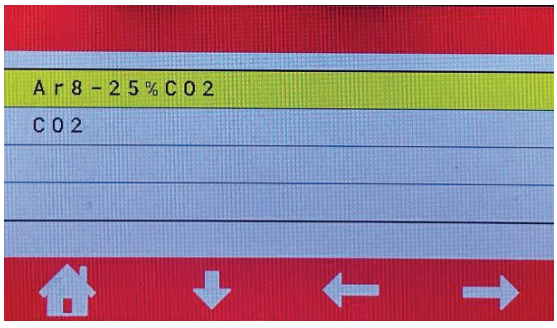
Select the Synergic Mig , Pulsed Mig or Double Pulsed Mig function through the button (**Fig.4,ref.9**) or the encoder (**Fig.4,ref. 12**)
To activate the selected function, press the button (**Fig.4,ref. 11**)

SYNERGIC MIG MODE

Choosing the Synergic Mig mode the display will show this :



Select the material though the button (**Fig.4,ref.9**) or the encoder (**Fig.4,ref. 12**)
To activate the selected function, press the button (**Fig.4,ref. 11**)

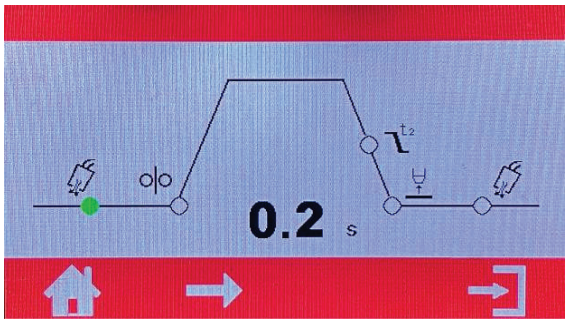


Select the GAS though the button (**Fig.4,ref.9**) or the encoder (**Fig.4,ref. 12**)
To activate the selected function, press the button (**Fig.4,ref. 11**)

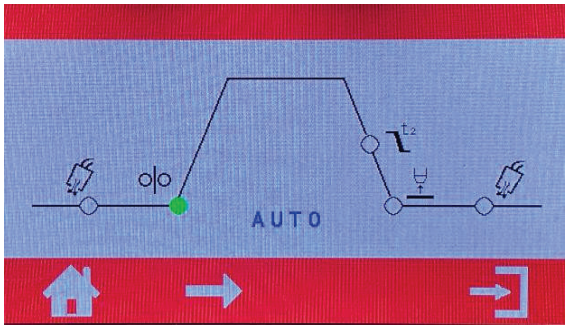
Select the size of the wire though the button (**Fig.4,ref.9**) or the encoder (**Fig.4,ref. 12**)
To activate the selected function, press the button (**Fig.4,ref. 11**)

Once you select a program, the program is displayed . The top line in the display shows the name of the program, the wire diameter, and the required gas/gas mixture. The line below displays, starting from the left, the wire speed, material thickness and arc trim.
On the Left display (**Fig.4,ref.15**) there is an approximate amperage (calculated based on the material, wire speed, wire diameter, and other variables).
On the right display (**Fig.4,ref. 13**) there is the value of the volts .
By turning left encoder F (**Fig. 4,ref.16**), you can adjust the material thickness; adjusting the material thickness also adjusts, automatically, the wire speed and the voltage

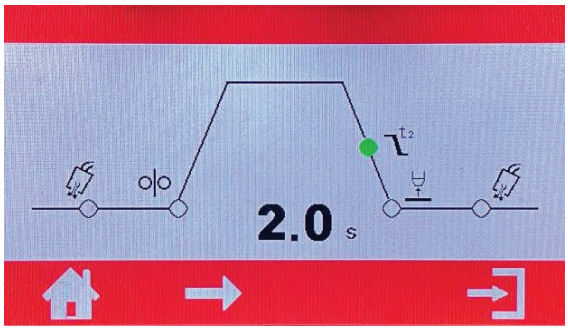
By pressing the button E (**Fig.4,ref. 9**) once, you enter the setup menu (Fig. 24).



The first parameter you can adjust the Pre Flow time . It is adjustable from 0,1 to 2 seconds.
Press the button ➡ (**Fig.4,ref. 11**) to go to Start Speed regulation .

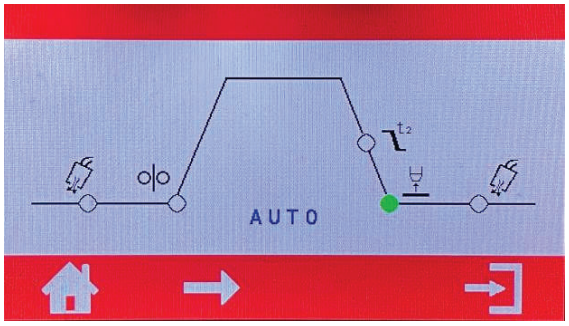


Normally this function is in AUTO . This is the optimal parameter calibrated for every synergic curve.
Press the button ➡ (**Fig.4,ref. 11**) to go to Slope Down Time regulation .



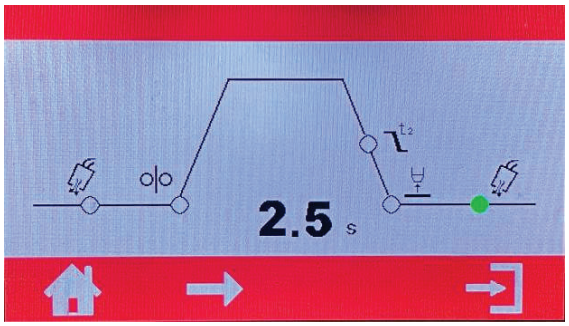
The slope down feature allows you to fill the crater at the end of the weld or allows you to neatly feather out a weld. On aluminum, set t2 between 3 and 5 seconds by turning right encoder (**Fig.4,ref. 12**). After you release the trigger, the machine still runs for the amount of time selected, but tapers down automatically during the slope down time. The tapering is visual in the arc and is also audible in the pulse program (the frequency and the sound of the machine changes). If no slope down is desired, set t2 to 0.1 seconds.

Press the button ➡ (**Fig.4,ref. 11**) to go to Burn Back regulation .



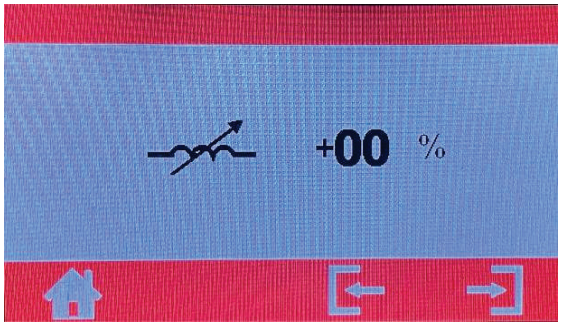
Normally this function is in AUTO . This is the optimal parameter calibrated for every synergic curve.
Burn back adjusts how long the wire sticks out after you finish welding. AUTO setup allows the wire to stick out as it normally does on a classic MIG welder, without any adjustments.
(**Attention:** High burn back numbers create the risk of burning the wire back into the contact tip).

Press the button ➡ (**Fig.4,ref. 11**) to go to Post Flow regulation.



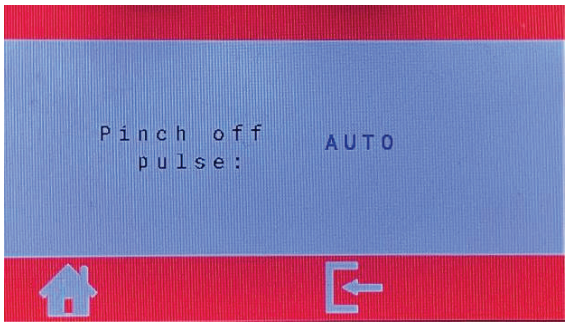
The Post gas flow is adjustable from 0,1 to 15 sec.

Pressing the button ➡] (**Fig.4,ref.11**) there is a submenu where is possible adjust the inductance .



Synergic, non-pulse programs and Mig manual have an option to adjust inductance. By turning right encoder (**Fig.4, ref.12**) , you can adjust the inductance of the machine. This feature is not available in the pulse programs or synergic programs only in MIG MANUAL The inductance feature allows you to set the arc characteristics from stiff/crisp to soft.
Pro TIP: negative numbers make a crisper/stiffer arc that is more “driving” and provides deeper penetration and positive numbers make a softer more “buttery” arc that provides a more fluid puddle.

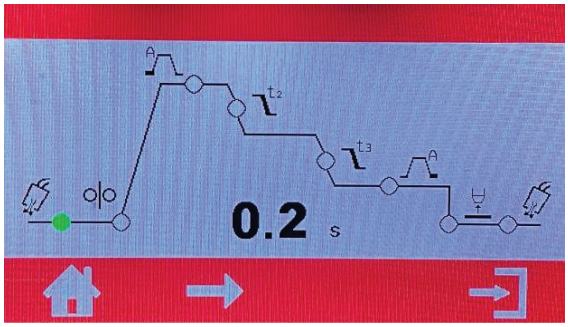
Pressing again the button ➡] it is possible regulate the Pinch off Pulse.



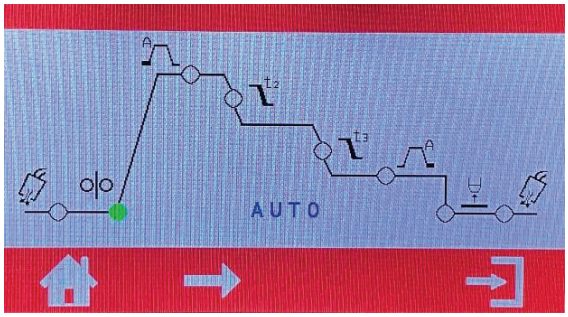
Right before you finish the weld, the machine sends a burst of current that shapes the end of the wire. Depending on the setting, there might not be a ball on the end of the wire that needs to be clipped off before re-striking an arc. The pinch has the purpose of eliminating the ball that could be created on the wire at the end of the welding.
Normally this function is in AUTO . This is the optimal parameter calibrated for every synergic curve.
Higher is the Pinch value, lower is the possibility that a ball can be created on the tip of the wire at the end of the weld.

MIG 4T SPECIAL

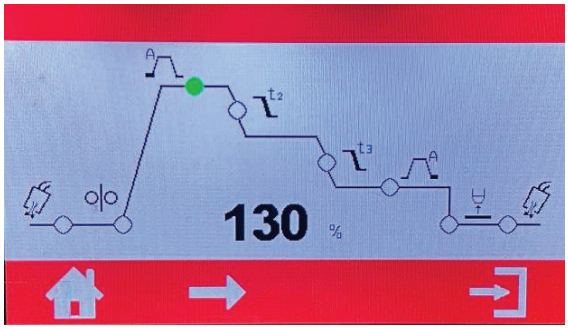
This is a Special function for the MIG 4T .
This function allows you to start welding with a welding parameter higher or lower than the one set.
With the 4T special it is possible to work with three different welding parameters.
Use the Select Mode button (**Fig.4,ref.7**) to toggle through the menu until the LED next to MIG4TS illuminates. You are now in the MIG 4TS welding mode.
Press the button ➡ **]** (**Fig.4,ref.9**) to go to in MIG 4TS setup .



The first parameter is the Pre Flow . It works like in MIG 2T.
Pressing again the button ➡ it is possible regulate the Start Speed.

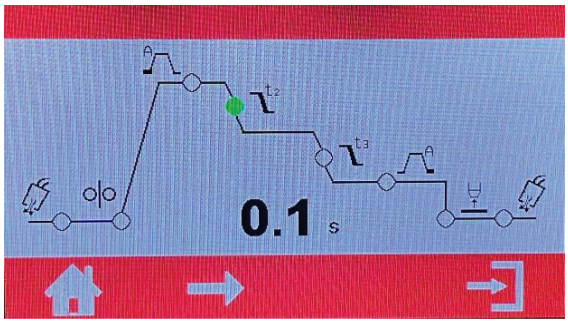


It works like in MIG 2T.
Pressing again the button ➡ it is possible regulate the “Hot Start”.

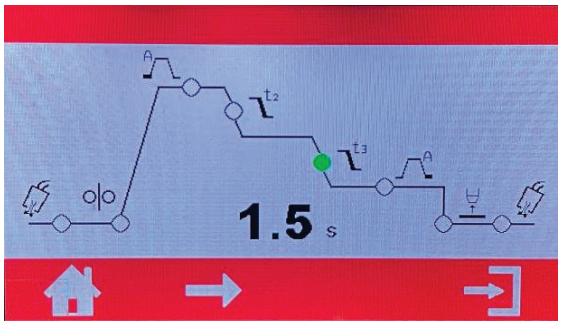


It is possible adjust the “Hot start” value from 50 – 200 % of your wire speed .
For example if the main welding parameter is 10 m/min when you press and keep pressed the torch button the initial welding parameter will be at 13 m/min .
Note: If wire feed speeds selected here are producing Amperages over 220 amps, the machine will automatically limit the output accordingly

Pressing again the button ➡ it is possible regulate the Slope Down Time t2.

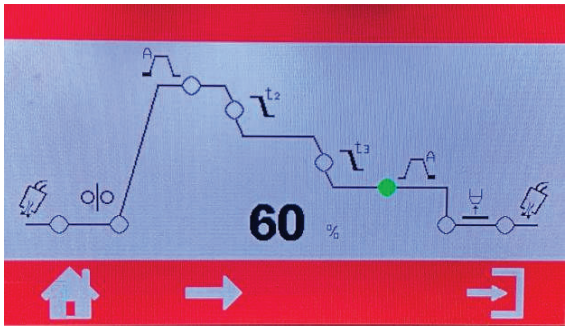


It is possible adjust the t2 value from 0,1 to 10 seconds.
Pressing again the button ➡ it is possible regulate the Slope Down Time t3.

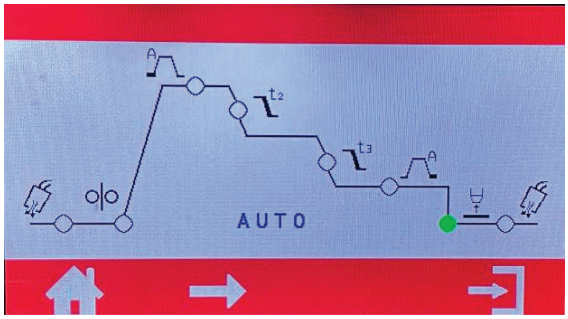


It is possible adjust the t2 value from 0,1 to 10 seconds.

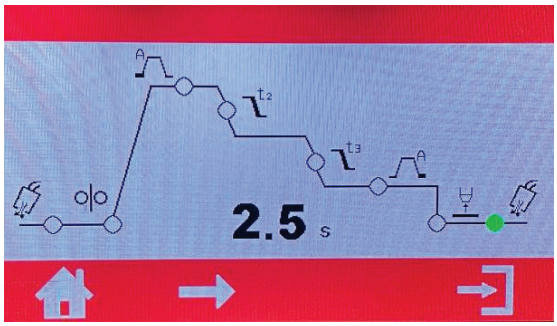
Pressing again the button ➡ it is possible to regulate the FINAL CURRENT, that is a value used to fill the crater when welding aluminum. A good starting point for the user here is 60%
It is possible adjust the t2 value from 0,1 to 10 seconds.



Pressing again the button ➡ it is possible regulate the Burn Back Value.
It works like in MIG 2T/4T.



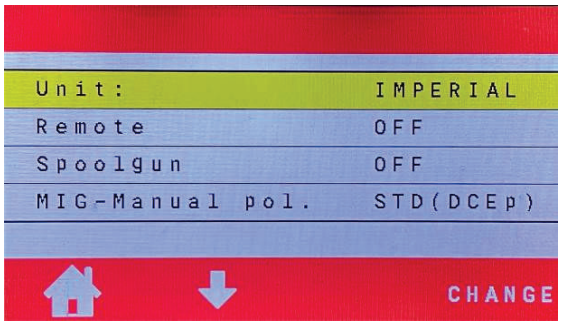
Pressing again the button ➡ it is possible regulate the Post Gas Flow time.

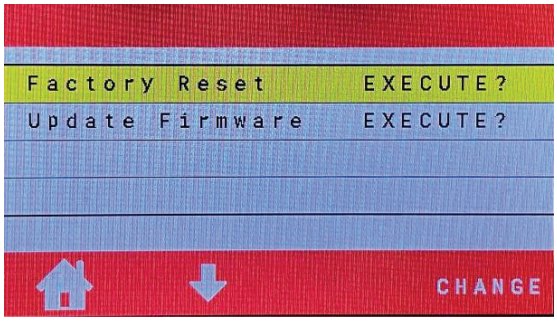


It works like in MIG 2T/4T.

SETTINGS

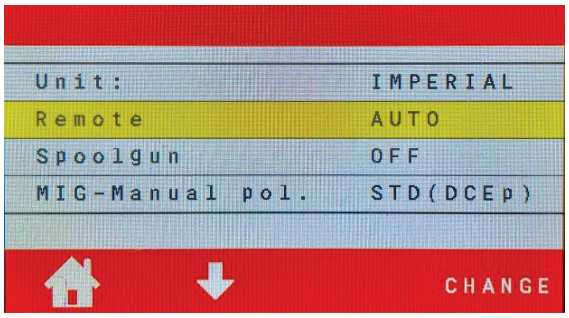
From every welding mode, pressing the button ⚙ it is possible to go into the settings menu.





REMOTE CONTROL

To select e activate the Remote Control press the button ⚙ to go into the settings menu.
With the button ⬇ select Remote .
Press the button CHANGE (**Fig.4,ref.11**) and select AUTO

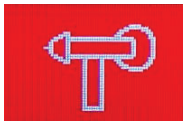


Then press Home button to come back to the main screen . Here you will see the Remote Symbol

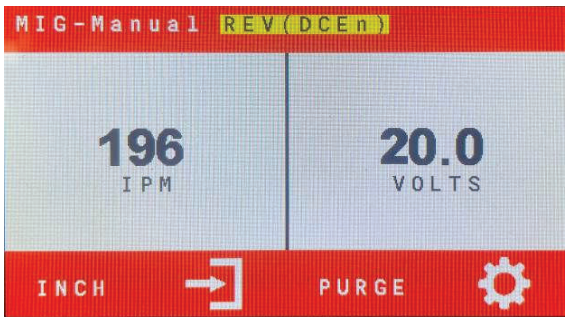
SPOOL GUN SETTING

In order to use the SpoolGun the SpoolGun Kit 601855000L needs to be added.
Press the button ⚙ to go into the settings menu.
With the button ⬇ select SpoolGun .
Press the button CHANGE (**Fig.4,ref.11**).
After that next to SpoolGun will appear ON .
If you go on the main page you will the Spoolgun see Symbol.

Pro Tip: when turing on the spool gun also turn on remote as the HTP spoolgun has remote control functions build in.

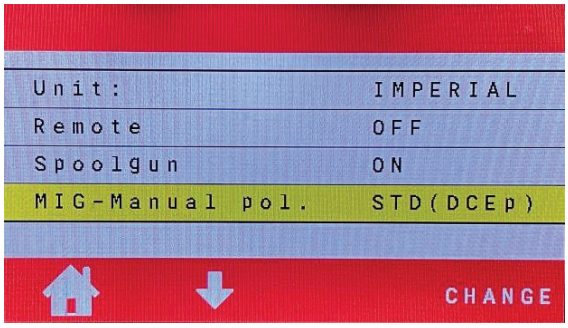


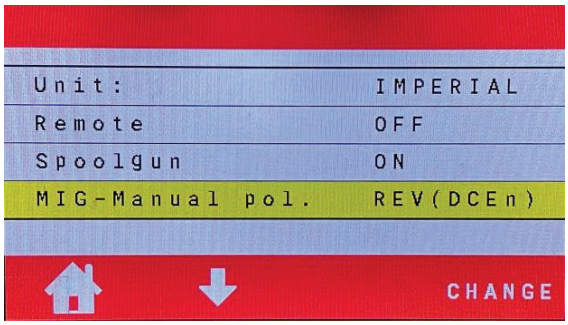
With the button ⬇ select MIG-Manual pol .
Press the button CHANGE (**Fig.4,ref.11**)
and next to MIG-Manual pol . it is possible see **STD (** standard **)** or **REV (** reverse **)**.
If reverse polarity is chosen on the display this is what it is possible see .
The **REV**ers polarity is used when you want to use a flux-cored wire without gas



MIG MANUAL POLARITY

With this function it is possible change the polarity of the welding gun only in Manual Mode. This function is used when it is necessary to weld a gasless flux cored wire.

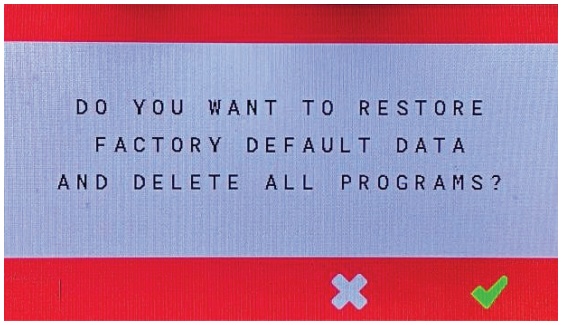




Press the button ⚙ to go into the settings menu.

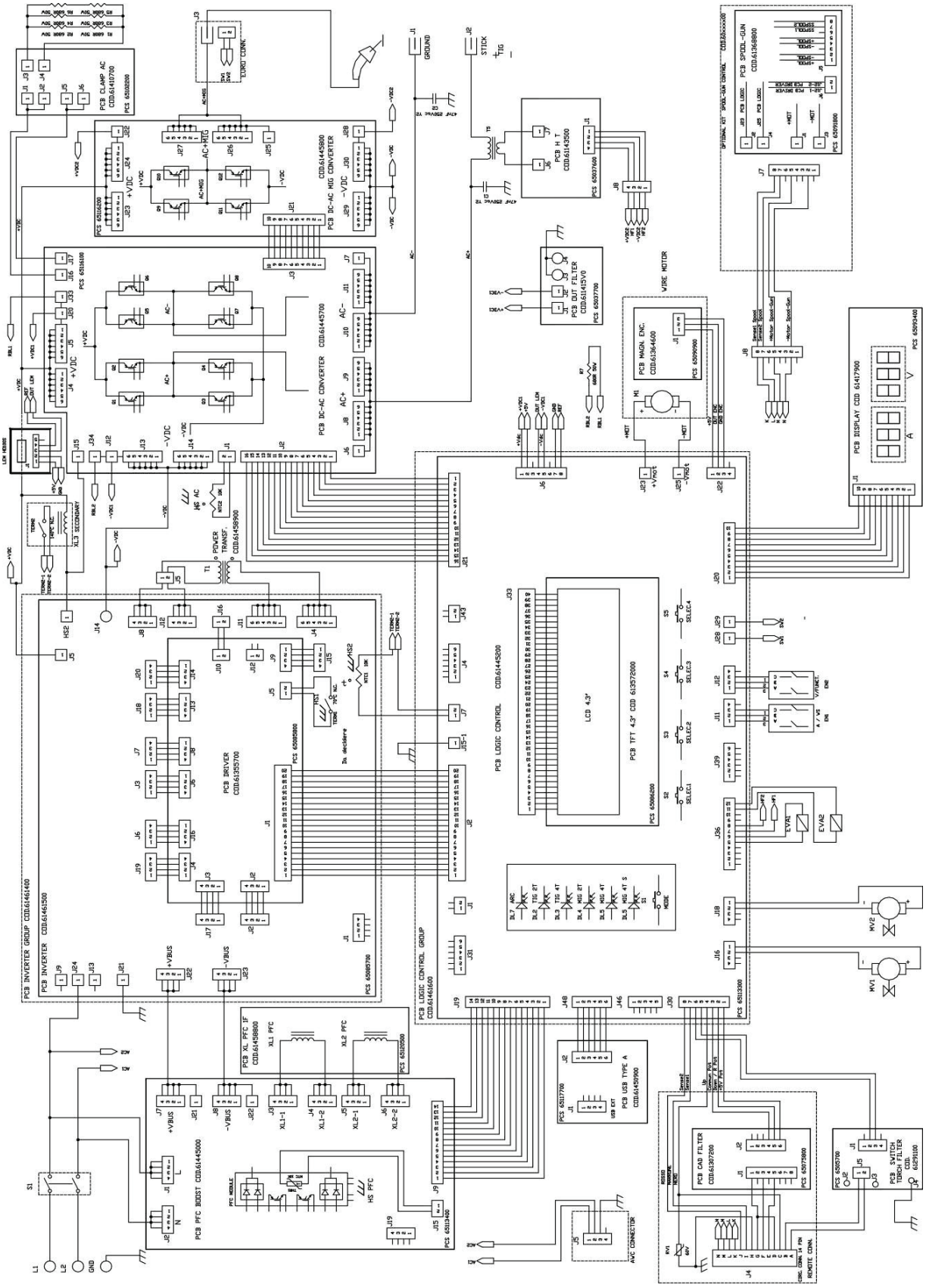
FACTORY RESET

If it is necessary to do a factory reset press the button ⚙ to go into the settings menu.
With the button ⬇ select Factory Reset .

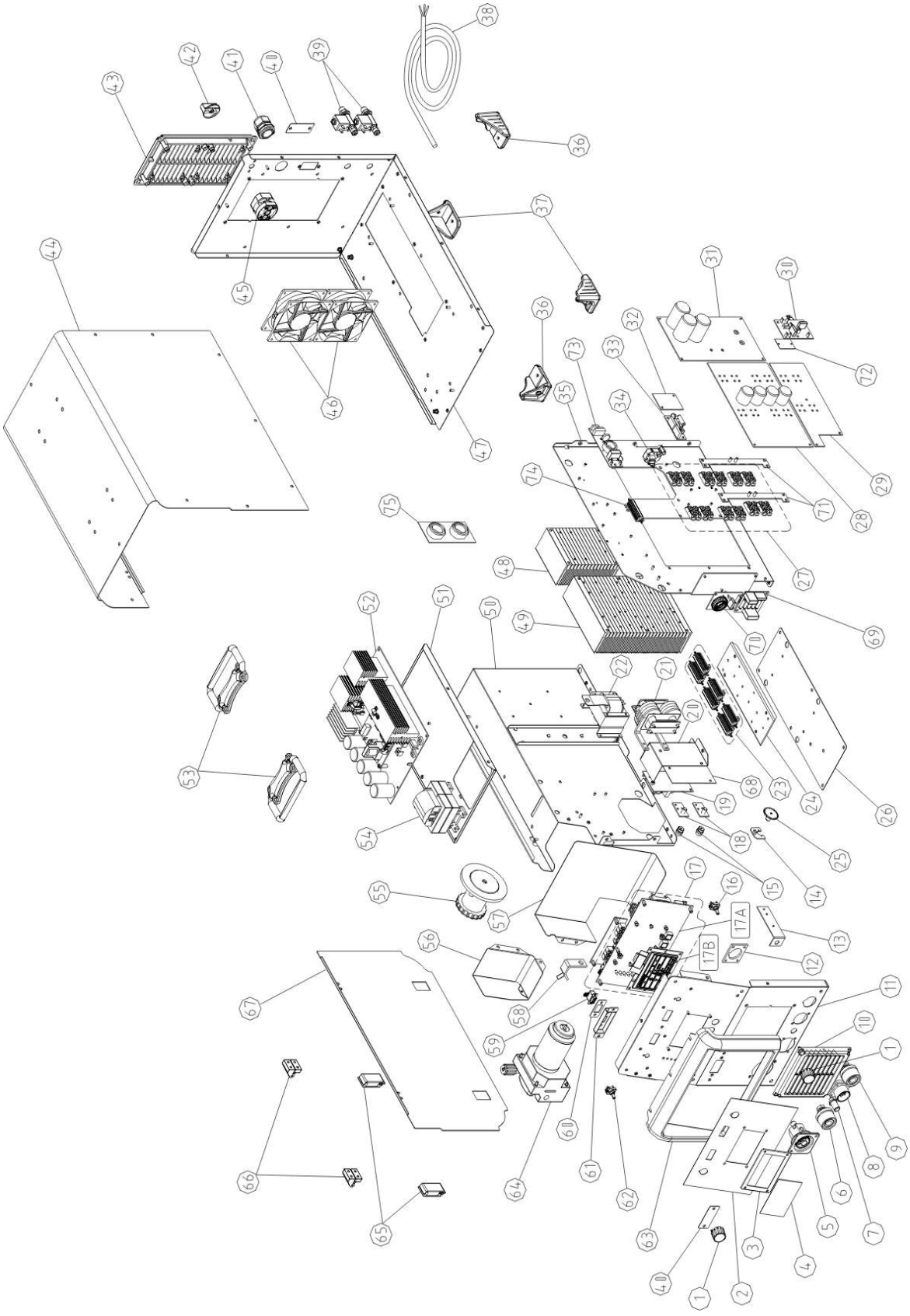


Press the button CHANGE (Fig.4,ref.11)
and then press the button V
After that the machine will be on TIG DC mode with HF ON at 60

WIRING DIAGRAM – Revolution 2500



EXPLODED VIEW

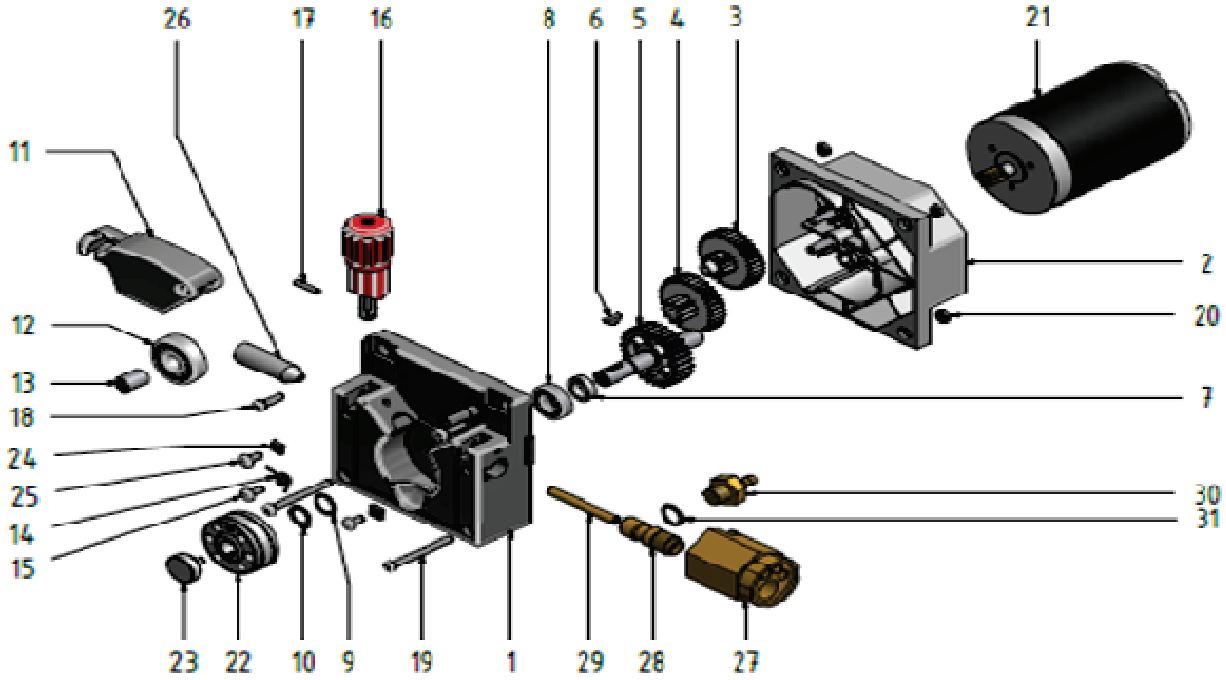


PART LIST – REVOLUTION 2500

Position	Part #	Description
1	6610620000	Knob
2	6616970010	Instrument Label
3	-	-
4	6614220000	Display Protection
5	6646200000	Central Connector Frame
6	6427400000	Welding Socket
7	63197000 + 6318500	Gas outlet TIG torch
8	614621000L	Remote Control Receptacle 14 pin
9	64274000000	Welding Socket
10	611043000L	Front Fan Cover
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	611902000L	Encoder
17	-	-
17A	-	-
17B	-	-
18	-	-
19	611435004L	HF Pcb
20	-	-
21	614013000L	HF Transformer
22	614592000L	Output Inductance
23	6460700000	Resistor 680R – 50W (Pz.6)
24	-	-
25	-	-
26	-	-
27	6511320000	Secondary Diodes
28	614457001L	AC/DC Converter Pcb
29	614458001L	MIG Converter Pcb
30	614107000L	Clamper Pcb
31	614445001L	PFC Pcb
32	613688001L	Spool Gun Pcb (optional)
33	611415V02L	Pcb Filter HF
34	6509770000	LEM Probe
35	-	-
36	6614180L00	Plastic Foot
37	-	-
38	6476100000	Input Power Cable
39	617030000L	Solenoid Valve
40	-	-
41	6607850000	Cable Relief

Position	Part #	Description
42		
43	6610930L00	Rear Fan Cover
44	621003CG00	Cover
45	6472400000	Switch
46	614322000L	Fan 120 x 120 x 38
47	-	-
48	-	-
49	-	-
50	-	-
51	-	-
52	614614000L	Primary Inverter Pcb Group
53	6610340000	Handle
54	614589000L	Power Transformer
55	6647000000	Spool Holder
56	6210050K00	Protection Pcb
57	-	-
58	-	-
59	614509000L	USB Pcb
60	-	-
61	-	-
62	611902000L	Encoder
63	6613850L10	Plastic Frame
64	614116000L	Wire Feed Assembly
65	6647100000	Sliding Latch
66	6646800000	Hinge
67	621004CG00	Door
68	-	-
69	613072000L	Remote Filter Pcb
70	612911002L	Torch Switch Filter Pcb
71	-	-
72	6607840000	Isolator TO247
73	-	-
74	-	-
75	614588000L	Pfc Inductance Pcb

EXPLODED VIEW WIRE FEEDER



N°	DESCRIPTION	CODE
1	2- R Housing SF 15030, front composite	613704000L
2	2- R Housing SF 15030-37, back composite	613705000L
3	Gear to motor	6613110000
4	Intermediary gear	6613120000
5	Gear with main axle	6362100000
6	/	/
7	/	/
8	/	/
9	/	/
10	/	/
11	Pressure arm ø 30mm composite, left	6363500000
12	/	/
13	/	/
14	/	/
15	/	/
16	Pressure adjustment unit, black	6363600000
17	/	/
18	/	/
19	/	/
20	/	/
21	Motor EP ø 63mm, 24V/50W	6480200000
21C	Encoder Cover,nylon, ø 48 mm	6613470000
22	/	/
23	Retaining screw	6346900000
24	/	/
25	/	/
26	Wire inlet guide, PA66,ID ø 3.0,L40	6347000010
27	Torch adapter	6349900000
28	Connecting screw M12x1.5x35mm,brass	6362500000
29	Wire guide tube 5 x 2 x 57mm, brass	6363700000
30	Current-gas connection screw,brass	6362600000
31	/	/

No.	Material	Wire Diameter	Shield Gas	Program Name	Gas Flow Rate	Minimum Thickness	Maximum Thickness	Note
1	Mild Steel	.024”	Ar 8-25% CO2	Ms .024 Ar 8-25% CO2	20-25 CFH	26 GA	1/8”	
2	Mild Steel	.030”	Ar 8-25% CO2	Ms .030 Ar 8-25% CO2	20-25 CFH	24 GA	7/32”	
3	Mild Steel	.030”	Ar 8-25% CO2	Ms .030 Ar 8-25% CO2 PULSE	20-25 CFH	24 GA	7/32”	Use 92/8 gas only
4	Mild Steel	.030”	Ar 8-25% CO2	Ms .030 Ar 8-25% CO2 DP	20-25 CFH	/	/	Use 92/8 gas only
5	Mild Steel	.030”	100% CO2	Ms .030 100% CO2	20-25 CFH	24 GA	5/16”	
6	Mild Steel	.035”	100% CO2	Ms .035 100% CO2	20-25 CFH	20 GA	5/16”	
7	Aluminum 5356	.030”	100% Ar	AL5356 .030 100%Ar	40-50 CFH	24 GA	1/8”	
8	Aluminum 5356	.035”	100% Ar	AL5356 .035 100%Ar	40-50 CFH	22 GA	1/4”	
9	Aluminum 5356	.035”	100% Ar	AL5356 .035 100%Ar PULSE	40-50 CFH	20 GA	1/4”	
10	Aluminum 5356	035”	100% Ar	AL5356 .035 100%Ar DP	40-50 CFH	/	/	
11	Aluminum 5356	3/64”	100% Ar	AL5356 3/64 100%Ar	40-50 CFH	18 GA	5/16”	
12	Aluminum 5356	3/64”	100% Ar	AL5356 3/64 100%Ar PULSE	40-50 CFH	20 GA	3/8”	
13	Aluminum 5356	3/64”	100% Ar	AL5356 3/64 100%Ar DP	40-50 CFH	/	/	
14	Aluminum 4043	.035”	100% Ar	AL4043 .035 100%Ar	40-50 CFH	18 GA	1/4”	
15	Aluminum 4043	.035”	100% Ar	AL4043 .035 100%Ar PULSE	40-50 CFH	18 GA	5/16”	
16	Aluminum 4043	.035”	100% Ar	AL4043 .035 100%Ar DP	40-50 CFH	/	/	
17	Aluminum 4043	3/64”	100% Ar	AL4043 3/64 100%Ar	40-50 CFH	18 GA	7/32”	
18	Stainless Steel	.030”	Ar 2%CO2	SS308 .030 Ar2%CO2	30-35 CFH	24 GA	10 GA	
19	Stainless Steel	.035”	Ar 2%CO2	SS308 .035 Ar2%CO2	30-35 CFH	22 GA	1/4”	
20	Stainless Steel	.030”	90%He 7.5Ar 2.5 CO2	SS308 .030 Trimix	30-35 CFH	24 GA	7/32”	
21	Stainless Steel	.035”	90%He 7.5Ar 2.5 CO2	SS308 .035 Trimix	30-35 CFH	20 GA	7/32”	
22	Flux Cored	.035”	Ar 25%CO2	E71T1 .035 25%CO2	40-50 CFH	18 GA	5/16”	
23	Flux Cored	.035”	No Gas	FlxC .035 Gas-Less	No Gas	18 GA	1/4”	