Invertig™ 251 AC/DC
Invertig™ 251 DV AC/DC

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HTP America Inc.

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1) FOREWARD

Thank you for purchasing an HTP America® Invertig 251 and Invertig 251 DV—our advanced, multi-process welder. The Invertig 251 is a versatile, high-quality, and feature-rich machine that offers pulse programs in every welding process. With the Invertig 251 you can run the following processes: SMAW (Stick), SMAW-P (Pulse Stick), GTAW (TIG), GTAW-P (Pulse TIG). All TIG and stick processes offer both AC and DC options.

In the AC TIG mode multiples wave forms are available. The Invertig 251 DV offers the ability to run on single-phase power, from 110 Volt* (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, on all applications, 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 current or previously sold 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) TIG welding torches, gas hoses, ground cables, foot pedals and regulators/flowmeters are accessories and 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 ultraviolet rays, which are harmful to skin and eyes.

Ultraviolet 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-face 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.

- Always provide adequate ventilation in the welding area.
- 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 ultraviolet 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.

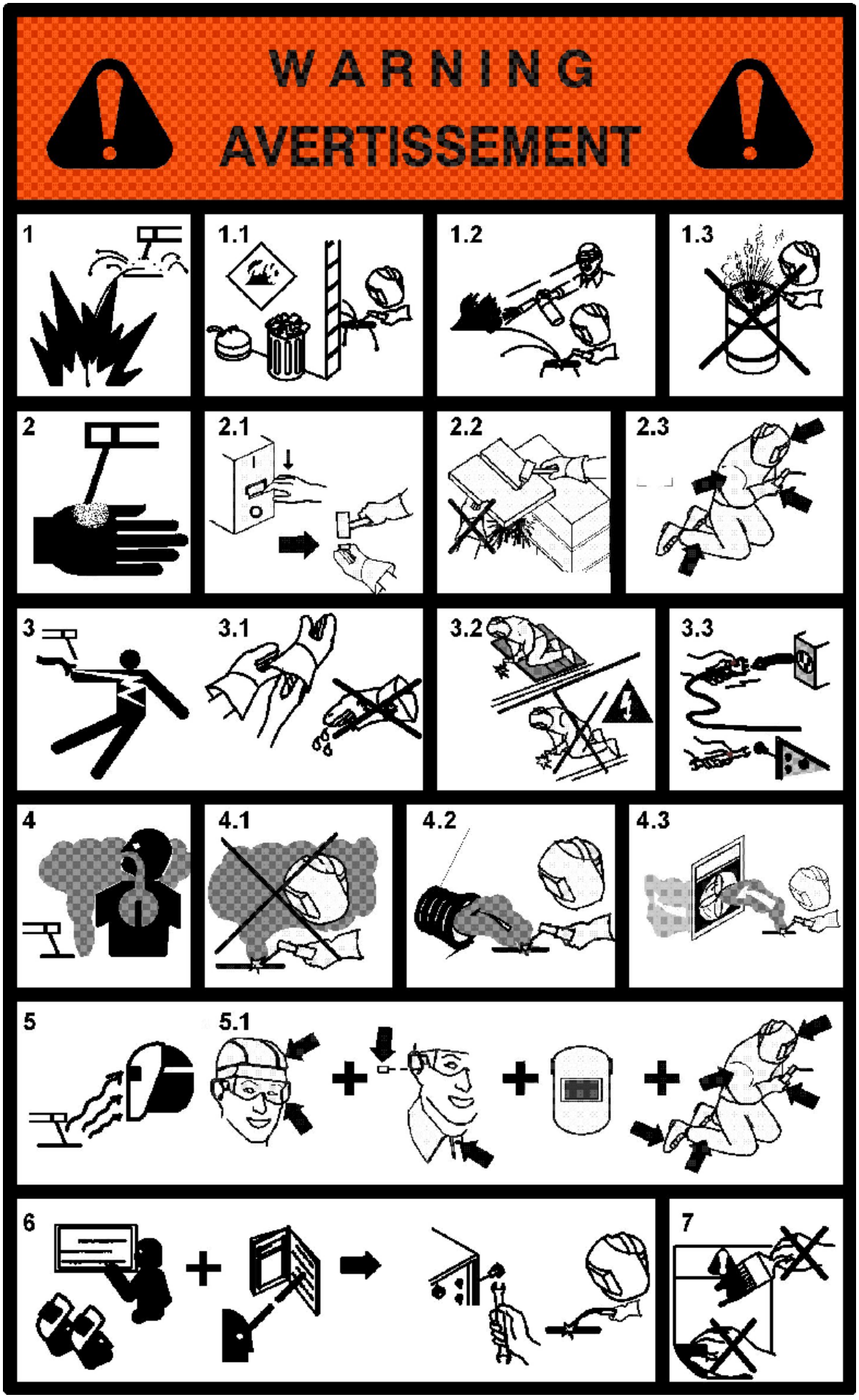
Exposed, electrically hot conductors, other bare metal in the welding circuit, or ungrounded, electrically hot equipment can fatally shock a person whose body becomes a conductor. Do not stand, sit, lie, lean on, or touch a wet surface when welding.

- 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 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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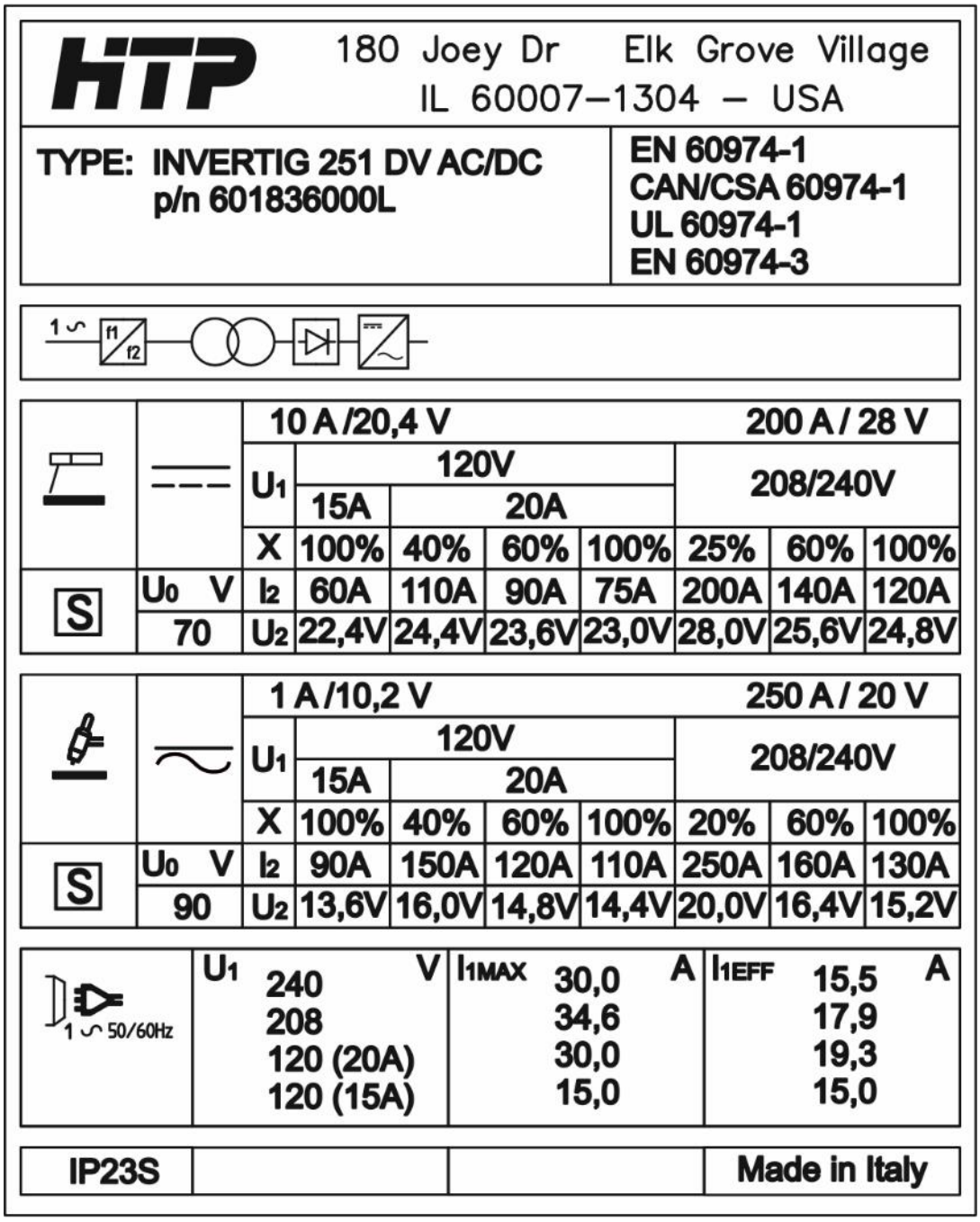
4) SPECIFICATIONS

Invertig 251 AC/DC – Invertig 251 AC/DC DV Specifications	
Input Voltage (volts)	Single Phase: 120 – 240 V
Electronic Overload Protection	YES
Welding Modes	STICK (and Pulse Stick) TIG 2T (pedal/slider) (and Pulse TIG) TIG 2T TIG 4T TIG SPOT CAC-A (gouging)
Hot-Start Stick (%)	0 to 50
Arc-Force Stick (%)	0 to 500
Wave Forms TIG	Square, Soft, 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: 0.1 – 25
Post Flow (Seconds)	TIG: 0.1 - 50
Initial Amps (%)	10 to 90
Final Amps (%)	10 to 90
Pulse Parameters Pulse/Second (PPS) Stick Pulse/Second (PPS) TIG AC Pulse/Second (PPS) TIG DC Peak Time (%) Background Amps (%)	 0,4 to 5,0 0,4 to 20 0,4 to 1000 10 to 90 10 to 90
Dimensions	19-3/4” x 10” x 15-1/2”
Weight (lbs)	54 – Invertig 251 AC/DC DV 49 – Invertig 251AC/DC

DATA PLATE INVERTIG 251 DV AC/DC



HTP	180 Joey Dr Elk Grove Village IL 60007–1304 – USA	
TYPE: INVERTIG 251 DV AC/DC p/n 601836000L		EN 60974-1 CAN/CSA 60974-1 UL 60974-1 EN 60974-3

		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

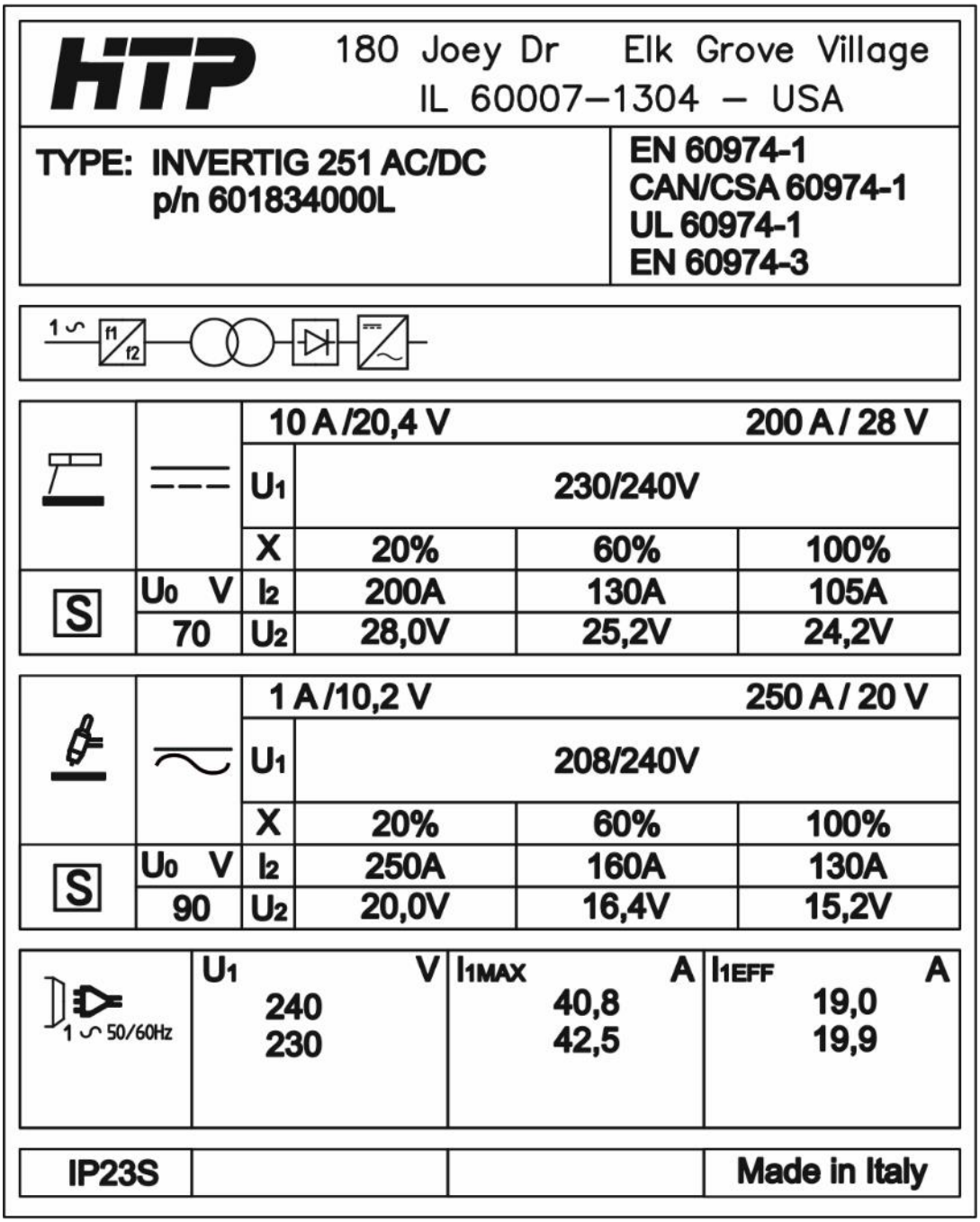
		1 A /10,2 V							250 A / 20 V
		U_1	120V				208/240V		
			15A	20A					
		X	100%	40%	60%	100%	20%	60%	100%
S	U_0 V	I_2	90A	150A	120A	110A	250A	160A	130A
	90	U_2	13,6V	16,0V	14,8V	14,4V	20,0V	16,4V	15,2V

	U_1 V	I_{1MAX} A	I_{1EFF} A
1 ~ 50/60Hz	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

tested at ambient temperature of 104°F

DATA PLATE INVERTIG 251 AC/DC



HTP	180 Joey Dr Elk Grove Village IL 60007–1304 – USA	
TYPE: INVERTIG 251 AC/DC p/n 601834000L		EN 60974-1 CAN/CSA 60974-1 UL 60974-1 EN 60974-3

		10 A /20,4 V			200 A / 28 V
		U1	230/240V		
		X	20%	60%	100%
S	U0 V	I2	200A	130A	105A
	70	U2	28,0V	25,2V	24,2V

		1 A /10,2 V			250 A / 20 V
		U1	208/240V		
		X	20%	60%	100%
S	U0 V	I2	250A	160A	130A
	90	U2	20,0V	16,4V	15,2V

1 ∽ 50/60Hz	U1 V	I1MAX A	I1EFF A
	240	40,8	19,0
	230	42,5	19,9

IP23S			Made in Italy

tested at ambient temperature of 104°F

5) ELECTRICAL CONNECTIONS

Your INVERTIG 251 or INVERTIG 251 DV operates to its full capacity on single-phase, 230V power (208V-240V).

INVERTIG 251 DV can run on 110/120 volts with reduced output. The machine draws 30-amps (230 volts) from the wall when operating at maximum output. We recommend a 30-amp breaker for maximum performance.

INVERTIG 251 can run on 230/240 volts. The machine draws 40.8-amps (240 volts) from the wall when operating at maximum output. We recommend a 40-amp (or higher) breaker for maximum performance.

If you operate the INVERTIG 251 DV on a generator (110 or 220 volts) 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 volts.

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 volts simply plug machine into the wall outlet, wait for the PF0 message to clear and the machine is ready to be used. There are no switches to switch, and no modifications needed, the machine will automatically identify the input voltage.

If you operate the INVERTIG 251 on a generator it needs to be a clean power generator with a minimum of 10000 watts. 10000 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 8AWG and should not exceed a length of 100’.

6) FRONT PANEL CONNECTIONS

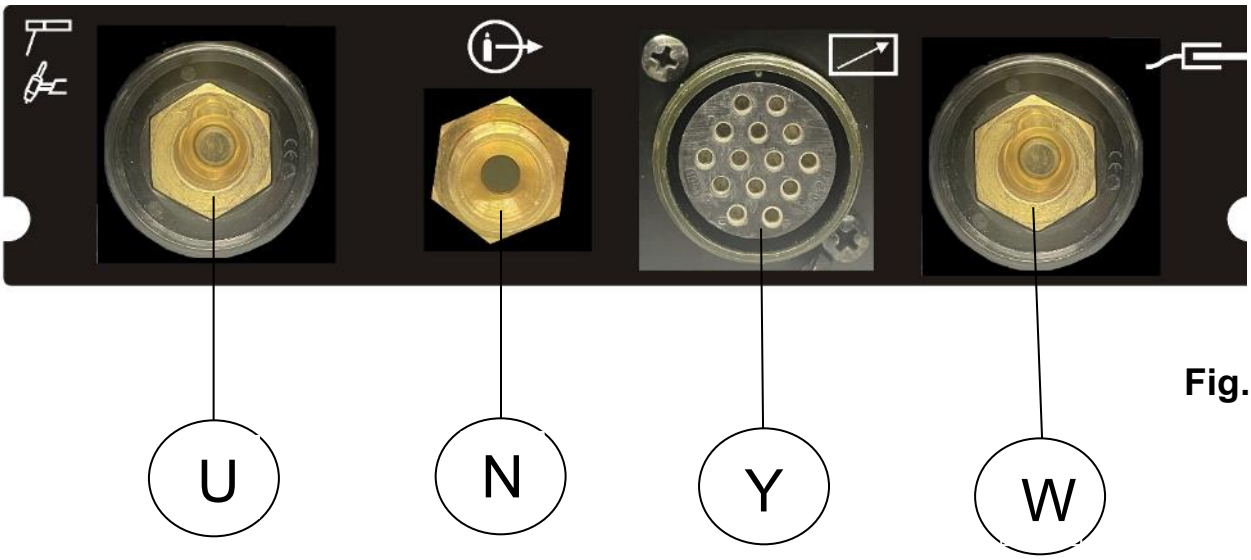


Fig. 1

U – Connector for TIG torch or electrode holder

N – Gas for TIG torch (outlet)

Y – Remote control receptacle

W – WORK (ground) clamp, automatic polarity reversal depending on welding process

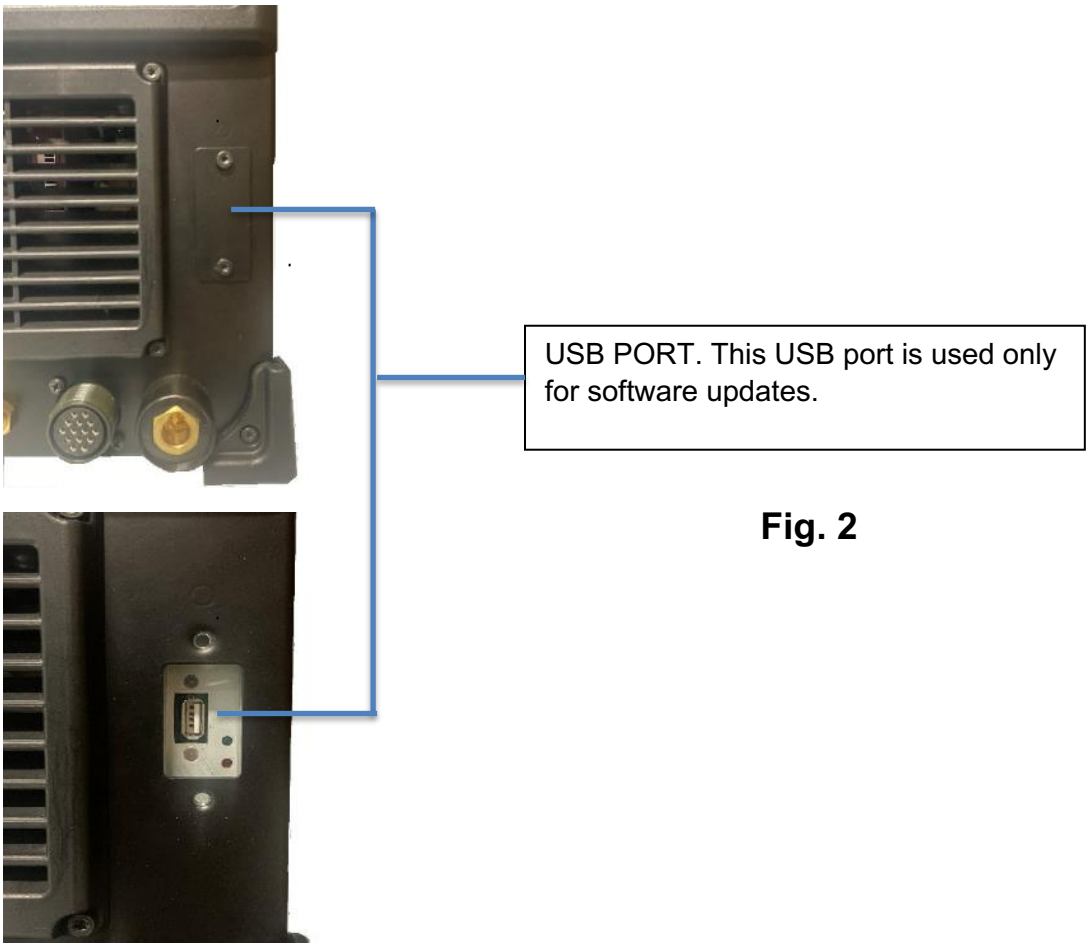


Fig. 2

7) REAR PANEL CONNECTIONS

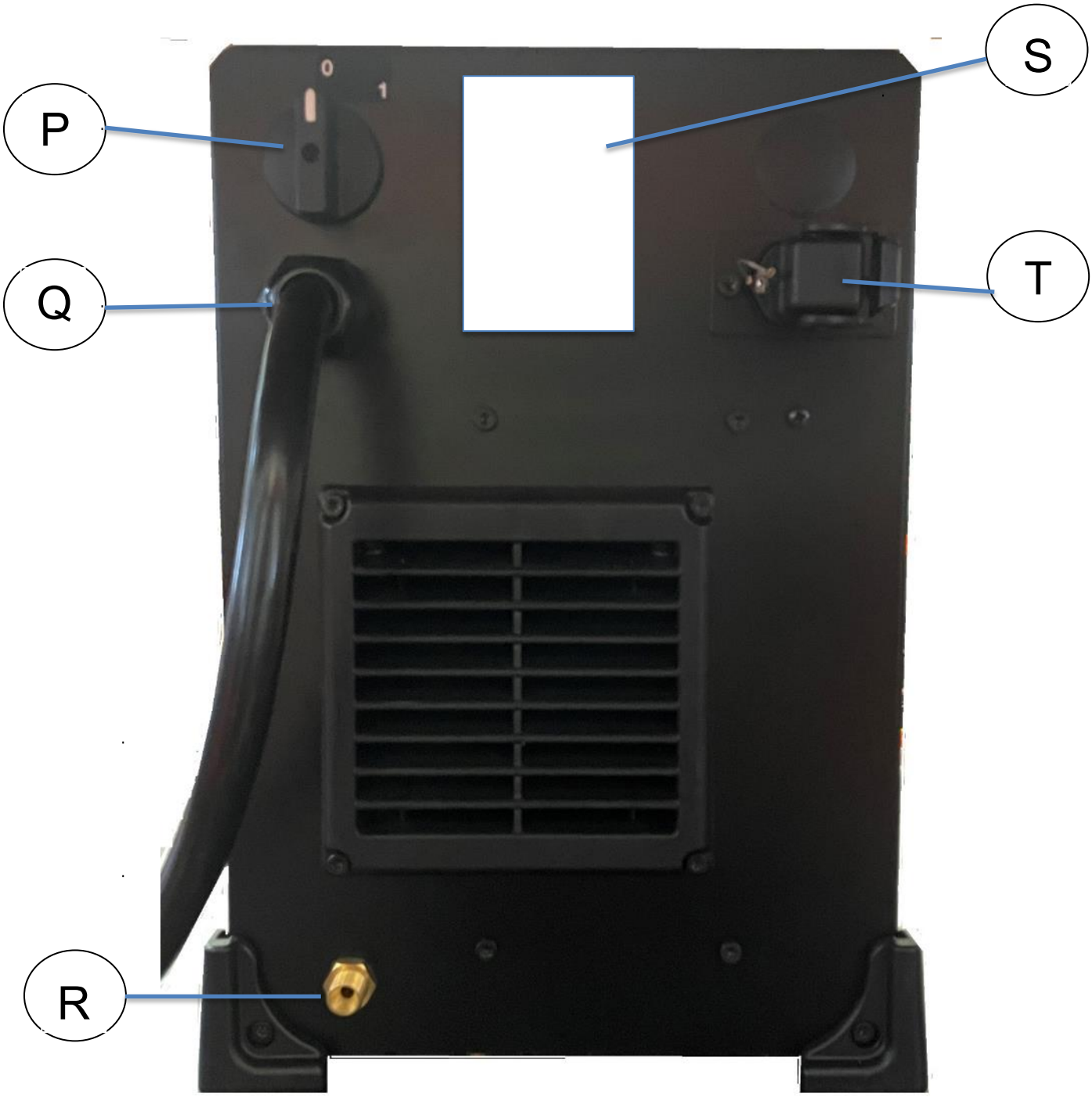


Fig. 3

P – On/Off switch

Q – Power plug

R – Gas hose connection

S – Data plate/Serial Number

T – AWC (water cooler)

Connection

8) FRONT PANEL CONTROLS

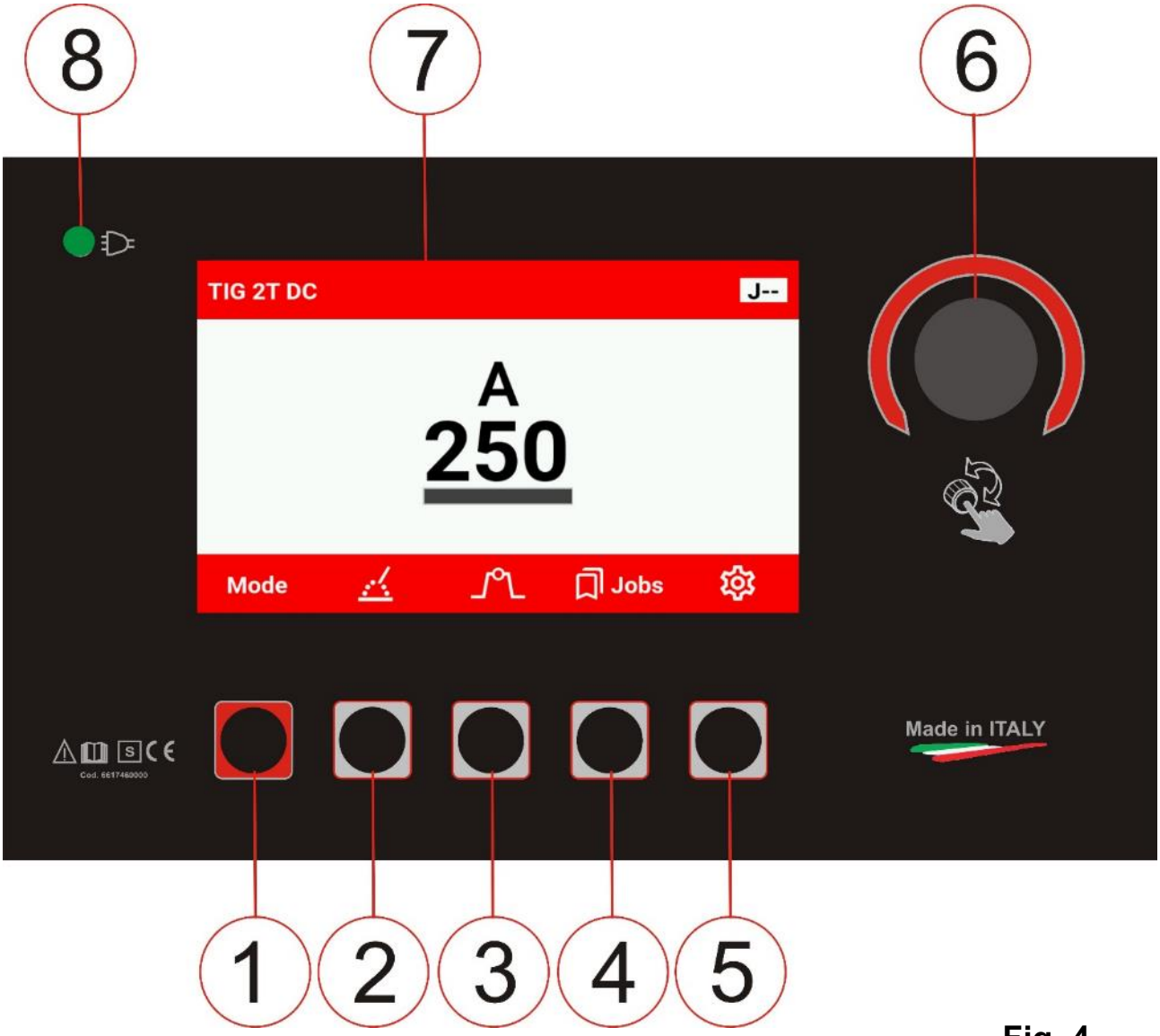


Fig. 4

1. **MODE / HOME BUTTON**
2. **PROCESS SELECTION BUTTON**
3. **MAIN WELDING SETTINGS BUTTON**
4. **JOBS BUTTON**
5. **MACHINE SETUP BUTTON**
6. **ENCODER (turn to select and push to confirm selection)**
7. **MAIN DISPLAY – All welding parameters**
8. **LIVE MACHINE LED**

9) EXPLAINATIONS

a) 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: 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.

Soft Wave: The soft square wave provides a more sinus like wave form, which allows for a softer arc and a more fluid weld puddle, and it does so while creating significantly less noise. Also referred to as a modified square wave. Pulse functions are unavailable in Soft AC.

Mix AC/DC : this process alternates AC phases with DC (negative) phases, it is possible to choose a percentage which determines how much DC to insert, the higher the percentage the more DC will be inserted (therefore more penetration, less cleaning). According to latest research, the advantages when properly used are:
Combining the effectiveness of TIG AC welding with the penetration of TIG DC welding, obtaining unparalleled additional heat input no matter if 100% argon or AR/HE mixes are used. This results in high welding speeds and creating the weld pool quicker on a cold piece or thick piece. This opens new possibilities to weld larger and thicker parts with modest amperag, given that the DC- has a much higher than using a traditional AC waveform.

b) 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 Invertig 251 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 and for the next 0.5 seconds, your current would come out of the torch and go into the material(your electrode negative (EN) part). 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 Invertig 251 you can adjust the balance from 10% to 90%.

c) **AC Frequency**
AC frequency does mainly two things. 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. 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 Invertig 251 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 operators use frequencies of 50Hz or less.

d) **Asymmetric AC**

Asymmetric arc determines the intensity of the current rather than the time (the balance function determines the time). Going back to our previously described example weld with 1Hz AC and a 50% balance at 100 amps, this time limiting the EP to 50%, you now weld for 0.5 seconds at 50 amps (50% of 100 amps) of EP/cleaning/breaking open the oxide layer, and then you weld for 0.5 seconds with 100 amps of EN/penetration and heating of the material (rather than the torch).

Does asymmetric arc do the same thing as balance? Sort of, but not really. If you turn asymmetric arc off, set
your frequency to 1Hz, and set your balance to 75% (EN), you weld for 0.25 seconds with 100 amps. (Is that the same as welding 0.5 seconds with 50 amps? No, but it starts to get into a similar ballpark). But NOW you have 0.75 seconds of EN, which gives you much better penetration than 0.5 seconds

So, is balance better than asymmetric arc? No, and although it is very similar, it is still different. Asymmetric arc allows you to control the size of the cleaning action line, or the frost line, much better (the cleaning action line is typically related more so to frequency but small adjustments to the asymmetric arc can make a big difference in certain situations) and also the shininess of the finished weld bead. Often, high balance settings, while providing a lot of penetration, create a rather gray, flat, and dull weld bead, even with 4000 series filler rod, where some asymmetric arc really helps with making the weld bead shinier.

Typically, you cannot find literature, videos, or any other online advice on setting asymmetric arc. Your asymmetric arc setting depends a lot on your base metal; for example, 6061 welds differently than 5052, and 5052 welds differently than 3003. Your asymmetric arc setting also depends on your specific application and variables such as size, temperature, cleanliness, filler rod, etc.

You can only limit either EN or EP, not both at the same time, and the limit range spans from 10 to 99% (100% would be turning asymmetric arc off). Whichever value you do not limit is set at 100% (but this is not shown in the LCD).

e) TIG Pulse

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. The first is using low-speed pulse frequencies typically between 0.5 and 2.0 PPS no more than 10 PPS max (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. The second is using 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 and distortion of parts is 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% - 50% and the peak time (pulse-on time or duty) to 25% - 50%.

As an 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 visually appealing ripples in the finished weld bead. 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 increased puddle control. 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 very short period, 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 INVERTIG 251, 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%.

In AC there is only a slow speed pulse available. The pulse frequency is 0.4-20 PPS.

f) Double Pulse in DC TIG

Double pulse TIG combines two types of pulsation. A slow and a fast pulse
The advantages of Double pulse are:

- Higher welding speed
- Deeper penetration
- Increased arc focus
- Better control of heat input

The most suitable applications for double pulse TIG are:

- Thin materials
- Corner joints
- Stainless steel
- Titanium
- Exotic and reactive metals
- Welds with high visual quality requirements

g) TIG DC Dynamic Power

This function allows the operator to vary amperage simply by holding the tig torch closer or further to the material. This might eliminate the need for a foot pedal all together.
The welding current increases as the arc voltage decreases. Opposite, if the voltage increases the welding current decreases.
The Dynamic arc value can be adjusted from a minimum of 0,1 V/A to a maximum of 25 V/A Ampere for each variation of 1Volt whether positive or negative.

h) Pulse in Stick

Advantages of Pulse Welding

Pulse welding includes ALL of the following advantages, but **not all at the same time**.
- Nearly 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
- 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
- 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)

i) Hot Start

Hot-Start for Stick
Hot-start when stick welding gives a short burst of current to ignite hard to start 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 set the hot-start to 5 amps. *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 1 amp arc start with no more than true 5 amp for a few milliseconds, which can be extremely important when welding thin and critical material.

l) High Frequency & LIFT Start
When welding near sensitive electronics, for example in hospitals and assisted living homes, or around computers and 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 foot travel 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 INVERTIG 251. 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 shorting anything out, 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 more comfortable.

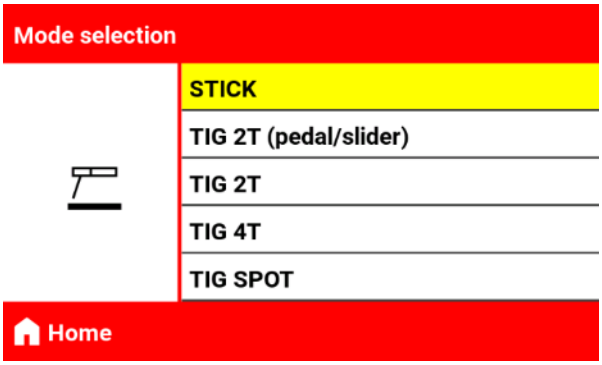
i) LIFT Pipe Smart
This is a lift start with a special feature.
When the smart pipe is selected it is not necessary to use a valved or button torch.
To start welding, simply bring the tungsten closer and bring it into contact. The solenoid valve and inverter will be automatically enabled.

10) HOW TO WELD

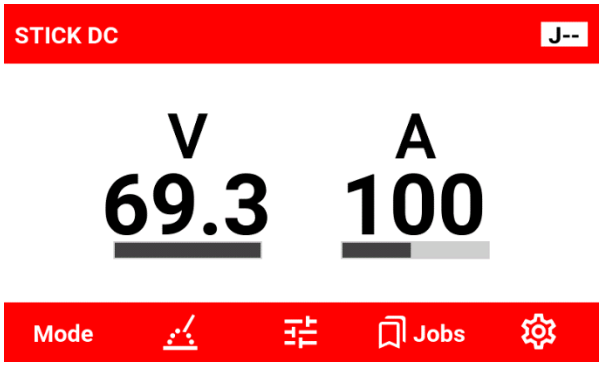
– STEP BY STEP

a) STICK (SMAW)

1) Press the button MODE (**Fig. 4, ref.1, Pg 11**) to enter in the menu.



2) Use the encoder (**Fig. 4, ref.6, Pg 11**) to select the function STICK and press the encoder to confirm the choice.



3) 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. 1, ref.U, Pg 9**)

4) Plug the ground clamp into the negative output receptacle (**Fig. 1, ref. W, Pg 9**).

5) Use the encoder **(Fig.4, ref. 6, Pg 11**) to set your welding amperage, which is shown in the LCD.

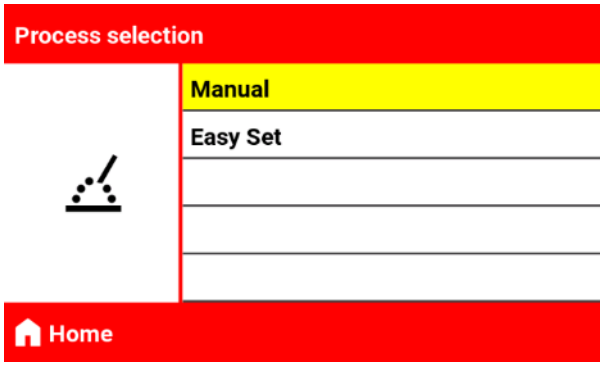
MANUAL / EASY SET

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.

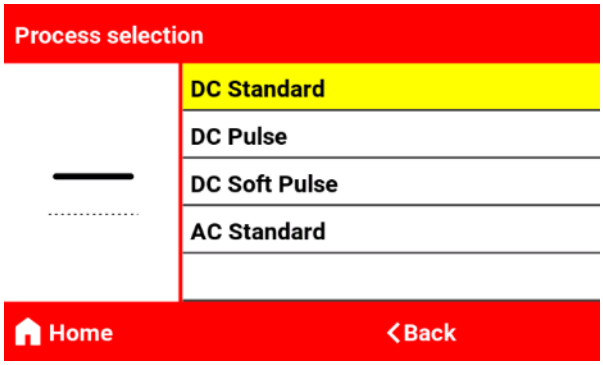
1) Press the button (**Fig. 4, ref.2,Pg 11**)



2) Select the Manual or Easy set function through the encoder (**Fig. 4, ref.6, Pg 11**)

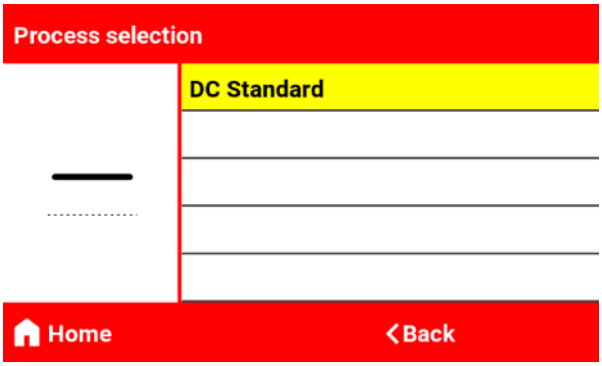
3) To activate the selected function, press the encoder (**Fig. 4,ref.6,Pg 11**)

4) If you select MANUAL you will see this :

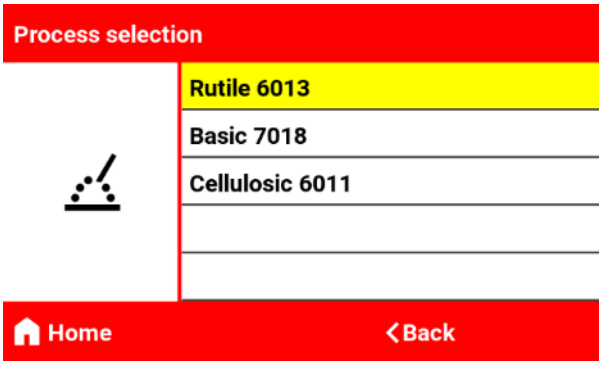


4a) With the encoder (**Fig. 4, ref.6, Pg 11**) it is possible to select the functions and press the encoder to confirm the choice.

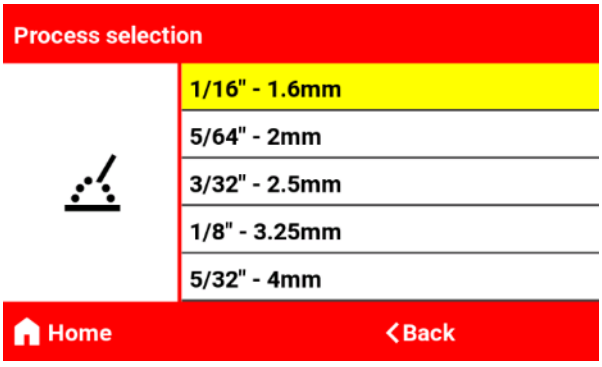
4b) If you select EASY SET you will see this:



4c) Press the encoder to confirm the choice.



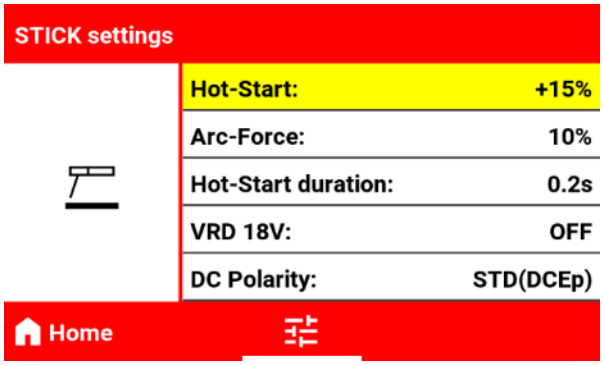
4d) Use the encoder (**Fig. 4, ref.6, Pg 11**) to select the type of electrode and press the encoder to confirm the choice.



4e) Use the encoder (**Fig. 4, ref.6, Pg 11**) to select the electrode diameter and press the encoder to confirm the choice.

STICK SETTINGS

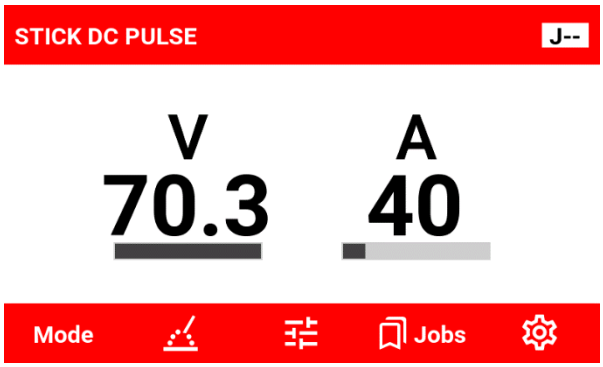
1) To enter in the Stick Settings adjustment menu, press the button (**Fig.4,ref. 3,Pg 11**)



2) Use the encoder (**Fig. 4, ref.6, Pg 11)** to select the function.
3) To modify the value or to activate the functions press the encoder and turn it .

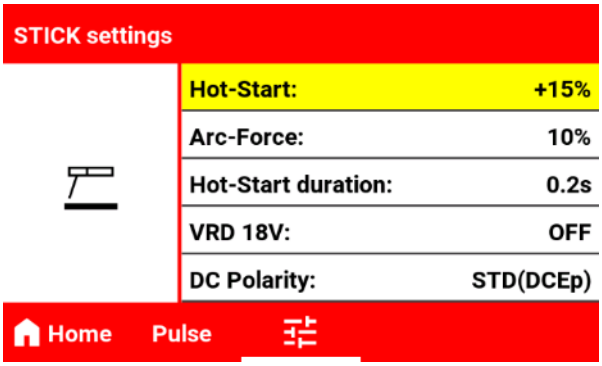
4) Press the button HOME (**Fig. 4, ref.1, Pg 11**) to come back in the main screen.

STICK PULSE PARAMETERS ADJUSTMENT (Only in MANUAL MODE)



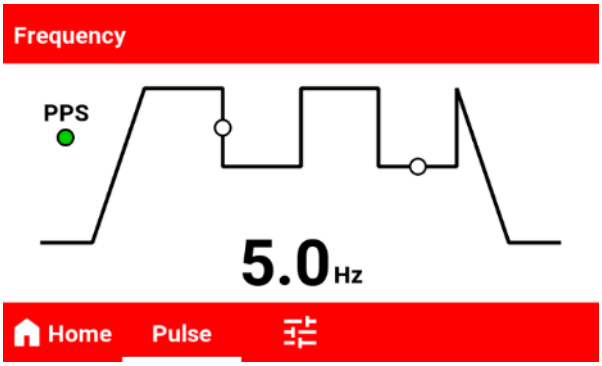
1) To enter in the Stick Pulse Parameters adjustment menu, press the button

(**Fig.4, ref. 3, Pg 11**)



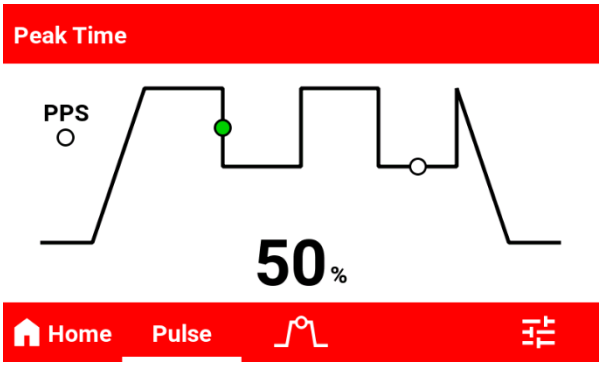
2) Then press the button PULSE (**Fig.4, ref. 2, Pg 11**)

3) The first parameter adjustable is the Frequency (PPS)



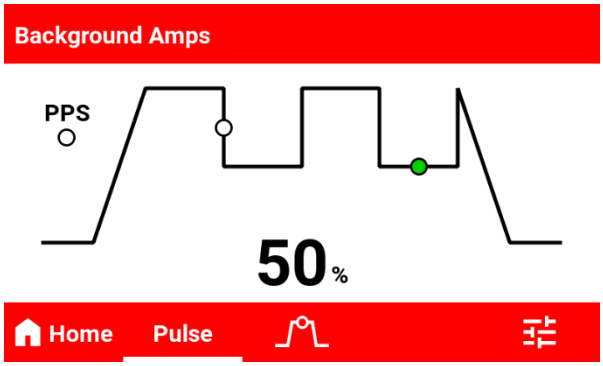
4) It is possible regulate the value turning the encoder

5) Press the encoder to jump to the next function : Peak Time



6) It is possible regulate the value turning the encoder

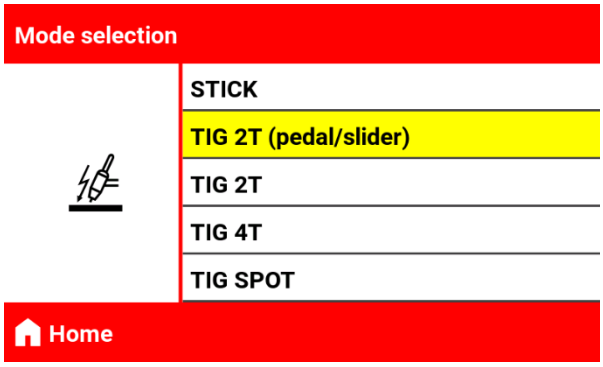
7) Press the encoder to jump to the next function: Background current



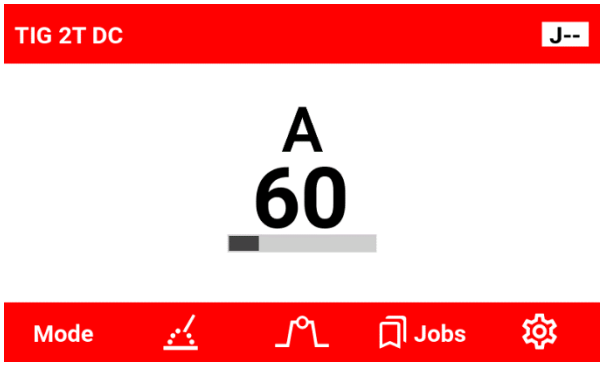
8) It is possible regulate the value turning the encoder

b) TIG WELDING

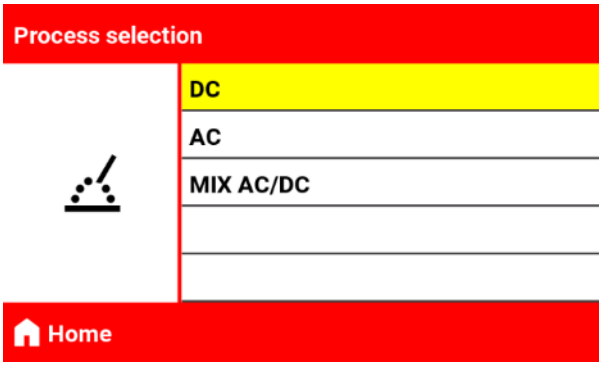
1) Press the button MODE (**Fig. 4, ref.1, Pg 11**) to enter in the menu.



2) Use the encoder to select the Welding Mode (**Fig.4, ref 6, Pg 11**) and press it to confirm the choice.



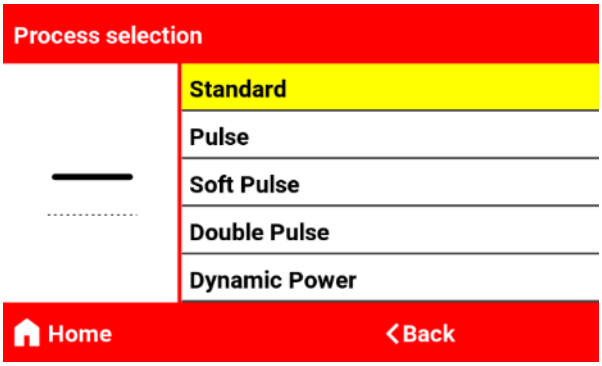
3) Then press the button  to enter in the Process Selection



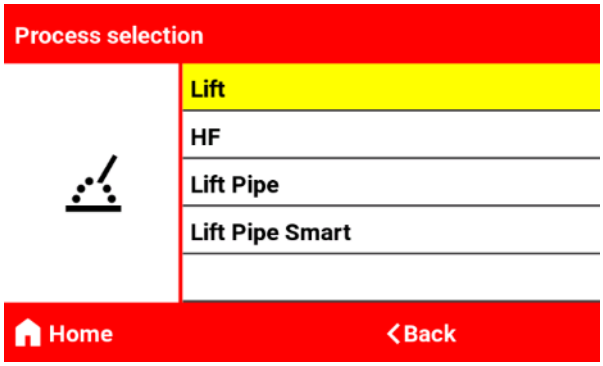
Plug the TIG torch into the output receptacle (**Fig.1, ref.U, Pg.9**) and the ground clamp into the output receptacle (**Fig.1, ref.W, Pg 9**)

TIG DC

1) If you select DC you will jump in this screen :

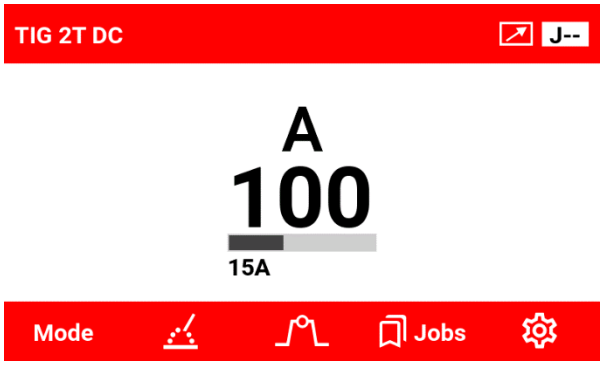


STANDARD : standard Tig
PULSE :pulse Tig
SOFT PULSE : Soft Pulse Tig .
DOUBLE PULSE: it is a double pulsation in which you can choose two frequencies, two Base current percentages and two duty cycles.
DYNAMIC POWER : This function allows you to weld in TIG without a fot pedal and "adjust" your amperage simply by how close or far you hold the tig torch to the workpiece. This function is keeping the overall output power constant, rather than the welding current as it is usually done. This function allows for more precise penetration control and a heat input; it focuses the arc on the welding part, even as the arc length varies. In fact, the longer the arc, the more the current drops and vice versa, the arc concentration should remain constant. It's possible choose a variation slope value ranging from 0.1A/V to 25A/V. A low value means that even with a large movement the current will vary little, a higher value however causes a variation of perceivable current even with minimal movement of the torch.
You could start far from the piece
without too much heat being introduced, then gradually as you get closer the current and therefore the heat input increases...



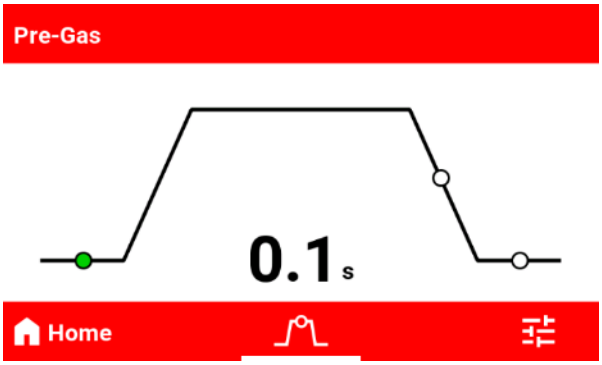
LIFT : Lift Ignition
HF : Hf Ignition
LIFT PIPE : Lift Ignition . You select this function when a torch with gas valve is used.
LIFT PIPE SMART : Lift Ignition. It works like LIFT PIPE but there is no need to use a torch with gas valve because when the tungsten touches the material the gas solenoid in the machine is activated automatically.

TIG DC 2T (pedal / slider)

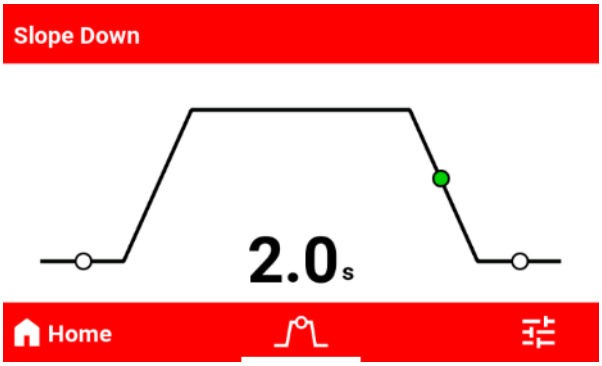


To access the TIG - MAIN SETTINGS submenu, press button

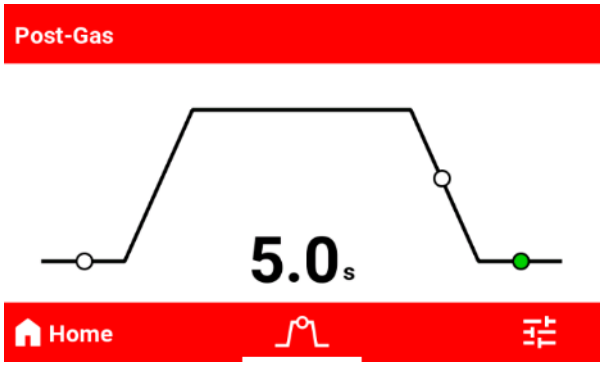
(Fig.4,ref.3,Pg.11), and the following screen appears :



Here, you can select your pre-gas flow in seconds. by turning the encoder (**Fig.4, ref.6**, **Pg 11**) until you reach your desired pre-gas flow duration.
In order to adjust the next value of the sequencer, in this case Slope Down, press the encoder;



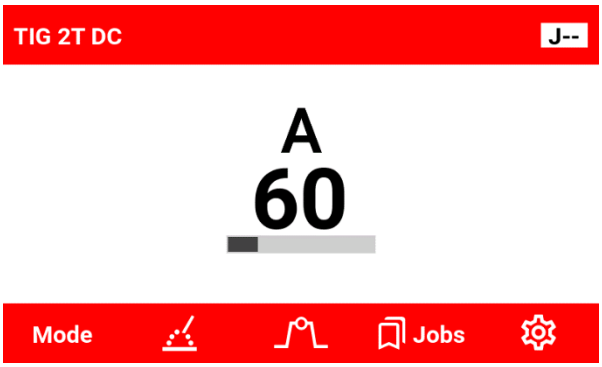
Here, you can adjust the slope down duration in seconds. It is very uncommon to set slope down when using a foot pedal. However, setting a slope down time may be done to implement a fail safe in an attempt to avoid abrupt termination of the weld and subsequent crater formation, which leads to weld defects. Push the encoder, to move to the final station of the sequencer—post-gas flow .



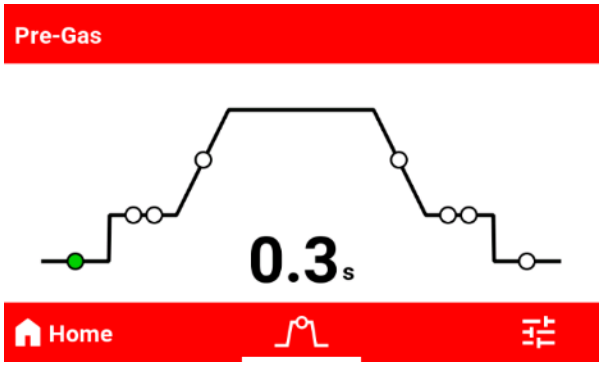
When setting post-gas flow, when in doubt- more is better. How much post-gas flow you need depends on the material you plan to weld, the cup you plan to use, the amperage you plan to weld at, and the amount of tungsten stick-out you use. Some people advocate that you never need more than 5 seconds of post-gas flow, claiming that more post-gas flow is just a waste of Argon. Well, most likely these people are welding very thin material or are not experienced enough to give you sound advice. 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 titanium, post-gas flow times of 30 seconds or more are common. To achieve longer than 50 second post flow, reignite the arc at a low amperage for a brief moment. That will restart the post gas flow sequence. During post-gas flow time, you also need to hold the torch in position to shield the metal from discoloring**.**

TIG DC 2T

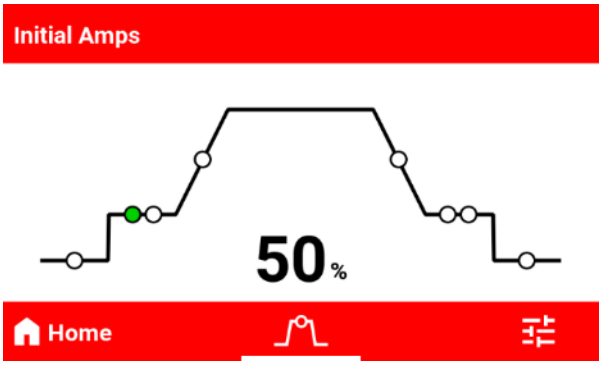
This is the main screen when you are in TIG DC 2T



When you press the button
(Fig.4,ref.3,Pg.11), it is possible to adjust some different parameters.

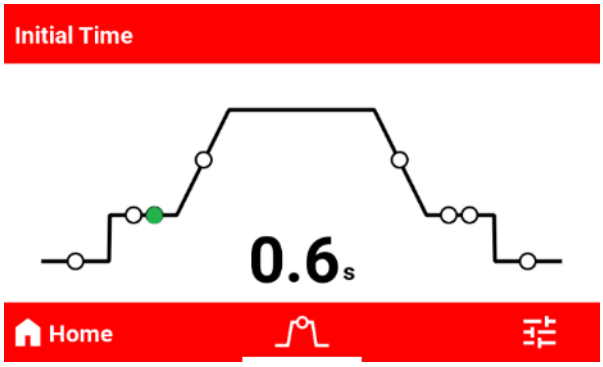


The first parameter is the Pre-Gas Flow time.
Turn the encoder to regulate the value.
In order to adjust the next value of the sequencer, press the encoder to go to Initial Amps.

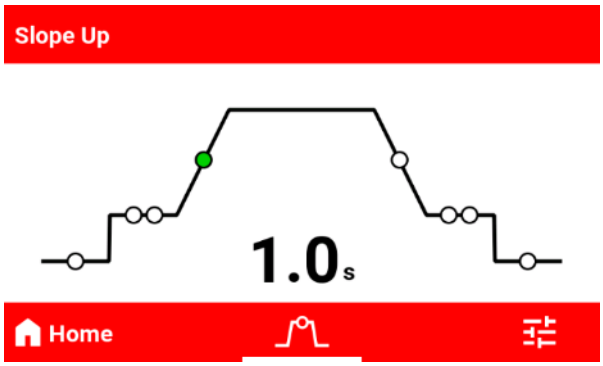


This value is a percentage of the welding current.

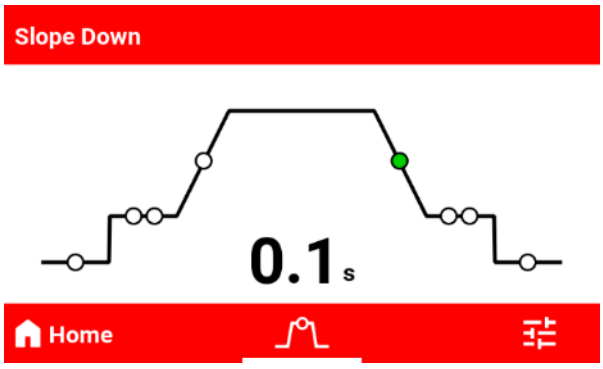
Turn the encoder to regulate the value and press it to go to the next regulation. Initial Time.



Here you set a time in seconds. This is the time you stay at the initial amps.
Turn the encoder to regulate the value and press it to go to the next regulation. Slope Up.



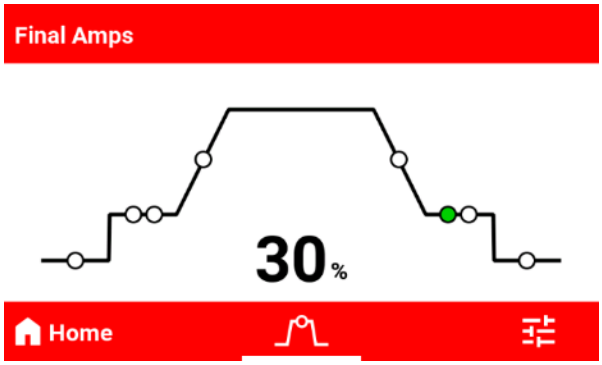
Here you set the Slope Up time in seconds.
Turn the encoder to regulate the value and press it to go to the next regulation. Slope Down



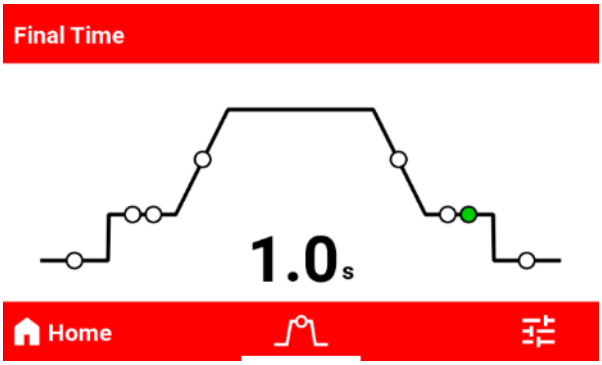
Here, you can adjust the slope down duration in seconds. However, setting a slope down time may be done to implement a fail safe in

an attempt to avoid abrupt termination of the weld and subsequent crater formation, which leads to weld defects.

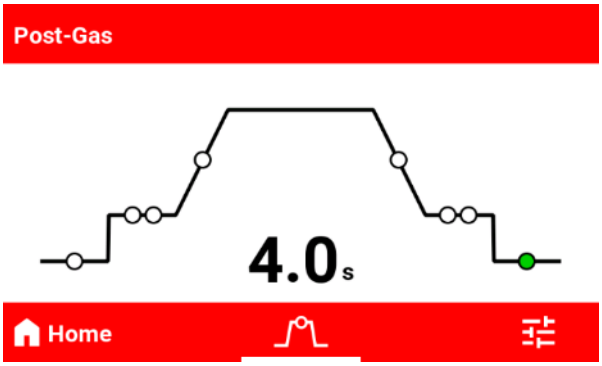
Turn the encoder to regulate the value and press it to go to the next regulation. Final Amps .



This value is a percentage of the welding current .
Turn the encoder to regulate the value and press it to go to the next regulation. Final Time .



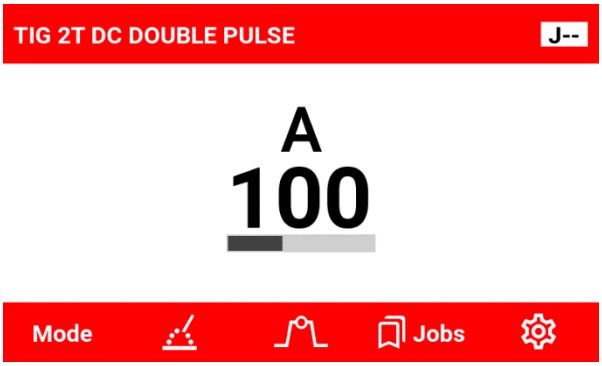
Here you set a time in seconds. This is the time you stay at the Final amps.
Turn the encoder to regulate the value and press it to go to the next regulation. Post Gas Time .



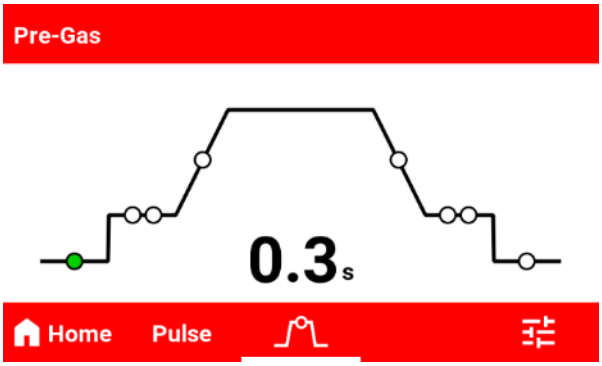
Here you set a time in seconds. The Post Gas Time.

TIG DC 2T DOUBLE PULSE

This is the main screen of TIG 2T DC Double Pulse :

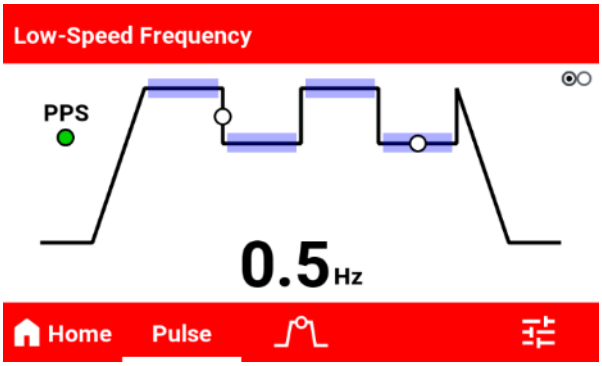


To access the TIG - MAIN SETTINGS submenu, press button (Fig.4,ref.3,Pg.11), and the following screen appears :

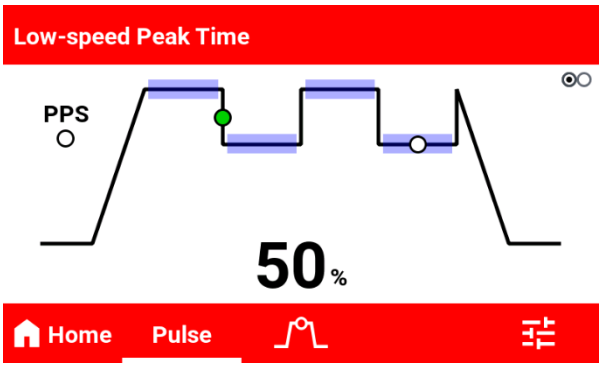


All parameters (Pre Gas, Initial Amp, Initial Time, Slope Up) are set like is explained in TIG DC 2T.

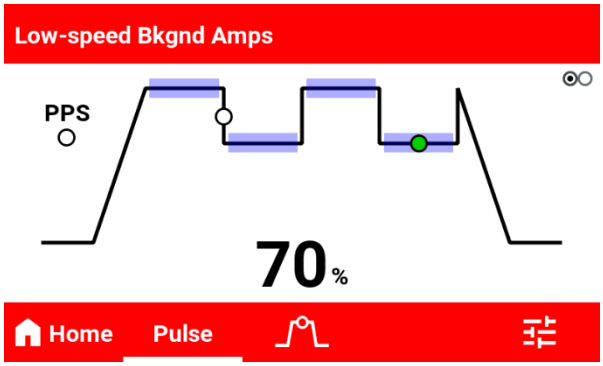
Then there are the pulse parameters to regulate.
Pressing the button PULSE (Fig.4,ref.2), you access to the adjustment of the low speed parameters.
The first parameter is Low Speed Frequency.



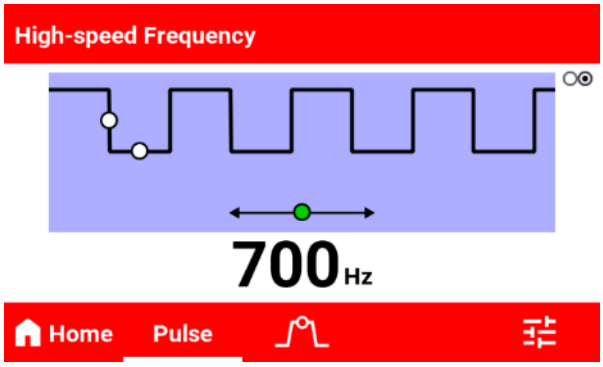
It is adjustable from 0,4 to 10 Hz turning the encoder.
Press the encoder to jump to the next parameter.
The second parameter is Low Speed Peak Time.



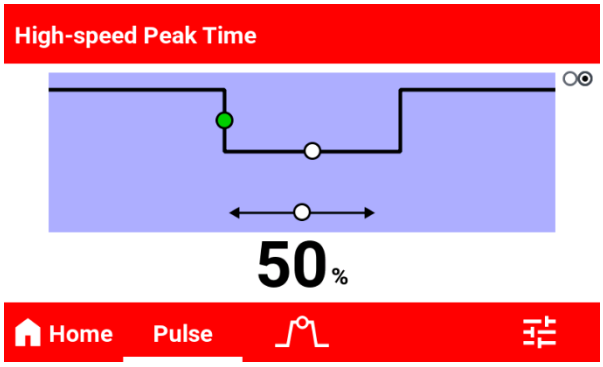
It is adjustable from 10 to 90 % turning the encoder.
Press the encoder to jump to the next parameter.
The third parameter is Low Speed Background Amps %



It is adjustable from 10 to 90% turning the encoder.
Pressing again the encoder start the regulation of the High-Speed Parameters.
The first parameter of the High-Speed settings is the Frequency.

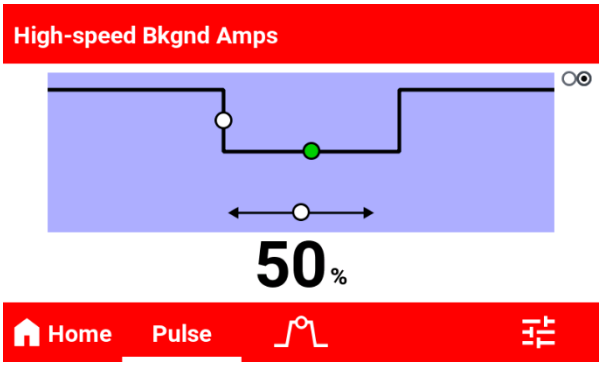


It is adjustable from 0,4 to 1000 Hz turning the encoder.
Press the encoder to jump to the next parameter.
The second parameter of High Speed is the Peak Time.



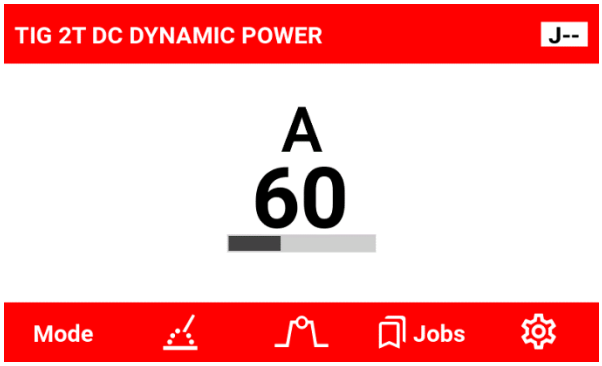
It is adjustable from 10 to 90 % turning the encoder.

Press the encoder to jump to the next parameter.
The third parameter is Background Amps %.

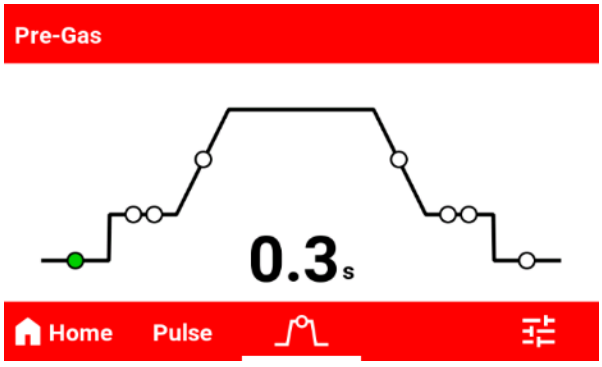


TIG DC DYNAMIC POWER

This is the main screen of TIG DC Dynamic Power :

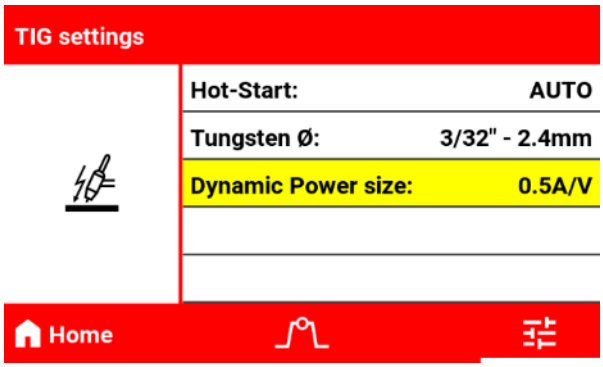


To access the TIG - MAIN SETTINGS submenu, press button (Fig.4,ref.3,Pg.11), and the following screen appears :



All parameters (Pre Gas, Initial Amp, Initial Time, Slope Up) are set like is explained in TIG DC 2T.
Pressing the button you access to the

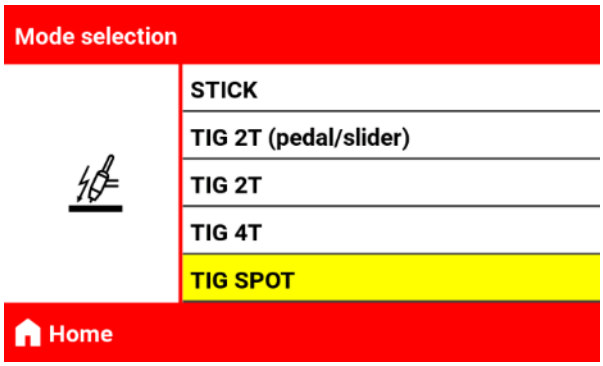
Tig Settings where it is possible to adjust the Dynamic Power Size .



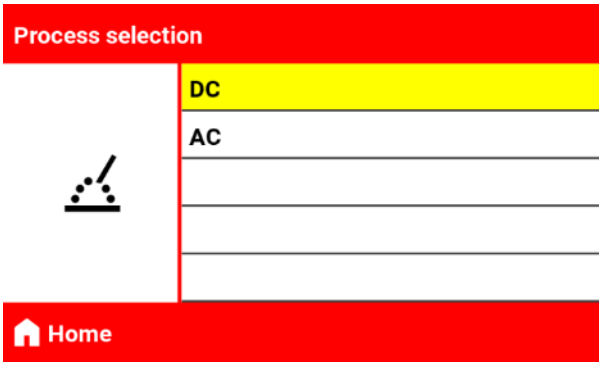
A higher A/V value will be changing the current more when the arc is lengthened or shortened

TIG DC SPOT

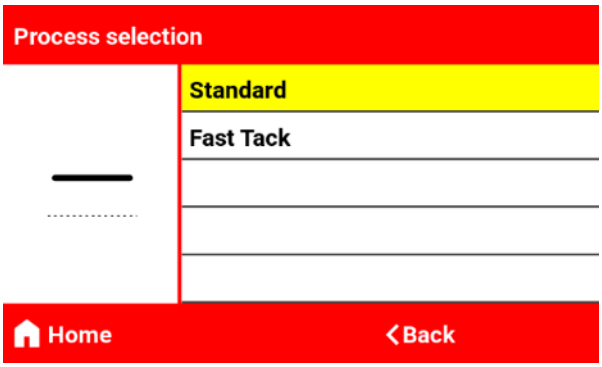
1) Press the button MODE (**Fig. 4, ref.1, Pg 11**) to enter in the menu and select the function TIG SPOT



Then from the main screen press the button to enter in the Process selection menu.

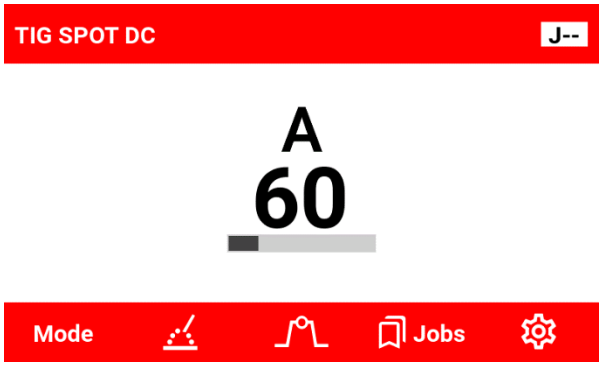


Turn the encoder and select DC and then press the encoder to confirm the choice.

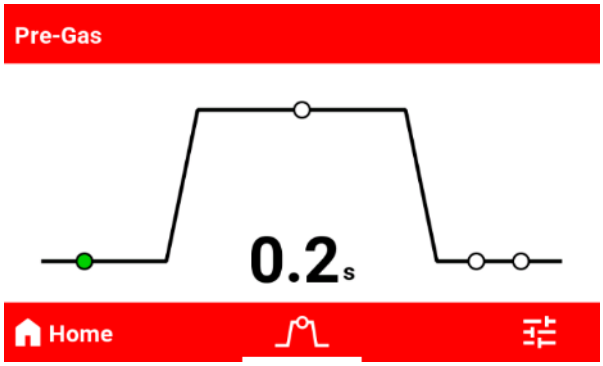


Between the two functions there is a difference.

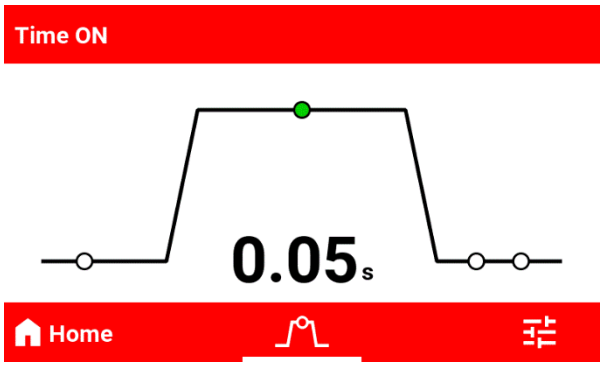
STANDARD : it is a normal Spot welding
FAST TACK : This function is used for joining thin sheet metal. The minimum arc on time has been reduced to 0.01sec. The fast tack function offers some pulsation which helps to further narrow the point and heat input. The pulsation is not user adjustable.



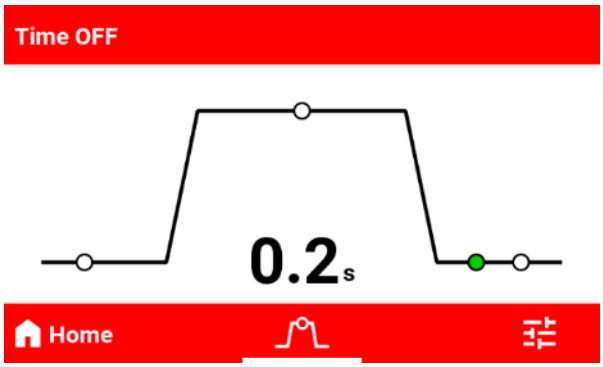
From the main screen press the button  **(Fig.4, ref.3, pg 11)**



Here it is possible regulate the Pre-Gas Time turning the encoder.
Press the encoder to go to the next regulation.
Time On

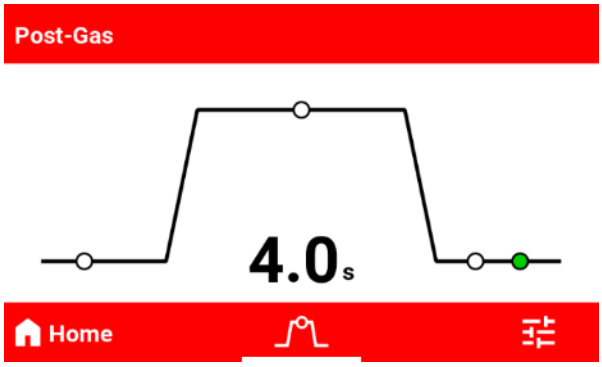


Here it is possible regulate the time the arc stays on.
Press the encoder to go to the next regulation.
Time Off.



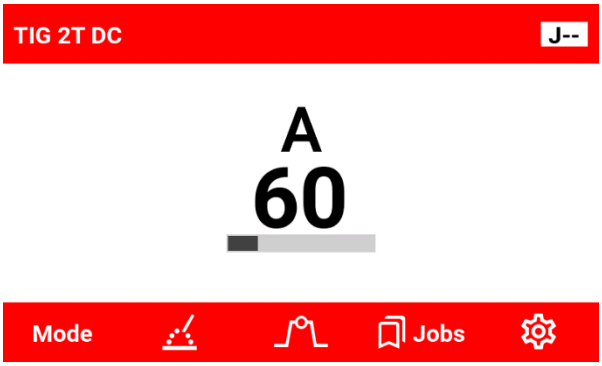
Here it is possible regulate the time the arc stays off.
If it set a time of 0.1 or more, this is time the arc stays off.
If it set a time of 0.0 when the arc stops it is necessary to press the torch button again to start again.

Press the encoder to go to the next regulation. Post Gas.



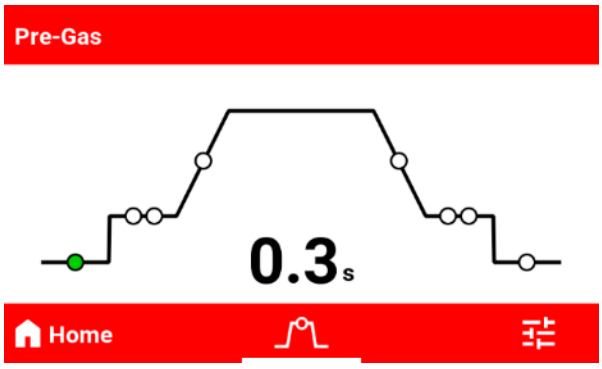
TIG SETTINGS DC

From the main screen it is possible to access to the TIG SETTINGS DC.

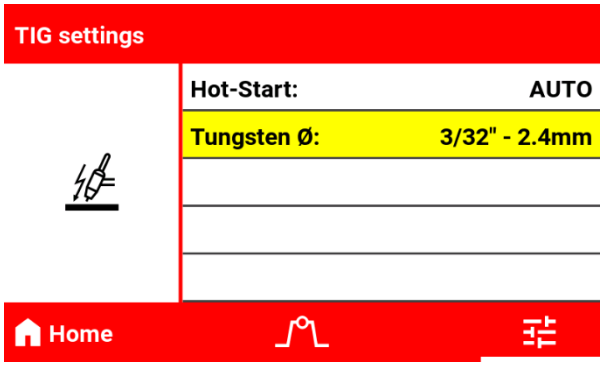


Press the button (**Fig.4, ref.3, pg 11**).

You will see the screen with welding regulation (this will differ if you are in 2T or 4T or SPOT)



Press the button (**Fig.4, ref.5, pg 11**)

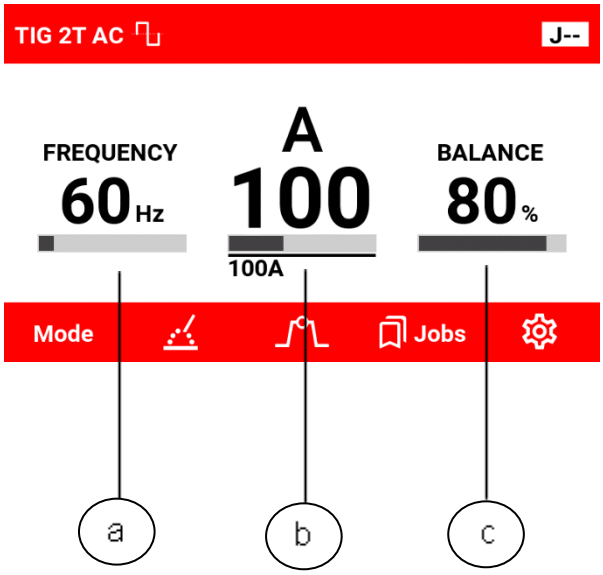


Here you can set up the size of your tungsten.

For every size of tungsten there is a Hot Start value programmed. Normally is in AUTO but it is possible modify.

AC MODE

This is the main screen when you activate the AC MODE

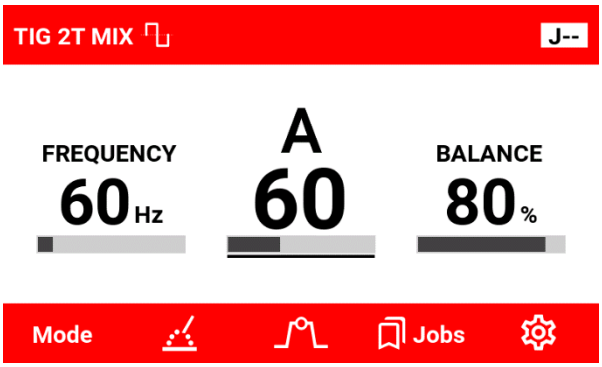


a AC Frequency
b Amps (starting amps small number, max pedal amps large number)
c AC Balance

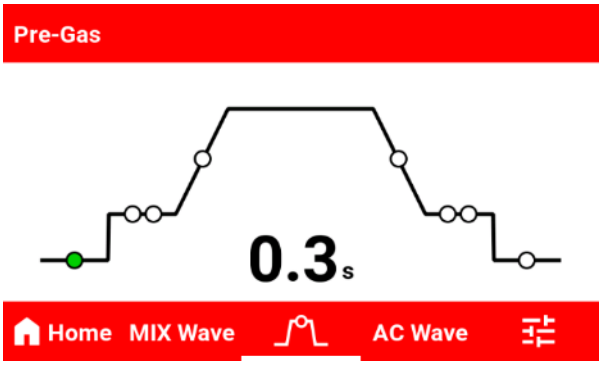
To set the parameters AC FREQUENCY and AC BALANCE press the encoder.
Every time you press the encoder it is possible to see a black line under the function selected.
Turn the encoder to adjust the value.

TIG MIX AC/DC

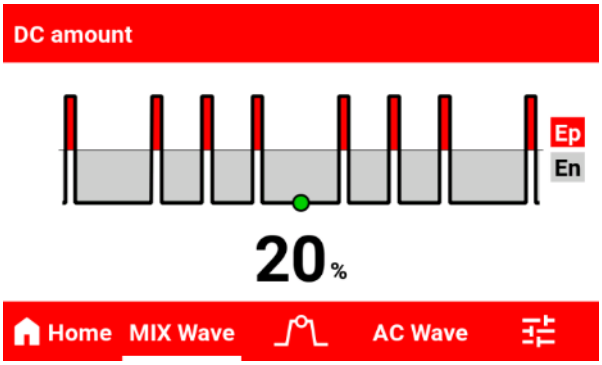
This is the main screen when you activate the MIX AC/DC



When you press the button (**Fig.4, ref.3, pg 11**) you will see the screen with weld parameter adjustments.



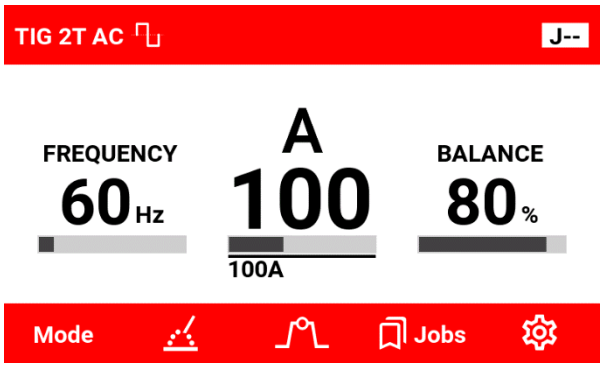
If you press the button AC WAVE you can adjust the standard AC parameters (Balance & Frequency).
If you press the button MIX WAVE you will see the screen about the DC amount added in the AC wave and you will be able to adjust it:



Here you can adjust how much time of DC you want to add.
If you use 100% argon gas typically, we do not encourage you to use more than 30 or 40% of DC so you can maintain some good cleaning properties. If you run Ar/He mixes or pure Helium you can go much higher than 40%.

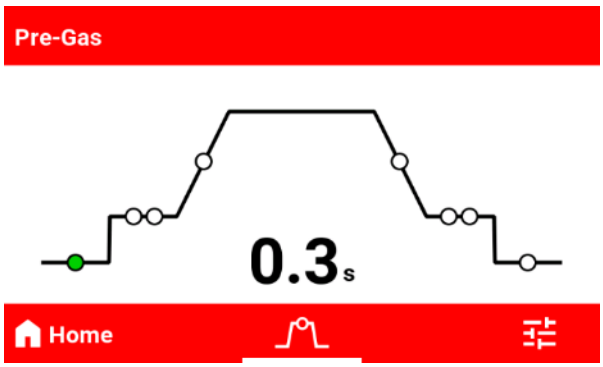
TIG SETTINGS AC

From the main screen it is possible to access to the TIG SETTINGS AC.

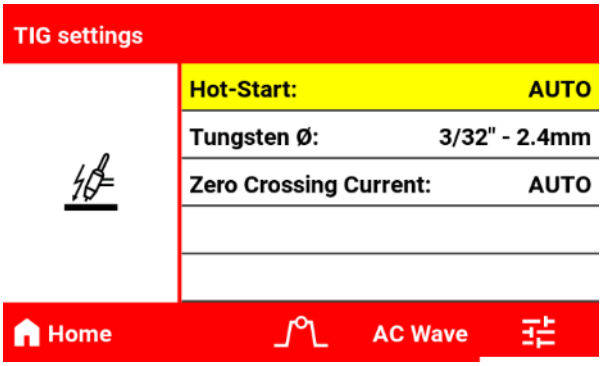


Press the button (**Fig.4, ref.3, pg 11**)

You will see the screen with welding settings (this will different if you are in 2T or 4T or SPOT).



Press the button (**Fig.4, ref.5, pg.11**)



Here you can set up the size of your tungsten. For every size of tungsten there is a Hot Start amount preprogrammed. Normally this function is set to AUTO but it is possible to adjust the hot start.
It is possible to adjust the Zero Crossing Current.

ALL Manufacturers are keeping a high AC zero crossing current 80-100A. This allows the arc to stay alive under all conditions, however it introduces quite a bit of energy (raises the average current) and leads to a lot of noise.

This now can be adjusted and in lower amperage ranges (below 150 Amp) it can be set to a significant lower zero crossing current, as low as 20Amp. This allows for greater welding comfort, less noise, and a smoother arc.

(*) The INVERTIG 251 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 5 to 100 amps?

Sometimes, depending on the size and type of tungsten you use (the Invertig 251 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 a while. 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.

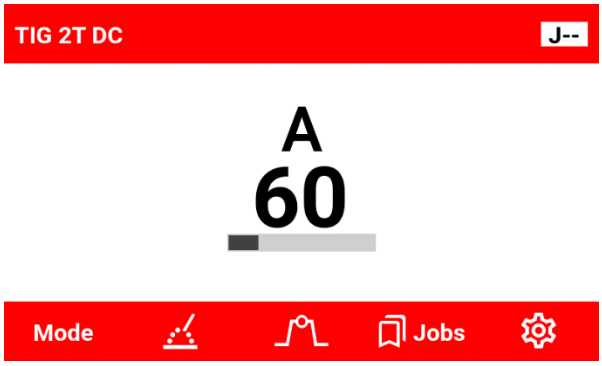
Your starting current does not always have to be 1 amp! When working with thicker, colder material (especially aluminum), a higher starting current gives you better arc ignition and arc stability. Or greater operator comfort and less operator frustration we suggest a minimum of 5 maybe even 10 amps starting and we also suggest to leave the hot start in AUTO mode based on tungsten diameter unless you have a very critical job that requires custom adjustments.

c) OTHER FUNCTIONS

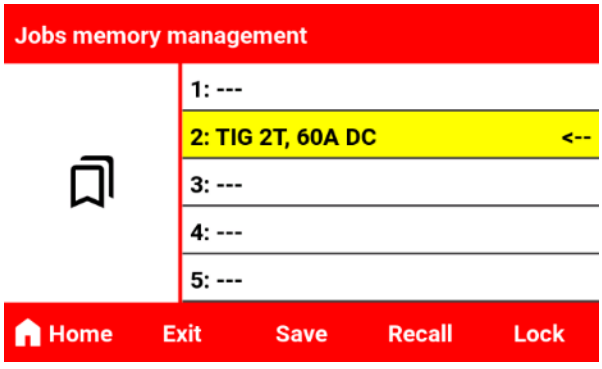
FUNCTION OF STORING AND LOADING WELDING PARAMETERS (JOB MODE)

This function allows you to store and load at any time all the settings made on the power source. It is possible to save 8 welding parameters settings.

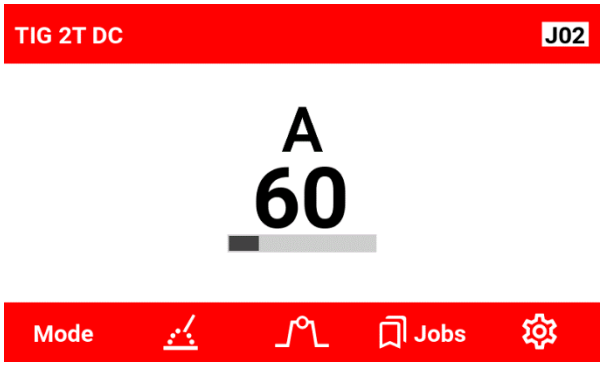
STORING WELDING SETTINGS



1) Press the button **JOBS** (**Fig.4, ref.4, pg 11**) to go in the JOB LIST page.
2) Using the encoder **(Fig.4,ref.6,pg11)** select the number of the program you want to save the welding parameter.
3) Press the **SAVE** button **(Fig.4,ref.3,pg.11)** to save.
4) After that next to the job number it is possible to see the preview of your welding parameter saved.



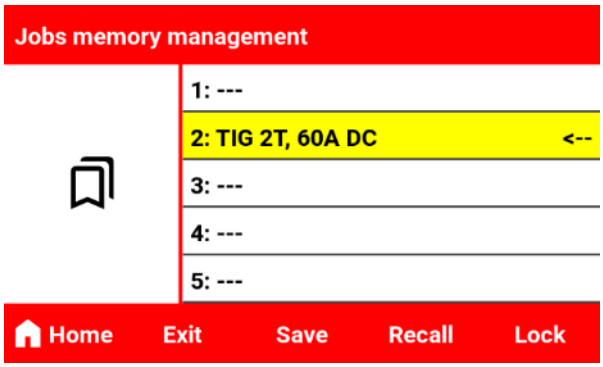
5) Press the button HOME (**Fig.4, ref.1, pg 11**) to return to the main screen.
6) On the main screen it is now possible to see the JOB's number you are using.



If the welding parameter will be changed the indication of the number of the Job change color. It will become red.

RECALL WELDING SETTINGS

1) Press the button **JOBS** (**Fig.4, ref.4, pg 11**) to go in the JOB LIST page.
2) Using the encoder **(Fig.4,ref.6,pg11)** select the number of the parameter you want to recall .



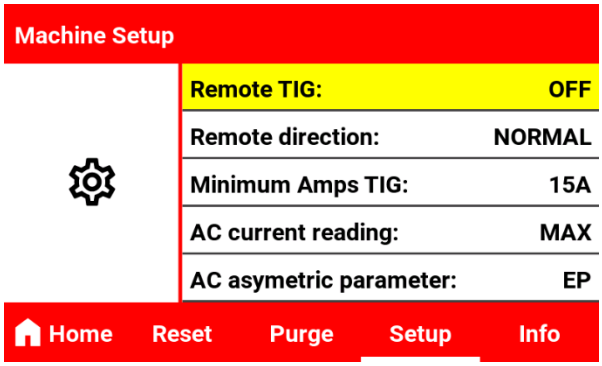
3) Press the **RECALL** button **(Fig.4,ref.4,pg11)** to recall the parameter.
4) Press the button HOME (**Fig.4, ref.1, pg 11**) to return to the main screen.

LOCK PARAMETERS

With this function it is possible lock all adjustments and buttons.
The only button that works is the JOBS button to enter in the job list and unlock this function.

TRIGGER JOB FUNCTION
In the first four position of the JOB LIST it is possible to activate the TRIGGER JOB FUNCTION
This function allows to recall one of the first four parameter of the JOB LIST with a quick pressure of torch button.
For recall these parameters they must have a Pre Gas time of 0,3 sec or more.

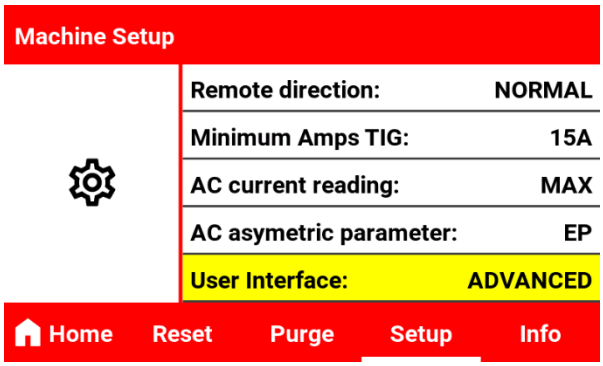
MACHINE SETUP
From every welding mode, pressing the button ⚙ it is possible to go into the Machine Setup menu.



REMOTE TIG : it is possible to activate the Remote
REMOTE DIRECTION : it possible to change the direction of the current regulation
MINIMUM AMPS TIG : it is possible to regulate the minimum current regulation
AC CURRENT READING : is possible to change the current reading . MAX or AVG
AC ASYMETRIC PARAMETER : it is possible to select which part of the wave form you want to adjust . EP (Electrode Positive) , EN (Electrode Negastive)

USER INTERFACE
It is possible to simplify the user interface. Selecting BASIC reduces the number of functions and adjustments.
1) Press the button ⚙ to go into the Machine Setup menu.

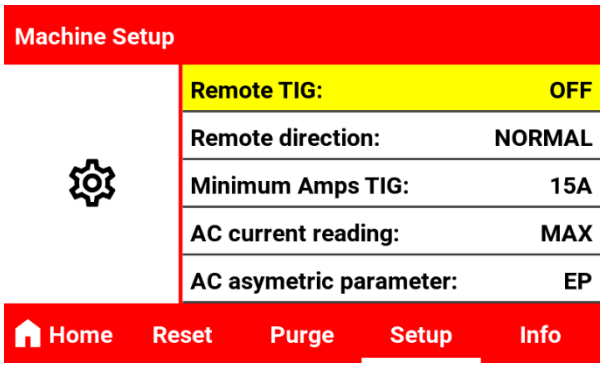
2) With the encoder select USER INTERFACE



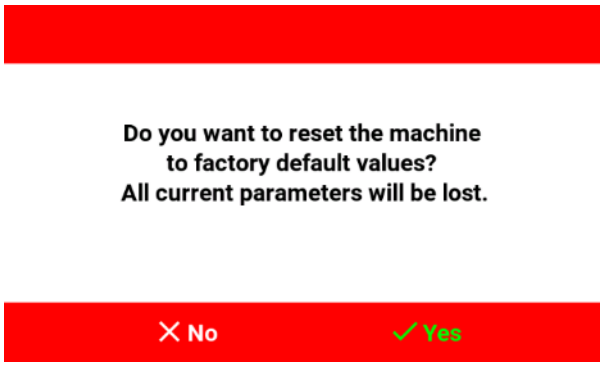
3) Press the encoder and turn it to select BASIC

FACTORY RESET

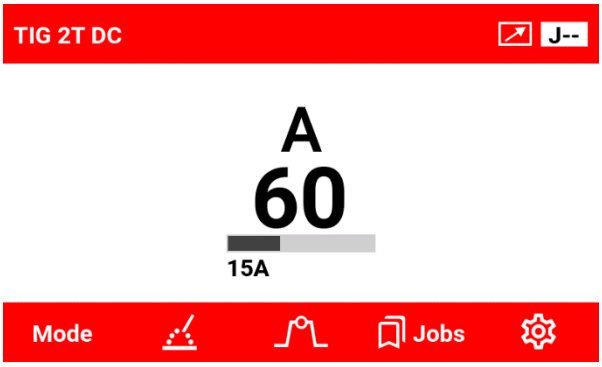
If it is necessary to do a factory reset press the button ⚙ to go into the settings menu.



Press the button RESET (**Fig.4, ref.2, pg 11**)



Press the button YES to start the Reset.
After that the machine will be on TIG 2T DC at 60 amps with REMOTE activated



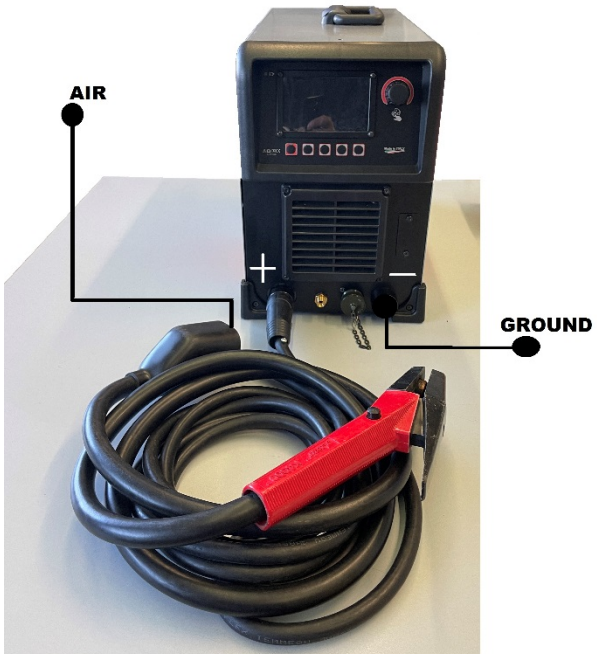
d) CAC-A (GOUGING)

Gouging applications use a welding power supplies with an open circuit voltage higher than 60 volts, to allow for any voltage drop in the circuit.

Connect the Welding Power Cable that is connected to the Torch Swivel Cable to the positive terminal on the power supply.

(**Fig. 1, ref.U, Pg 9**)

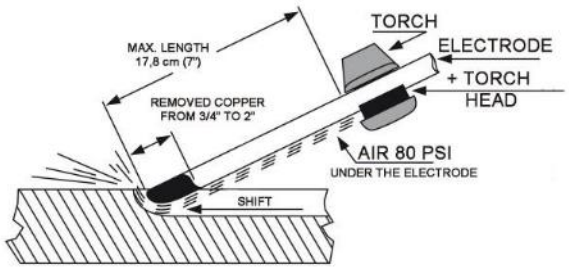
Connect the Welding Power Cable that is connected to the negative terminal on the power supply to the workpiece.



Turn on the power supply and air supply to the gouging torch and cable assembly.

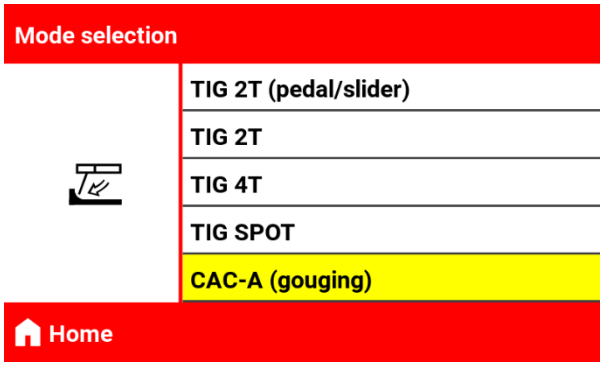
While the torch valve is open, adjust the air pressure at the torch (if it is possible) to the normal pressures range between 80 psi (552 kPa – 5,5 bar) and 100 psi (690 kPa – 6,9bar); higher pressures may be used, but they do not remove metal more efficiently.

Press down on the lever of the torch to insert the air carbon-arc electrode “carbon” into the torch. When using copper coated carbons, the bare carbon end should be down and away from the torch. This is where the arc will be struck between the carbon and workpiece.

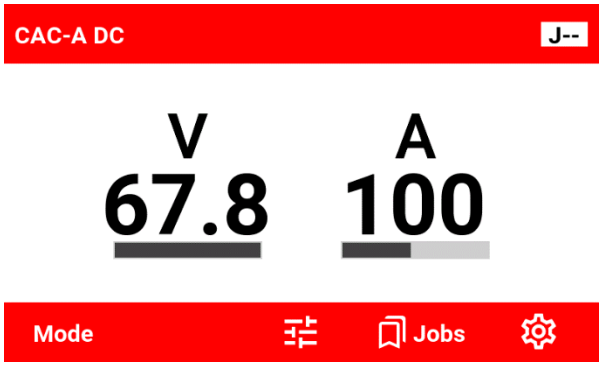


Hold the electrode as shown in Figure, so that a maximum of 7” (178 mm) extends from the torch. This extension should be 3” (76.5 mm) for aluminium.
Adjust the welding current, to the suggested current range shown for the carbon diameter being used.
We recommend the use of 5/32” carbon rods, 3/16” may be used by skilled operator on smaller jobs.

1) Press the button MODE (**Fig. 4, ref.1, Pg 11**) to enter in the menu.

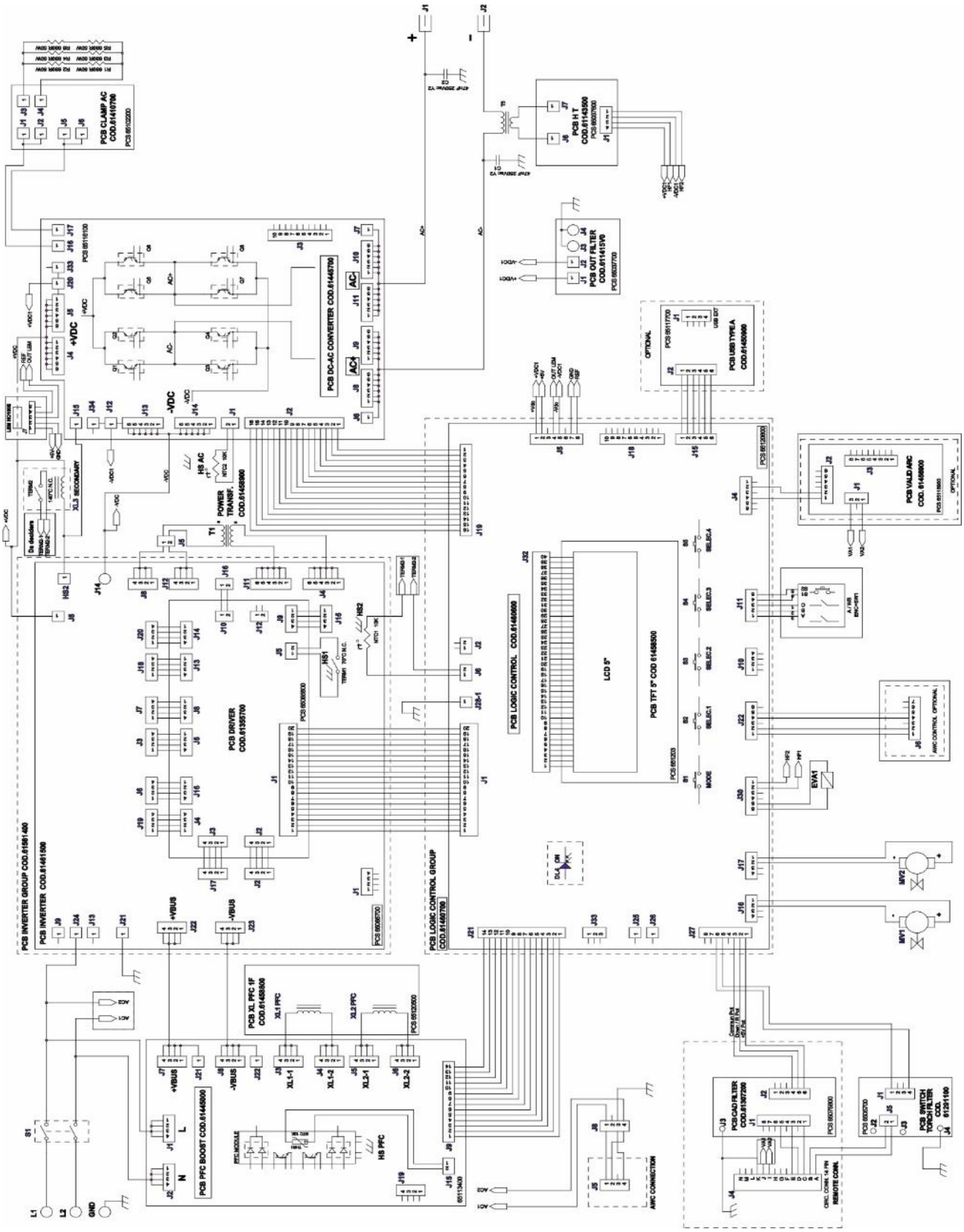


2) Use the encoder to select the Welding Mode (**Fig.4, ref 6, Pg 11**) and press it to confirm the choice.

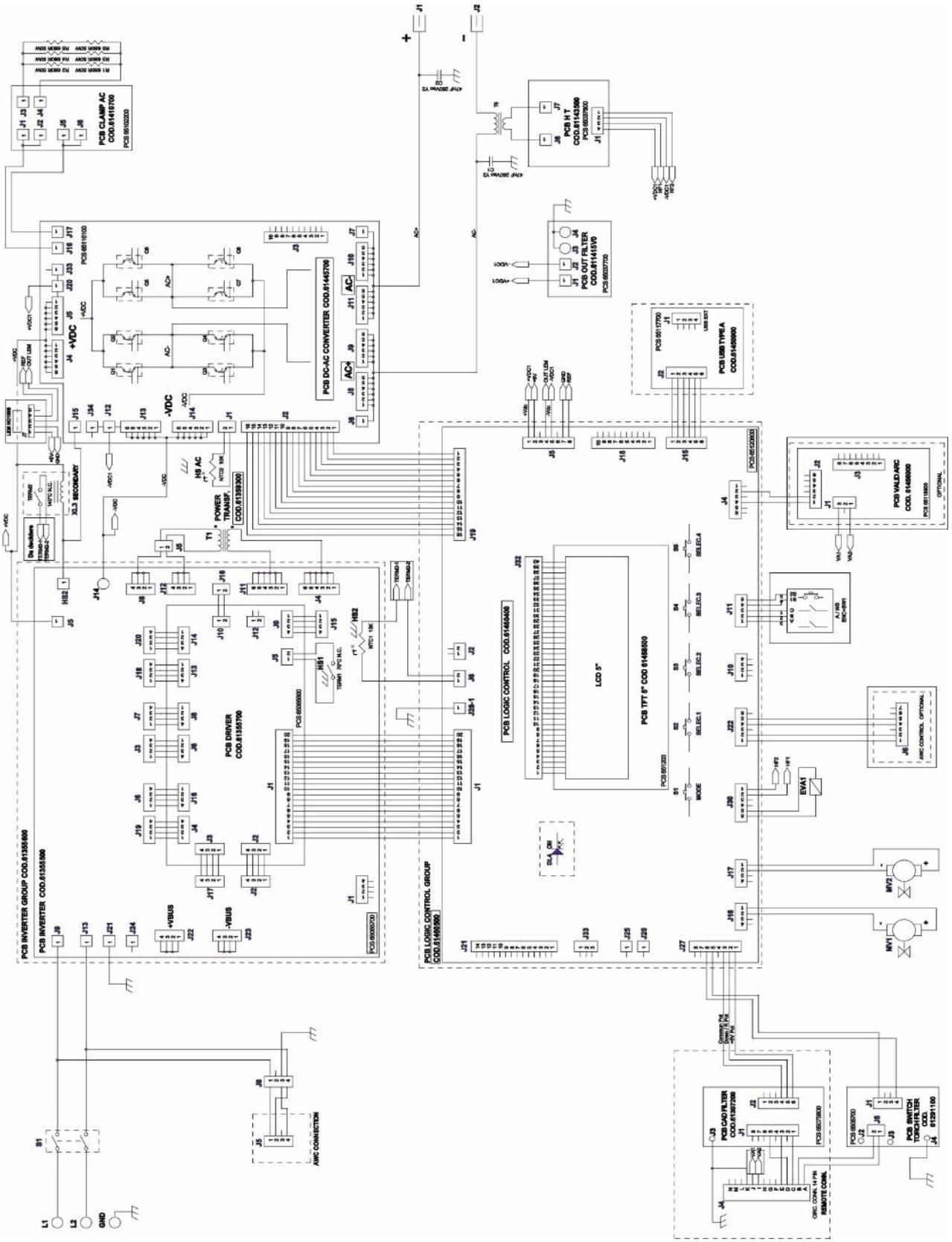


11) WIRING DIAGRAMS

WIRING DIAGRAM – INVERTIG 251 AC/DC DV

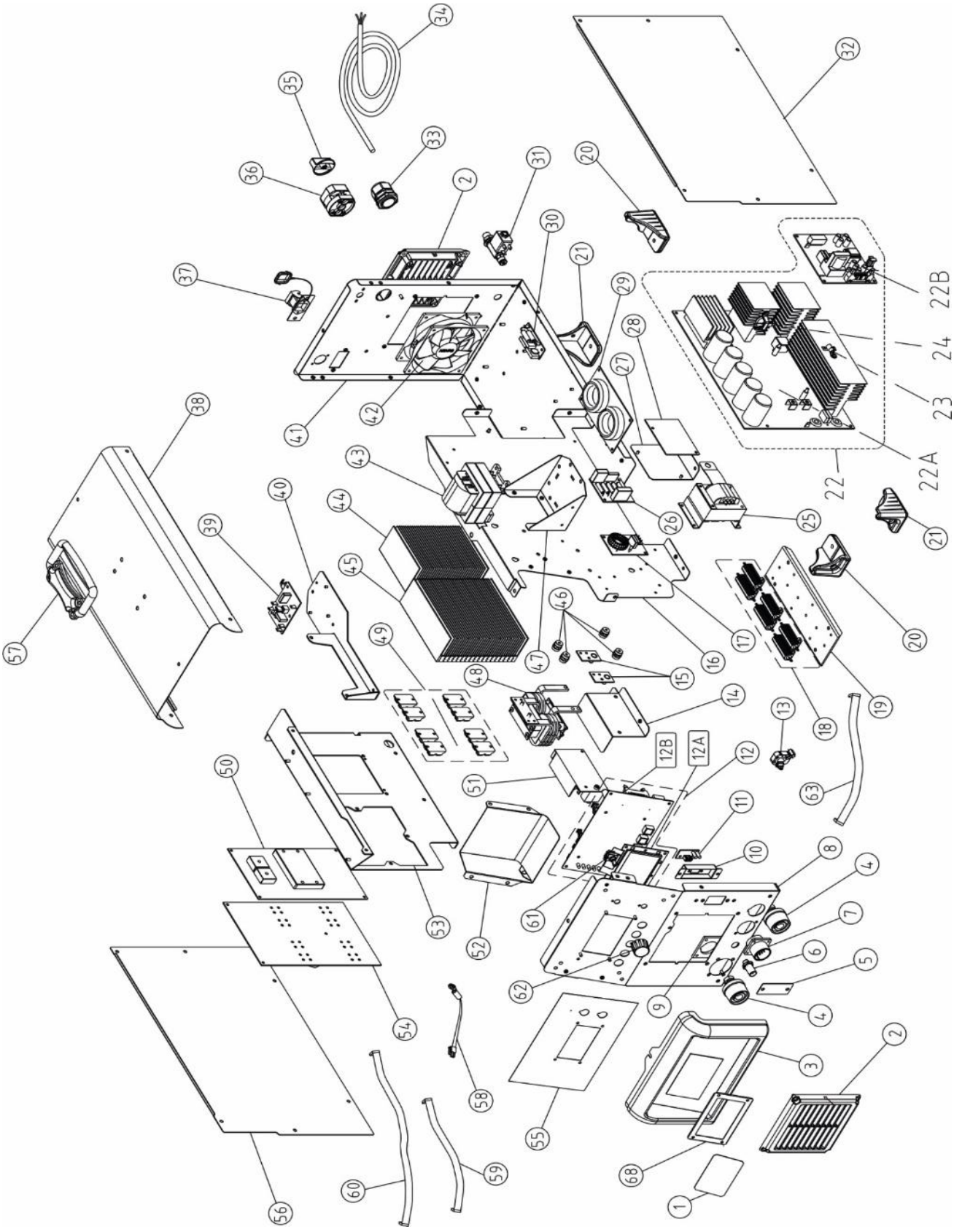


WIRING DIAGRAM – INVERTIG 251 AC/DC



12) EXPLODED VIEWS

EXPLODED VIEW INVERTIG 251 AC/DC DV

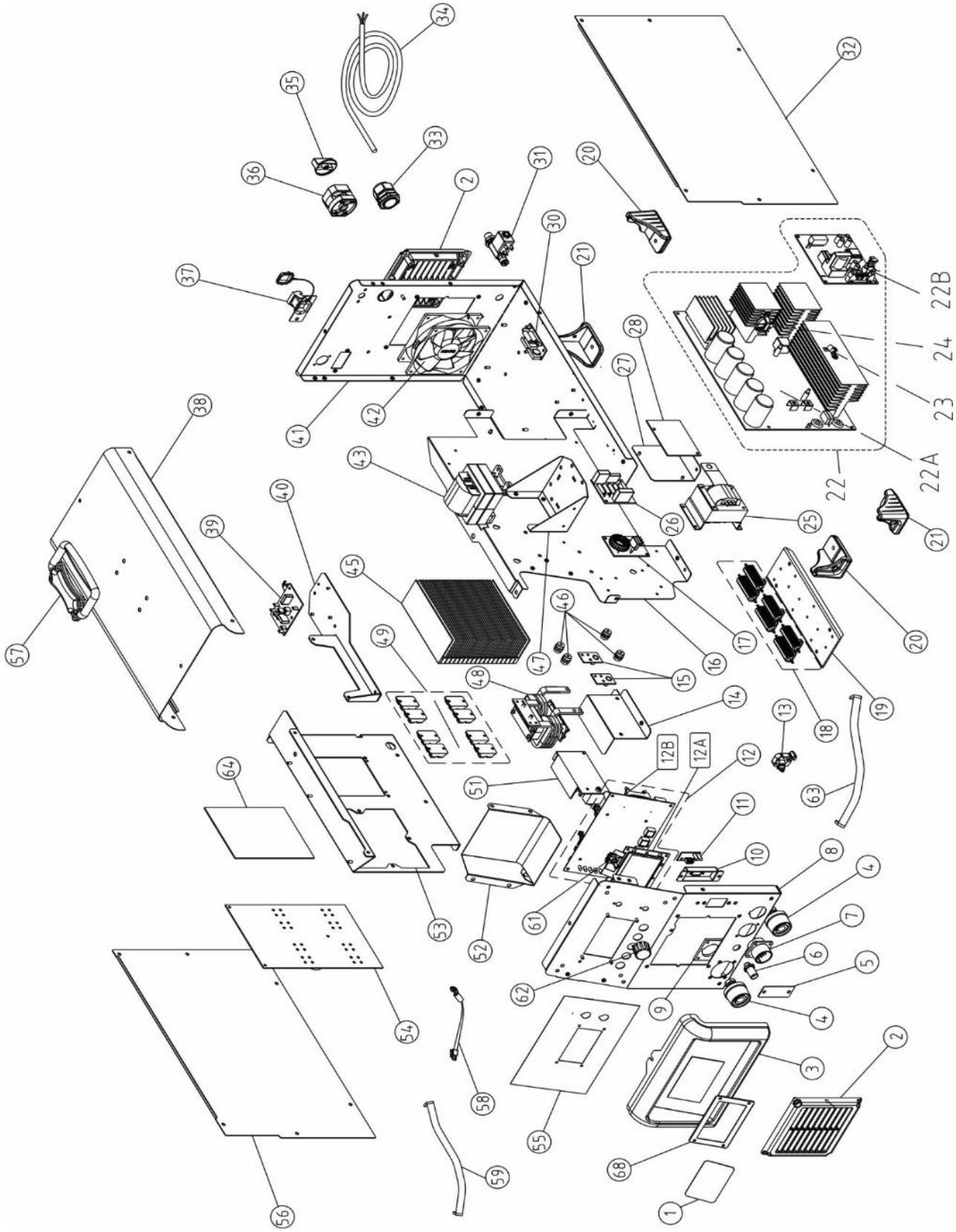


PART LIST – INVERTIG 251 AC/DC DV

Position	Part #	Description
1	66172500	Screen Protection
2	6610430L	Front Fan Cover
3	6611570L	Plastic Frame
4	64274000	Welding Socket
5	6205840K	Cover USB
6	63197000 + 6318500	Gas Outlet Tig Torch
7	61462100	Remote Control Receptacle 14 pin
8	-	-
9	-	-
10	-	-
11	61450900	USB Pcb
12	61460700	Logic Front Panel Group
13	65089700	Lem Probe
14	-	-
15	-	-
16	-	-
17	61291100	Torch Switch Filter Pcb
18	64607000	Resistor 680R – 50W (Pz.6)
19	-	-
20 + 21	6614180L	Plastic Foot
22	61461400	Primary Inverter Pcb Group
23	61382100	NTC Sensor
24	65069700	Thermal Switch 70°C
25	61477500	Output Inductance
26	61307200	Remote Filter PCB
27	-	-
28	-	-
29	61479900	XL PFC PCB
30	611415V0	Pcb Filter HF
31	61703000	Solenoid Valve
32	621105CQ	Right Side Panel
33	66078500	Cable Relief
34	64761000	Input Power Cable
35+36	64724000	Power Switch
37	60178100	Kit AWC Connection
38	621104CQ	Cover
39	61410700	Clamper Pcb
40	-	-
41	-	-
42	61432200	Fan 120 x 120 x 38
43	61458900	Power Transformer

Position	Part #	Description
44	-	-
45	-	-
46	-	-
47	-	-
48	61401300	HF Transformer
49	65113200	Converter IGBT VS-GT250SA60S
50	614445000	PFC Pcb
51	61143500	HF Pcb
52	-	-
53	-	-
54	61445700	Converter Dc/Ac PCB
55	66174600	Instrument Label
56	621106CQ	Left Side Panel
57	66103400	Handle
58	61381900	NTS Sensor
59	651211000	Flat Converter Connetor (16 way)
60	65100500	Flat PFC Connector (14 way)
61	61190200	Encoder
62	66106200	Knob
63	650378000	Flat Inverter Connector (20 way)
64	-	-
65	-	-
66	-	-
67	-	-
68	62108900	Display Protection Frame

EXPLODED VIEW INVERTIG 251 AC/DC



PART LIST – INVERTIG 251 AC/DC

Position	Part #	Description
1	66106200	Knob
2	66169700	Instrument Label
3	-	-
4	66142200	Display Protection
5	66462000	Central Connector Frame
6	64274000	Welding Socket
7	63197000 + 6318500	Gas outlet TIG torch
8	61462100	Remote Control Receptacle 14 pin
9	642740000	Welding Socket
10	61104300	Front Fan Cover
11	-	-
12	61460500	Logic Front Panel Group
13	-	-
14	-	-
15	-	-
16	61190200	Encoder
17	61291100	Torch Switch Filter Pcb
18	64607000	Resistor 680R – 50W (Pz.6)
19	-	-
20+21	6614180L	Plastic Foot
22	613556002	Primary Inverter Pcb Group
23	61382100	NTC Sensor
24	65069700	Thermal Switch 70°C
25	61477500	Output Inductance
26	61307200	Remote Filter PCB
27	-	-
28	-	-
29	-	-
30	611415V0	Pcb Filter HF
31	61703000	Solenoid Valve
32	621105CQ	Right Side Panel
33	66078500	Cable Relief
34	64761000	Input Power Cable
35+36	64724000	Power Switch
37	60178100	Kit AWC Connection
38	621104CQ	Cover
39	61410700	Clamper Pcb
40	-	-
41	-	-
42	61432200	Fan 120 x 120 x 38
43	613593000	Power Transformer

Position	Part #	Description
44	-	-
45	-	-
46	-	-
47	-	-
48	61401300	HF Transformer
49	65113200	Converter IGBT VS-GT250SA60S
50	-	-
51	61143500	HF Pcb
52	-	-
53	-	-
54	61445700	Converter Dc/Ac PCB
55	66174600	Instrument Label
56	621106CQ	Left Side Panel
57	66103400	Handle
58	61381900	NTS Sensor
59	651211000	Flat Converter Connetor (16 way)
60	65100500	Flat PFC Connector (14 way)
61	61190200	Encoder
62	66106200	Knob
63	650378000	Flat Inverter Connector (20 way)
64	-	-
65	-	-
66	-	-
67	-	-
68	62108900	Display Protection Frame