Welding & Cutting Equipment

www.canaweld.com

MIG PULSE 202

Owner's Manual

DC | CC/CV | 1 PHASE | MAX. THICKNESS 3/8" (9.5mm) | PRO | SYN Synergic | Pulse | 6-50 R | 6-30 R

www.canaweld.com

Thank You

From

Canaweld

Thank you for choosing a Canaweld machine, with 40+ years of welding equipment manufacturing experience overseas, you can feel confident that you have made the right choice.

Since the 1980s, the founders of Canaweld have been actively involved in research & development, production and sales within the welding and cutting industries. They have filed countless patents and set new standards in the welding industry.

For over a decade the founders of Canaweld, have been members of the Technical Committee (TC 26) of the **International Electro-technical Commission (IEC). IEC** is the world's leading organization on international standards for all electrical, electronic, and related technologies.

The company has also been an **expert member of the Canadian Standards Association (CSA), within the Technical Committee, responsible for Canadian standards of welding and cutting machines.**

Canaweld was created with the aim of providing our customers with advanced technologies. Our products, from design to assembly, are created with years of experience in research & development, materials engineering, quality control and testing.

Canaweld machines are among the best in the world in terms of quality.
The materials used in our designs are some of the best available on the market.
We believe in the high performance of our equipment and, therefore, offer a 3-year warranty.

We use strict test procedures, and our expectations exceed the required standards. For example, according to International Standards, machines must be tested at 40°C (104°F), but Canaweld tests the machines at both 40°C and 50°C (122°F). In doing so, we ensure that our machines will continue to operate even in hot climates.

Finally, all machines are only packaged and shipped when they pass strict mandatory tests.

This user manual should be read carefully to fully understand the machine you have purchased and how to maintain it in the best operating condition.

For more information on our full line of products please visit our website or contact a dealer in your local area, our dealer list can be found on our website: www.canaweld.com

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❑Safety precautions & Symbols (English)

1.1 General Safety Precautions

Users of Canaweld welding and plasma cutting equipment are ultimately responsible for ensuring that everyone working on or around the equipment follow all safety measures. Safety precautions must fulfill the criteria for welding or plasma cutting equipment of this sort. In addition to the usual workplace laws, the following guidelines should be followed. To keep yourself and others safe, read, obey, and save these critical safety warnings and operating instructions. You are entirely responsible for the Product's safe operation. Canaweld does not and cannot give any assurances or warranties about the product's safety in your environment. This device is not designed for use in residential areas where the electrical power comes from a public low-voltage supply source. Due to both conducted and radiated disturbances, it may be challenging to ensure electromagnetic compatibility of the equipment in certain regions. This product is only for removing metal. Any other usage might result in bodily harm and/or damage to the equipment. In the event of a malfunction, contact a professional for assistance.

All work must be done by skilled employees who are familiar with how the welding or plasma cutting equipment works. Incorrect equipment operation can lead to dangerous circumstances, resulting in harm to the operator and equipment damage. Anyone who works with welding or plasma cutting equipment should understand how it works, where the emergency stops are situated, what safety measures should be followed, and how to utilize plasma cutting and/or welding.

Use approved personal safety equipment, such as safety glasses, flame-resistant clothes, and safety gloves. Avoid wearing scarves, bracelets, rings, and other loose-fitting items that may become stuck or cause burns. The operator must guarantee that no unauthorized personnel are present in the equipment's working area when it is turned on and no one is exposed to the arc when it is struck. The work environment must be free from drafts and appropriate for the job. The return cable must be securely connected and working on high voltage equipment must be done by a qualified electrician only. A proper and clearly marked fire extinguishing equipment must be close at hand. While the equipment is in operation, do not lubricate or maintain it.

1.2 Safety Precautions & Symbol

Before working on the machine, read the owner's manual.

Read the safety information at the beginning of the manual. To fully understand the machine's capabilities and safety measures, read this manual thoroughly. Follow the Owner's Manuals, industry standards, and national, province, state, and local requirements.

DANGER!

The symbol indicates a dangerous action that will result in death or serious injury if not prevented. The potential dangers or hazards are depicted in the symbols next to them or discussed in the text.

ELECTRIC SHOCK

Touching electrical components can cause fatal electric shock and severe burns. By using a dry insulating mat or cover, insulate yourself from the workpiece and ground. While the machine is powered on, do not remove the machine cover, or touch any electrical components or circuits without a pair of proper and dry insulating gloves. Equipment that has been incorrectly placed or grounded is a hazard. ELECTRIC SHOCK can cause death or severe injuries. Do not touch any active electrical components. Wear dry insulating gloves and body protection with no holes in them. Use dry insulating mats or blankets large enough to avoid any direct touch with the work or ground to isolate oneself from the work and ground. If the torch pieces touch the work or the ground, do not touch them. Inspect the input power cable and ground conductor on a regular basis for aging or bare wiring; repair promptly if damaged; bare wiring can kill. When not in use, turn off all equipment. Do not utilize cables that are worn, broken, undersized, or repaired. Avoid wrapping the torch cable around your body. If codes demand it, connect the workpiece to a good electrical (earth) ground. Only use well-maintained equipment. Repair or replace broken pieces at the same time. When operating above floor level, use a safety harness. Maintain the integrity of all panels and coverings. Do not try to bypass or overcome the safety mechanisms. Only use the torch types which indicated in the owner's manual. When the trigger is pressed, keep your hands away from the electrode/tungsten tip and the arc. Clamp the work cable to the workpiece (not a component that will fall away) or the worktable as close to the welding area as possible. When not attached to the workpiece, insulate the work clamp to avoid contact with any metal objects. Before inspecting, cleaning, or replacing torch parts, and before installing or repairing this machine, turn off the power. Install, ground, and operate this equipment in accordance with its owner's manual and any national, province, state, and local laws. Always ensure that the input power cord ground wire is correctly connected to the ground terminal and the cord connector is attached to a properly grounded receptacle outlet. Attach the correct grounding conductor first while establishing input connections. Maintain cables by keeping them dry, clear of oil and grease, and away from hot metal and sparks.

High DC VOLTAGE exists inside the machine even after turning off.

Even after disconnecting the input power, there is dangerous DC voltage in inverter welding power sources. Before touching any parts, turn off the inverter, disconnect the input power, and wait for the input capacitors to discharge.

BURNS AND ELECTRIC SHOCK RISK WEAR DRY INSULATED GLOVES.

When replacing the consumables, always use dry insulated gloves. During welding, the consumables get extremely hot, and serious burns are possible. If the power supply is turned on, touching the consumables might cause an electric shock. Never

touch the exposed parts of the welding torch/electrode holder of the machine, change or clean consumables while the machine is on, because the shocking voltage between the parts will be extremely dangerous and even fatal.

WELDING can result in a fire or explosion.

From the welding arc, hot metal and sparks are ejected that can cause fire or explosion. Before performing any welding, double-check that the location is safe. Welding has the potential to start a fire or explosion. Remove all combustible materials around the work area. If this isn't feasible, use certified covers to firmly cover them. Avoid welding in areas where flying sparks might ignite combustible materials. Make sure you and others are safe from flying sparks and hot metal. Be aware that welding sparks and hot materials can easily pass-through minor gaps and holes and onto surrounding places. Keep an eye out for flames and a fire extinguisher nearby. Welding on a ceiling, floor, bulkhead, or wall might result in a fire on the concealed side. Do not weld on combustible-filled containers or closed containers like tanks, drums, or pipelines unless they have been adequately prepared according to relevant safety standards. Check the area for sparks, glowing embers, and flames when the task is completed. Only use the proper fuses or circuit breakers. Do not oversize or bypass them. All work should be done in accordance with applicable safety regulations, and a fire watcher and extinguisher should be available. To avoid welding currents from traveling too long, perhaps unknown courses and generating electric shock, sparks, and fire dangers, connect the work cable to the work as near to the welding area as possible. Never weld on containers containing potentially combustible products; they must first be emptied and thoroughly cleaned. Never perform welding where combustible dust, gas, or liquid vapors (such as gasoline) are present in the atmosphere. Welding pressurized cylinders, pipelines, or containers is prohibited. Wear flame-resistant, long-lasting body protection (leather, heavy cotton, wool). Oil-free clothes, such as leather gloves, a thick shirt, cuffless pants, work boots with electrical insulated sole, and a hat, are all recommended for body protection. Avoid placing the device near or on flammable materials. Before performing any welding, make sure you don't have any combustibles on you, such as butane lighter or matches.

EXCESSIVE NOISE HAZARD

Be cautious if there is excessive noise in the workplace. Wear hearing protection if the noise level is too high. Workers nearby are also impacted by noise and may require hearing protection.

Hot PARTS HAZARD

All welded pieces become extremely hot immediately after welding or cutting, causing burns to anybody in touch with exposed skin. After welding or cutting, do not contact the workpiece, ground clamp, or electrode holder/torch instantly, and wait for a cooling interval before picking them up. To avoid burns, use proper equipment while working with hot parts, and use thick insulating welding/cutting gloves and clothes as well.

WELDING/CUTTING FUMES HAZARD

Welding and cutting generate gases and fumes. The inhalation of these gases and vapors might be hazardous. These gases and fumes can replace oxygen in the body, causing harm or death. Keep your head away from the welding or cutting area and avoid inhaling the fumes and gases. If the weld/cut is indoors, ventilate the environment or utilize local forced ventilation at the weld site to eliminate smoke and gas. Wear an authorized air supply respirator if ventilation is insufficient. Only work inside if you are properly ventilated or using an air-supplied respirator. For any materials being used, read the Material Safety Data Sheet (MSDS) and the manufacturer's instructions.

DANGEROUS GASES AND FUMES HAZARD

Welding and cutting coated metal, such as stainless steel, are not permitted, unless the coating has been removed from the weld or cut area, and the area is thoroughly ventilated, and an air-supplied respirator is used as well. During welding or cutting, the coating and all metals containing these elements can produce harmful fumes. Do not cut containers that contain poisonous or reactive products or containers that have previously held toxic or reactive materials; they must first be emptied and thoroughly cleaned. Cut away from degreasing, cleaning, or spraying processes. The arc's heat and light can combine with vapors to produce very poisonous and unpleasant fumes.

DANGEROUS GAS HAZARD FROM THE SHIELDING / CUTTING GAS CYLINDERS

Turn off the shielding/cutting gas, when not in use. These gases can displace air, lowering oxygen levels and resulting in harm or death.

CYLINDERS can explode if they are damaged.

Excessive heat, mechanical shocks, physical damage, slag, open flame, sparks, and arcs should all be avoided while using compressed gas cylinders. Keep cylinders away from any electrical or cutting/welding circuits. Never allow a welding torch/electrode holder or plasma arc torch to make electrical contact with a cylinder. An explosion will occur if you cut a pressurized cylinder. When the cylinder is not in use or attached for use, keep the protective cap on the valve. To avoid falling or tipping, install and secure cylinders in an upright position by chaining them to a fixed support or equipment cylinder rack. Lift and move cylinders with the proper equipment, procedures, and a sufficient number of people. Read and obey the directions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA). Use just the right compressed gas cylinders, regulators, hoses, and fittings for the job, and keep them and their parts in excellent working order. When opening the cylinder valve, face away from the valve outlet. When opening the valve, make sure you're not standing in front of or behind the regulator.

WELDING/CUTTING RAYS HAZARD

The visible and invisible light (ultraviolet and infrared rays) produced by the welding or cutting process can burn the eyes and skin. Wear an appropriate welding helmet with suitably shaded filter lenses to protect your face and eyes from welding rays. Cover any exposed skin, arms, or neck. Wear protective clothing made of flame-resistant material (leather, thick cotton, or wool). Protect people from flashes, glare, and sparks by using a safety screen or barriers.

ESD- ELECTROSTATIC DISCHARGE

During welding/cutting, an electric static charge can be produced and released into any items contacted by the welder/cutter after welding/cutting. Before touching any boards or electronic components, put on a grounded wrist strap. When storing, moving, or shipping PC boards, use proper static-proof bags and boxes.

MOVING PARTS HAZARD

Typical welding/cutting machines may include several moving elements, such as rollers and fans. Hands should be kept away from moving elements like fans. Keep a safe distance from moving parts. Keep your distance from pinch spots like drive rolls. Keep loose garments and hair out of the path of moving parts. All doors, panels, covers, and guards should be closed and secured. Only allow qualified individuals to remove doors, panels, coverings, or guards as needed for maintenance and troubleshooting. When the maintenance is performed, reinstall the doors, panels, covers, or guards before reconnecting the input power.

BATTERY EXPLOSION can cause injury.

Do not use welding machine to charge batteries or jump start vehicles that can cause explosion.

FALLING EQUIPMENT can cause injury.

Lift just the unit, not the gas cylinders, or other attachments together. Make sure you have equipment with adequate capacity to raise the unit. If you're going to relocate the unit using lift forks, be sure they're long enough to reach the other side. When working from an aerial location, keep equipment (cables and cords) out of the way of moving vehicles.

Sparks and hot metal blow out from the cutting arc can cause injury.

Flying hot metal generated by chopping and grinding can cause injury. Wear a face shield or safety goggles with side shields that are approved. Protect your skin by wearing suitable body protection. To prevent sparks from entering your ears, use flame-resistant ear plugs or earmuffs. Wear safety glasses with side shields or wear face shields.

EXPLODING INVERTER PARTS can cause injury.

When electricity is connected to inverter power sources, faulty parts can explode or cause other parts to explode. Turn off the power source and then start to service the inverters, and always wear a face shield and long sleeves to protect your body and skin.

EMF- ELECTRIC MAGNETIC FIELDS can cause fault in electrical devices such as pacemakers.

Electric magnetic fields are formed during welding or cutting, which might cause faults in electrical components or Implanted Medical Devices in the surrounding area. Those who wear pacemakers or other implanted medical devices should stay away from EMF emitted by welders/cutters. Before arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations, wearers of implanted medical devices should consult their doctor and the device manufacturer.

Welding can cause interference in electronic equipment.

Electronic equipment, such as computers and computer-driven equipment, such as robots, can be harmed by electromagnetic energy. Keep cables short, close together, and low as possible, to prevent any interference. Welding should be done far away from any sensitive electrical equipment. Ensure that this welding power source is installed and grounded in accordance with the instructions in this manual. If interference still occurs, the user should consider relocating the equipment, employing shielded cables, utilizing line filters, or shielding the workspace.

Moving PARTS can bring injury

Avoid touching moving components.

Avoid tight spots, such as drive rolls.

Welding wire has the potential to cause harm

Wait to pull the trigger on the gun until directed to. When threading welding wire, never point a gun at the human body, any metal, or any other object.

ELECTRIC SHOCK RISK

Keep your hands and other metallic items far from the welding wire and driving components while the procedure is in progress.

1.3 Important Safety Precautions

- Put on dry insulating gloves. Avoid touching the electrode with your bare hand. Wearing damp or damaged gloves is not permitted.
- Injuries can be caused by flying components. When servicing a unit, always wear a face shield. Put on a cap and safety glasses. Wear a welding helmet with the appropriate filter shade. Wear full bodily protection.
- The most unstable position of the equipment must not be inclined up more than 10°. Auxiliary components such as gas cylinders, wire feed units, or cooling devices may impact stability depending on the kind of equipment, and they must be considered.
- Before changing torch consumables, working on the machine, turn off the power and unplug the input plug.
- After the power is switched off, dangerous voltage remains on the input capacitors. Do not touch fully charged capacitors. Always wait 60 seconds after turning off the

power before working on the machine and check the input capacitor voltage to ensure it is near zero before touching any parts.

1.4 Minimizing EMF (Electrical and Magnetic Fields) Exposure from the Welding / Cutting Circuit.

Arc welding and related processes such as gouge, plasma arc cutting, and spot welding generate an EMF field surrounding the welding circuits. Some medical devices, such as pacemakers, can be affected by EMF. Protective precautions for those who have medical implants must be implemented. For example, limit passing by or do individual risk assessments for welders. By following the relevant procedures, EMF exposure can be reduced. Twist or tape cables together, or use a cable cover, to keep them close together.

Precautions about Implanted Medical Devices

Before performing or going near arc welding, spot welding, gouging, plasma arc cutting, or induction heating procedures, implanted medical device wearers should consult their doctor and the device manufacturer. Follow the above procedures only if your doctor has approved you.

Avoid putting your body between welding or cutting cables. Arrange the wires so that they are to one side and away from the operator. Work away from the welding power source and do not sit or lean on it. Keep your head and body as far away from the welding circuit's equipment as possible.

Work clamp should be connected to the workpiece as near to the weld or cut area as possible. Welding should not be done while carrying the welding or cutting power source or wire feeder. If you have an Implanted Medical Device in your body, you should consult your doctor before doing or going near arc welding, spot welding, gouging, or plasma arc cutting activities. Do not wrap cables around your body or coil them. It is the user's responsibility to install and operate the equipment in accordance with the manufacturer's instructions. If electromagnetic disturbances are detected, it is the user's obligation to fix the problem with the manufacturer's technical help. In other circumstances, resolving the problem may be easy by connecting the machine to the earth and the workpiece. In other circumstances, it might include building an electromagnetic screen that encloses the power source and the work area, along with applying some input filters. Cutting/welding equipment must be connected to the power source in accordance with the manufacturer's instructions. If interference occurs, further precautions, such as mains supply filtering, may be required. Shielding the supply cable of permanently installed equipment in metallic conduit or equivalent should be considered. The shielding should be electrically continuous over its whole length. The shielding should be attached to the power supply to preserve excellent electrical contact between the conduit and the power source enclosure. The user must analyze any electromagnetic concerns in the surrounding region before installing the device. The user must confirm that all other devices in the area are compatible. This may necessitate extra precautions. Where the workpiece is not tied to earth for electrical safety or because of its size and location, such as a ship's hull or constructing steel work, a connection linking the workpiece to earth may minimize emissions in some cases. The workpiece without earth increases the danger of harm to users or damage to other electrical equipment. The workpiece should be connected to earth by a direct connection to the workpiece. If direct connection is not permitted, bonding should be accomplished via adequate capacitances determined in accordance with national rules. Changing the earth circuit arrangements should be authorized only by someone who is qualified to assess whether the alterations would raise the danger of injury, such as by enabling parallel cutting/welding current return pathways, which may damage the earth circuits of other equipment. IEC 60974-9 provides additional advice, Arc Welding Equipment, Part 9: Installation and Use.

Interference concerns may be alleviated by selective screening and shielding of other cables and equipment in the direct vicinity. For some particular applications, screening of the complete cutting/welding system may be considered.

1.5 Grounding of Welding/Cutting Machines:

In an electric circuit, there is an active wire that supplies power, a neutral wire that returns the current and a 'grounding wire' that provides an additional path for electrical current to safely return to the ground in the event of a short circuit. A copper conductor is connected from the wiring system's metal rod to a set of ground connection terminals in the service panel.

Because electricity always seeks the shortest path to the earth, if the neutral wire is broken or interrupted, it is the grounding wire that provides a direct path to the ground. Because of this direct physical connection, the earth can act as the path of least resistance, preventing an appliance or person from becoming the shortest path.

Importance of Electrical Grounding

Protects Against Electrical Overloads

You may occasionally experience power surges or be struck by lightning during severe weather conditions. These occurrences may generate dangerously high levels of electricity, which can destroy your electrical appliances. By grounding the electrical system, all excess electricity is directed to the earth rather than frying the system's connected appliances. The appliances will be secure and safe from large electrical surges.

Stabilizes the Voltage Levels

Grounding the electrical system makes it easier to distribute the right amount of power to the right places. This ensures that the circuits are never overloaded and, as a result, do not blow. The earth can be regarded as a common reference point for any electrical system's voltage sources. This aids in maintaining stable voltage levels throughout the electrical system.

Earth Conducts with Least Resistance

One of the primary reasons for grounding your electrical appliances is that the earth is a great conductor, capable of carrying all excess electricity with minimal resistance. When you ground the electrical system and connect it to the earth, you are allowing excess electricity to flow somewhere without resistance rather than through you or your appliances.

Prevents Serious Damage and Death

When you fail to ground the electrical system, you endanger your appliances and even your life. When high voltage is passed through a device, it is fried and irreparably damaged.

An excess of electricity can even start a fire, endangering your property and the lives of your loved ones.

Welding and Cutting Equipment Grounding

Welding/cutting machines are typically grounded via a third grounding wire connected to their electrical connections. Mobile engine-driven generator welding units should be grounded by connecting a cable from the machine's ground stud to a metal stake driven into the ground. Always follow the manufacturer's instructions for properly grounding the model being used.

Auxiliary receptacles on welding machines may or may not be protected by a ground-fault circuit interrupter (GFCI). In wet or damp areas, GFCI adapters or "pigtails" should be used. Tools, extension cords, and other items plugged into these receptacles must be grounded or double insulated.

When connecting the work piece to the welding table, make sure the table is grounded as well (typically a cable from the table leg to the building structure). Avoid grounding to a structure that is a long distance away from the weld. Never use flammable liquid pipelines as a ground, and never use electrical conduit as a ground.

Precautions to prevent an electrical shock.

To reduce the extent of live parts, ensure that all cables are in good condition, with no bare insulation or frayed wires.

Keep cables safe from vehicle traffic and other hazards so they don't get damaged, cut, or pinched.

Check that the rod electrode holder is properly insulated.

During a welding/cutting operation, always keep your hands and body dry.

Avoid standing in water, on wet surfaces, using wet hands, or wearing sweaty clothing. Never immerse energized (hot) electrode holders or torches in water.

Avoid coming into direct contact with live welding equipment and the workpiece. Connect the work or metal to a good electrical ground. Always shield yourself from the work and the ground. If performing arc welding in wet or high humidity conditions, wear appropriate protective equipment such as rubber boots and rubber pads. Wear rubber gloves beneath your welding gloves. Use an insulating mat under the operator if the welding/cutting operation must be performed on steel or another conductive material. Put the welding or cutting machine in close proximity. In the event of an emergency or an accident, the machine can be quickly turned off to cut off the power source. When not in use or on breaks, turn off the welding or cutting machine. Before leaving the cutting/welding area, disconnect the machine from the power grid. When moving from one working position to another, do not hold or move the torch/electrode holder and the Ground (Earth) return cable at the same time If the power source to the equipment has not been cut.

What should I do in case of an electric shock?

Call for medical assistance right away.

DO NOT USE YOUR "BARE HANDS" on the victim until he or she is away from the live electrical source. If an appliance or electrical equipment is the electrical source, turn off the power at the fuse box or circuit breaker panel, or, if possible, turn off the appliance or electrical equipment and unplug it. Simply turning off the equipment is insufficient.

If the electricity cannot be turned off and the victim is still in contact with the electrical source, determine whether the victim should be moved, or the wire should be pushed away from the victim (call for emergency help if the wire is a high voltage power line).

Wear dry gloves or cover your hands with cloth if you must move a victim away from a live contact, and stand on dry insulating material such as cardboard, wood, or clothes. When attempting to move the victim, ensure that you have good footing and will not slip or fall.

Move the wire or power source away from the victim or push the victim off the live electrical source with a dry piece of wood, broom, or other dry, insulating object or material.

If there is a risk of neck or spinal injuries (for example, from a fall), do not move the victim unless absolutely necessary.

If the victim is not breathing, provide artificial respiration.

If the victim's heart has stopped, perform CPR (only if you are trained in CPR).

Apply a sterile dressing to burns. There could be burns where the power source touched the victim and where the electricity exited the body (to ground). Electrical burns may appear minor on the surface, but they can be severe deep within the tissue. Maintain the victim's comfort, warmth, and rest, and keep an eye on his or her breathing.

Information Sources for Grounding

American Welding Society, ANSI Z49.1:2005 "Safety in Welding, Cutting & Allied Processes."

National Fire Protection Association, NFPA 70, "National Electrical Code", 2005.

American Welding Society, Safety and Health Fact Sheet No. 29, "Grounding of Portable and Vehicle Mounted Welding Generators", July 2004.

American Welding Society, AWS A3.0-2001, "Standard Welding Terms and Definitions"

Guide for Helmet Shade Number

When cutting or watching, use face protection (helmet or shield) with appropriate filter glasses to protect your face and eyes from arc rays and sparks (see Safety Standards). The suggested colors in the table below are offered for the convenience of the operator.

Process	Welding Current (A)	Minimum Protective Shade Size	Recommended* Shade Size
GMAW / MIG & Flux Cored Arc Welding (FCAW)	Less than 55	7	-
	55 to 155	10	11
	155 to 240	10	12
Gas Tungsten Arc Welding (GTAW)	Less than 50	8	10
	50 to 150	8	12
	150 to 500	10	14
Shielded Metal Arc Welding (STICK WELDING)	Less than 60	7	10
	60 to 160	8	10
	160 to 250	10	12
	250 to 550	11	14
Recommendation: take a shade that is too dark to see the weld zone. Then try a lighter shade which ensures sufficient view of the weld zone without going below the minimum.			

Additional Safety Information

Safety in Welding, Cutting, and Allied Processes, CSA Standard W117.2 from Canadian Standards Association. Website: www.csagroup.org

OSHA Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910.177 Subpart N, Part 1910 Subpart Q, and Part 1926, Subpart J. Website: www.osha.gov

OSHA Important Note Regarding the ACGIH TLV, Policy Statement on the Uses of TLVs and BEIs. Website: www.osha.gov.

Applications Manual for the Revised NIOSH Lifting Equation from the National Institute for Occupational Safety and Health (NIOSH). Website: www.cdc.gov/niosh.

Standard for Fire Prevention During Welding, Cutting, and Other Hot Work,
NFPA Standard 51B from National Fire Protection Association. Website: www.nfpa.org.

Safety in Welding, Cutting, and Allied Processes, American Welding Society standard ANSI Standard Z49.1. Website: www.aws.org.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1 from Compressed Gas Association. Website: www.cganet.com.

Safe Practices for Welding and Cutting Containers that have Held Combustibles, American Welding Society Standard AWS A6.0 from Global Engineering Documents. Website: www.global.ihs.com.

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting, American Welding Society Standard AWS F4.1 from Global Engineering Documents. Website: www.global.ihs.com.

Safe Practice for Occupational and Educational Eye and Face Protection, ANSI Standard Z87.1 from American National Standards Institute. Website: www.ansi.org.

❑Précautions de sécurité et les symboles (French)

Mesures de sécurité generals

Les utilisateurs d'équipement de soudage et de coupage au plasma Canaweld sont en fin de compte responsables de s'assurer que toute personne travaillant sur ou autour de l'équipement respecte toutes les mesures de sécurité. Les mesures de sécurité doivent répondre aux critères d'un équipement de soudage ou de découpe au plasma de ce type. En plus des lois habituelles sur le lieu de travail, les directives suivantes doivent être suivies. Pour assurer votre sécurité et celle des autres, lisez, respectez et conservez ces avertissements de sécurité et instructions d'utilisation essentiels. Vous êtes entièrement responsable de l'utilisation sûre du produit. Canaweld ne donne et ne peut donner aucune assurance ou garantie quant à la sécurité du produit dans votre environnement. Cet appareil n'est pas conçu pour être utilisé dans des zones résidentielles où l'alimentation électrique provient d'une source publique de basse tension. En raison des perturbations conduites et rayonnées, il peut être difficile d'assurer la compatibilité électromagnétique de l'appareil dans certaines régions. Ce produit est uniquement destiné à enlever du métal. Toute autre utilisation peut entraîner des blessures corporelles et/ou endommager l'équipement. En cas de dysfonctionnement, contactez un professionnel pour obtenir de l'aide. Tous les travaux doivent être effectués par des employés qualifiés qui connaissent le fonctionnement de l'équipement de soudage ou de découpe au plasma. Une utilisation incorrecte de l'équipement peut conduire à des circonstances dangereuses, entraînant des blessures pour l'opérateur et des dommages pour l'équipement. Toute personne qui travaille avec un équipement de soudage ou de découpe au plasma doit comprendre comment il fonctionne, où se trouvent les arrêts d'urgence, quelles sont les mesures de sécurité à respecter et comment utiliser la découpe au plasma et/ou le soudage. Utilisez des équipements de sécurité personnelle approuvés, tels que des lunettes de sécurité, des vêtements résistant aux flammes et des gants de sécurité. Évitez de porter des écharpes, des bracelets, des bagues et d'autres articles amples qui pourraient se coincer ou causer des brûlures. L'opérateur doit garantir qu'aucune personne non autorisée ne se trouve dans la zone de travail de l'équipement lorsqu'il est allumé et que personne n'est exposé à l'arc lorsqu'il est amorcé. L'environnement de travail doit être exempt de courants d'air et adapté à la tâche. Le câble de retour doit être solidement connecté et les travaux sur les équipements à haute tension ne doivent être effectués que par un électricien qualifié. Un équipement d'extinction d'incendie approprié et clairement identifié doit être à portée de main. Pendant que l'équipement est en fonctionnement, ne le lubrifiez pas et ne l'entretenez pas.

Précautions et symboles de sécurité

Avant de travailler sur la machine, lisez le manuel d'utilisation.

Lisez les informations de sécurité au début du manuel. Trouvez chaque partie à étudier dans le manuel pour bien comprendre les capacités de la machine. Respectez les manuels du propriétaire, les normes industrielles et les exigences nationales, provinciales, étatiques et locales.

DANGER !

Le symbole indique une action dangereuse qui entraînera la mort ou des blessures graves si elle n'est pas évitée. Les dangers ou risques potentiels sont représentés par les symboles qui leur sont accolés ou discutés dans le texte.

CHOC ELECTRIQUE

Le contact avec des composants électriques peut provoquer un choc électrique mortel et des brûlures graves. En utilisant un tapis isolant sec ou une couverture, isolez-vous de la pièce à travailler et de la terre. Lorsque la machine est sous tension, ne retirez pas le capot de la machine et ne touchez pas les composants ou circuits électriques sans un gant isolant sec et approprié. Un équipement mal placé ou mal mis à la terre présente un risque. Les CHOCS ELECTRIQUES peuvent causer la mort ou des blessures graves. Ne pas entrer en contact avec des composants électriques actifs. Porter des gants isolants secs et des protections corporelles non trouées. Utiliser des tapis ou des couvertures isolants secs suffisamment grands pour éviter tout contact direct avec l'ouvrage ou le sol afin de s'isoler de l'ouvrage et du sol. Si les pièces de la torche entrent en contact avec l'ouvrage ou le sol, ne pas les toucher.

Inspectez régulièrement le câble d'alimentation d'entrée et le conducteur de terre pour vérifier qu'ils ne sont pas vieillissants ou dénudés ; réparez-les rapidement s'ils sont endommagés ; les fils dénudés peuvent tuer. Lorsque vous n'utilisez pas l'appareil, éteindre tous les équipements. N'utilisez pas de câbles usés, cassés, sous-dimensionnés ou réparés. Évitez d'enrouler le câble du chalumeau autour de votre corps. Si les codes l'exigent, connectez la pièce de travail à une bonne mise à la terre électrique (earth). N'utilisez que du matériel bien entretenu. Réparez ou remplacez les pièces cassées en même temps. Lorsque vous travaillez au-dessus du niveau du sol, utilisez un harnais de sécurité. Maintenez l'intégrité de tous les panneaux et revêtements.N'essayez pas de contourner ou de surmonter les mécanismes de sécurité. N'utilisez que les types de torche indiqués dans le manuel d'utilisation. Lorsque vous appuyez sur la gâchette, gardez vos mains de l'électrode/du bout du tungstène et de l'arc. Fixez le câble de travail à la pièce (et non à un élément qui va tomber) ou à la table de travail, aussi près que possible de la zone de soudage. Lorsqu'elle n'est pas fixée à la pièce, isolez la pince de travail pour éviter tout contact avec des objets métalliques.

Avant d'inspecter, de nettoyer ou de remplacer des pièces de la torche, et avant d'installer ou de réparer cette machine, mettez-la hors tension. Installez, mettez à la terre et utilisez cet équipement conformément au manuel d'utilisation et aux lois nationales, provinciales, nationales et locales. Assurez-vous toujours que le fil de terre du cordon d'alimentation d'entrée est correctement connecté à la borne de terre et que le connecteur du cordon est fixé à une prise de courant correctement mise à la terre. Fixez d'abord le bon conducteur de mise à la terre lorsque vous établissez les connexions d'entrée. Entretenez les câbles en les gardant au sec, exempts d'huile et de graisse, et à l'écart du métal chaud et des étincelles.

Une tension continue élevée existe à l'intérieur de la machine même après l'avoir éteinte.

Même après avoir déconnecté l'alimentation d'entrée, il existe une tension continue dangereuse dans les sources d'alimentation de soudage de l'onduleur. Avant de toucher une quelconque pièce, éteignez l'onduleur, déconnectez l'alimentation d'entrée et attendez que les condensateurs d'entrée se déchargent.

RISQUE DE BRÛLURES ET DE CHOCS ÉLECTRIQUES - PORTER DES GANTS SECS ISOLÉS

Lors du remplacement des consommables, utilisez toujours des gants secs et isolés. Pendant le soudage, les consommables deviennent extrêmement chauds et des brûlures graves sont possibles. Si l'alimentation électrique est sous tension, le fait de toucher les consommables peut provoquer un choc électrique. Ne touchez jamais les parties exposées de la torche de soudage/du porte-électrode de la machine, ne changez pas ou ne nettoyez pas les consommables lorsque la machine est allumée, car la tension de choc entre les pièces sera extrêmement dangereuse, voire mortelle.

La soudure peut provoquer un incendie ou une explosion.

L'arc de soudage projette du métal chaud et des étincelles qui peuvent provoquer un incendie ou une explosion. Avant d'effectuer toute soudure, vérifiez que l'endroit est sûr. Le soudage est susceptible de déclencher un incendie ou une explosion. Retirez tous les matériaux combustibles autour de la zone de travail. Si cela n'est pas possible, utilisez des couvertures certifiées pour les recouvrir fermement. Évitez de souder dans des zones où des étincelles pourraient enflammer des matériaux combustibles. Assurez-vous que vous et les autres personnes êtes à l'abri des étincelles et du métal chaud. Sachez que les étincelles de soudage et les matériaux chauds peuvent facilement passer à travers de petits trous et interstices et atteindre les endroits environnants. Gardez un œil sur les flammes et un extincteur à proximité.Le soudage sur un plafond, un plancher, une cloison ou un mur peut provoquer un incendie sur le côté caché. Ne soudez pas sur des récipients remplis de combustible ou des récipients fermés tels que des réservoirs, des fûts ou des canalisations, à moins qu'ils n'aient été préparés de manière adéquate conformément aux normes de sécurité en vigueur.

Une fois la tâche terminée, vérifiez l'absence d'étincelles, de braises incandescentes et de flammes dans la zone. N'utilisez que les fusibles ou les disjoncteurs appropriés. Ne les surdimensionnez pas et ne les contournez pas. Tous les travaux doivent être effectués conformément aux règles de sécurité en vigueur, et un surveillant d'incendie et un extincteur doivent être disponibles. Pour éviter que les courants de soudage ne se déplacent trop longtemps, peut-être sur des parcours inconnus, et ne génèrent des chocs électriques, des étincelles et des risques d'incendie, connectez le câble de travail à l'ouvrage aussi près que possible de la zone de soudage. Ne soudez jamais sur des récipients contenant des produits potentiellement combustibles; ils doivent d'abord être vidés et soigneusement nettoyés. Ne jamais effectuer de soudage lorsque des poussières, des gaz ou des vapeurs liquides combustibles (comme l'essence) sont présents dans l'atmosphère. Il est interdit de souder des bouteilles, des canalisations ou des conteneurs sous pression. Portez des protections corporelles résistantes aux flammes et de longue durée (cuir, coton lourd, laine). Pour la protection corporelle, il est recommandé de porter des vêtements exempts d'huile, tels que des gants en cuir, une chemise épaisse, un pantalon sans revers, des bottes de travail avec une semelle isolée électriquement et un chapeau.

Évitez de placer l'appareil à proximité ou sur des matériaux inflammables. Avant d'effectuer des travaux de soudage, assurez-vous que vous n'avez pas de combustibles sur vous, comme un briquet au butane ou des allumettes.

RISQUE DE BRUIT EXCESSIF

Soyez prudent s'il y a un bruit excessif sur le lieu de travail. Portez des protections auditives si le niveau sonore est trop élevé. Les travailleurs à proximité sont également touchés par le bruit et peuvent avoir besoin de protections auditives.

DANGER LIÉ AUX PIÈCES CHAUDES

Toutes les pièces soudées deviennent extrêmement chaudes immédiatement après le soudage ou le coupage, provoquant des brûlures à toute personne en contact avec la peau exposée. Après le soudage ou le coupage, ne pas toucher instantanément la pièce, la pince de masse ou le porte-électrode/la torche, et attendre un intervalle de refroidissement avant de les ramasser. Pour éviter les brûlures, utilisez un équipement approprié lorsque vous travaillez avec des pièces chaudes, ainsi que des gants et des chiffons de soudage/coupage épais et isolants.

RISQUE DE FUMÉES DE SOUDAGE/COUPAGE

Le soudage et le coupage génèrent des gaz et des fumées. L'inhalation de ces gaz et vapeurs peut être dangereuse. Ces gaz et vapeurs peuvent remplacer l'oxygène dans le corps, ce qui peut causer des dommages ou la mort. Tenez votre tête éloignée de la zone de soudage ou de découpage et évitez d'inhaler les fumées et les gaz. Si la soudure/le découpage a lieu à l'intérieur, ventilez l'environnement ou utilisez une ventilation forcée locale sur le site de soudure pour éliminer la fumée et les gaz. Porter un appareil respiratoire à adduction d'air autorisé si la ventilation est insuffisante. Ne travaillez à l'intérieur que si vous êtes correctement ventilé ou si vous utilisez un respirateur à adduction d'air. Pour tous les matériaux utilisés, lisez la fiche de données de sécurité (FDS) et les instructions du fabricant.

RISQUE DE GAZ ET DE FUMÉES DANGEREUX

Le soudage et le coupage de métaux revêtus, comme l'acier inoxydable, ne sont pas autorisés, à moins que le revêtement n'ait été retiré de la zone de soudage ou de coupage, et que la zone soit bien ventilée et qu'un masque respiratoire à adduction d'air soit également utilisé. Pendant le soudage ou le découpage, le revêtement et tous les métaux contenant ces éléments peuvent produire des fumées nocives. Ne coupez pas les récipients qui contiennent des produits toxiques ou réactifs ou les récipients qui ont précédemment contenu des matériaux toxiques ou réactifs ; ils doivent d'abord être vidés et soigneusement nettoyés. Coupez à l'écart des processus de dégraissage, de nettoyage ou de pulvérisation. La chaleur et la lumière de l'arc peuvent se combiner aux vapeurs et produire des fumées très toxiques et désagréables.

DANGER DE GAZ DANGEREUX PROVENANT DES CYLINDRES DE GAZ DE BLINDAGE / DE COUPE

Éteignez le gaz de protection/de coupe lorsqu'il n'est pas utilisé, car ces gaz peuvent déplacer l'air, abaisser les niveaux d'oxygène et entraîner des blessures ou la mort.

RISQUE DE RAYONS DE SOUDAGE/ COUPAGE

La lumière visible et invisible (rayons ultraviolets et infrarouges) produite par le processus de soudage ou de coupage peut brûler les yeux et la peau. Portez un casque de soudage approprié avec des lentilles filtrantes convenablement ombragées pour protéger votre visage et vos yeux des rayons de soudage. Couvrez toute peau, bras ou cou exposés. Portez des vêtements de protection fabriqués dans un matériau résistant aux flammes (cuir, coton épais ou laine). Protégez les personnes contre les éclairs, l'éblouissement et les étincelles en utilisant un écran ou des barrières de sécurité.

Les CYLINDRES peuvent exploser s'ils sont endommagés.

La chaleur excessive, les chocs mécaniques, les dommages physiques, les scories, les flammes nues, les étincelles et les arcs électriques doivent être évités lors de l'utilisation des bouteilles de gaz comprimé. Tenir les bouteilles à l'écart de tout circuit électrique ou de tout circuit de coupure ou de soudage. Ne laissez jamais une torche de soudage/un porte-électrode ou une torche à arc plasma entrer en contact électrique avec une bouteille. Une explosion se produira si vous coupez une bouteille sous pression. Lorsque la bouteille n'est pas utilisée ou fixée pour être utilisée, gardez le bouchon de protection sur le robinet. Pour éviter de tomber ou de basculer, installez et fixez les bouteilles en position verticale en les enchaînant à un support fixe ou à un support de bouteilles d'équipement. Soulevez et déplacez les bouteilles avec l'équipement et les procédures appropriés et un nombre suffisant de personnes. Lisez et respectez les instructions figurant sur les bouteilles de gaz comprimé, l'équipement associé et la Compressed Gas Association (CGA). Utilisez les bouteilles de gaz comprimé, les détendeurs, les tuyaux et les raccords qui conviennent le mieux à votre travail et maintenez-les, ainsi que leurs pièces, en excellent état de fonctionnement. Lorsque vous ouvrez le robinet de la bouteille, ne vous approchez pas de la sortie du robinet. Lorsque vous ouvrez le robinet, assurez-vous de ne pas vous tenir devant ou derrière le détendeur.

ESD-DÉCHARGE STATIQUE ELECTRIQUE

Pendant le soudage/la découpe, une charge électrique statique peut être produite et libérée dans tous les objets avec lesquels le soudeur/la découpe entre en contact après le soudage/la découpe. Avant de toucher des cartes ou des composants électroniques, mettez un bracelet relié à la terre. Lorsque vous stockez, déplacez ou expédiez des cartes PC, utilisez des sacs et des boîtes antistatiques appropriés.

RISQUE D'EXPOSITION À DES PIÈCES EN MOUVEMENT

Les machines de soudage/coupage typiques peuvent comprendre plusieurs éléments mobiles, tels que des rouleaux et des ventilateurs. Les mains doivent être tenues à l'écart des éléments mobiles comme les ventilateurs. Gardez une distance de sécurité avec les pièces en mouvement. Restez à distance des points de pincement comme les rouleaux d'entraînement. Gardez les vêtements amples et les cheveux hors de la trajectoire des pièces mobiles. Toutes les portes, panneaux, couvercles et protections doivent être fermés et sécurisés. Ne permettez qu'à des personnes qualifiées de retirer les portes, panneaux, couvercles et protections doivent être fermés et sécurisés. Ne permettez qu'à des personnes qualifiées de retirer les portes,

panneaux, couvertures ou protections si nécessaire pour la maintenance et le dépannage. Une fois l'entretien effectué, réinstallez les portes, panneaux, couvertures ou protections avant de reconnecter l'alimentation d'entrée.

L'EXPLOSION DE LA BATTERIE peut causer des blessures.

N'utilisez pas la machine à souder pour charger des batteries ou démarrer des véhicules, car cela pourrait provoquer une explosion.

LA CHUTE D'UN ÉQUIPEMENT peut causer des blessures

Ne soulevez que l'unité, et non le train de roulement, les bouteilles de gaz ou autres accessoires, à l'aide de l'anneau de levage. Assurez-vous de disposer d'un équipement d'une capacité suffisante pour soulever l'unité. Si vous devez déplacer l'appareil à l'aide de fourches de levage, assurez-vous qu'elles sont suffisamment longues pour atteindre l'autre côté. Lorsque vous travaillez depuis un emplacement aérien, gardez l'équipement (câbles et cordons) hors de la trajectoire des véhicules en mouvement.

Les étincelles et les projections de métal chaud provenant de l'arc de coupe peuvent causer des blessures.

Les projections de métal chaud générées par le hachage et le meulage peuvent causer des blessures. Portez un écran facial ou des lunettes de sécurité avec écrans latéraux homologués. Protégez votre peau en portant une protection corporelle appropriée. Pour éviter que les étincelles ne pénètrent dans vos oreilles, utilisez des bouchons d'oreille ou des protège-oreilles résistant aux flammes. Portez des lunettes de sécurité avec des écrans latéraux ou des écrans faciaux.

L'EXPLOSION DES PIÈCES DE L'INVERSEUR peut provoquer des blessures.

Lorsque l'électricité est connectée aux sources d'alimentation des onduleurs, les pièces défectueuses peuvent exploser ou provoquer l'explosion d'autres pièces. Coupez la source d'alimentation et commencez à entretenir les onduleurs, et portez toujours un écran facial et des manches longues pour protéger votre corps et votre peau.

Les champs électromagnétiques peuvent provoquer des défaillances dans les appareils électriques tels que les stimulateurs cardiaques.

Des champs électromagnétiques se forment pendant le soudage ou le découpage, ce qui peut provoquer des défaillances dans les composants électriques ou les dispositifs médicaux implantés dans la zone environnante. Les personnes qui portent des stimulateurs cardiaques ou d'autres dispositifs médicaux implantés doivent rester à l'écart des CEM émis par les soudeurs/coupeurs. Avant toute opération de soudage à l'arc, de soudage par points, de gougeage, de découpe à l'arc plasma ou de chauffage par induction, les porteurs de dispositifs médicaux implantés doivent consulter leur médecin et le fabricant du dispositif.

La soudure peut provoquer des interférences dans les équipements électroniques

Les équipements électroniques, tels que les ordinateurs et les équipements pilotés par ordinateur, comme les robots, peuvent être endommagés par l'énergie électromagnétique. Gardez les câbles courts, proches les uns des autres et aussi bas que possible, pour éviter toute interférence. Le soudage doit être effectué loin de tout équipement électrique sensible. Assurez-vous que cette source de courant de soudage est installée et mise à la terre conformément aux instructions de ce manuel. Si les interférences persistent, l'utilisateur doit envisager de déplacer l'équipement, d'utiliser des câbles blindés, des filtres de ligne ou de protéger l'espace de travail.

Les pièces en mouvement peuvent provoquer des blessures.

Évitez de toucher les composants en mouvement. Évitez les endroits étroits, comme les rouleaux d'entraînement.

Le fil de soudure peut potentiellement causer des dommages

Attendez d'avoir reçu l'ordre d'appuyer sur la gâchette du pistolet.

Lorsque vous enfilez un fil de soudure, ne dirigez jamais le pistolet vers le corps humain, un métal ou tout autre objet.

RISQUE DE CHOCS ÉLECTRIQUES

Gardez vos mains et autres objets métalliques loin du fil de soudure et des composants d'entraînement pendant la procédure.

Mesures de sécurité importantes

- Mettez des gants isolants secs. Évitez de toucher l'électrode à main nue. Le port de gants humides ou endommagés est interdit.
- Des blessures peuvent être causées par la projection de composants. Lors de l'entretien d'un appareil, portez toujours un écran facial. Mettez une casquette et des lunettes de sécurité. Portez un casque de soudage avec la teinte de filtre appropriée. Portez une protection corporelle complète.
- La position la plus instable de l'appareil ne doit pas être inclinée vers le haut de plus de 10°. Les composants auxiliaires tels que les bouteilles de gaz, les unités d'alimentation en fil ou les dispositifs de refroidissement peuvent avoir un impact sur la stabilité selon le type d'équipement, et il faut en tenir compte.
- Avant de changer les consommables de la torche, de travailler sur la machine, mettez-la hors tension et débranchez la fiche d'entrée.
- Après la mise hors tension, une tension dangereuse subsiste sur les condensateurs d'entrée. Ne pas entrer en contact avec des condensateurs complètement chargés. Attendez toujours 60 secondes après avoir coupé le courant avant de travailler sur la machine, et vérifiez que la tension du condensateur d'entrée est proche de zéro avant de toucher une quelconque pièce.

Minimiser l'exposition CEM (champs électriques et magnétiques) du circuit de soudage / coupage.

Le soudage à l'arc et les procédés connexes tels que le découpage à la gouge, le découpage au plasma et le soudage par points génèrent un champ électromagnétique autour des circuits de soudage. Certains dispositifs médicaux, comme les stimulateurs cardiaques, peuvent être affectés par les CEM. Des précautions de protection doivent être prises pour les personnes qui ont des implants médicaux. Par exemple, il faut limiter le passage ou procéder à une évaluation individuelle des risques pour les soudeurs. En suivant les procédures appropriées, l'exposition aux CEM peut être réduite. Torsadez ou scotchez les câbles ensemble, ou utilisez un cache-câble, pour les maintenir proches les uns des autres.

Précautions concernant les dispositifs médicaux implantés:

Avant d'effectuer ou de s'approcher de procédures de soudage à l'arc, de soudage par points, de gougeage, de découpe au plasma ou de chauffage par induction, les porteurs de dispositifs médicaux implantés doivent consulter leur médecin et le fabricant du dispositif. Ne suivez les procédures ci-dessus que si votre médecin vous a donné son accord.

Évitez de mettre votre corps entre les câbles de soudage ou de coupe. Disposez les câbles de manière à ce qu'ils soient sur le côté et loin de l'opérateur. Travaillez loin de la source de courant de soudage et ne vous asseyez pas ou ne vous appuyez pas dessus. Gardez votre tête et votre corps aussi loin que possible de l'équipement du circuit de soudage. La pince de travail doit être reliée à la pièce à souder aussi près que possible de la zone de soudure ou de coupe. Le soudage ne doit pas être effectué en portant la source de courant de soudage ou de coupe ou le dévidoir de fil. Si vous avez un dispositif médical implanté dans votre corps, vous devez consulter votre médecin avant d'effectuer ou de vous approcher d'activités de soudage à l'arc, de soudage par points, de gougeage ou de découpe à l'arc plasma. N'enroulez pas les câbles autour de votre corps et ne les enroulez pas.

Il est de la responsabilité de l'utilisateur d'installer et d'utiliser l'équipement plasma conformément aux instructions du fabricant. Si des perturbations électromagnétiques sont détectées, il est de l'obligation de l'utilisateur de résoudre le problème avec l'aide technique du fabricant. Dans d'autres circonstances, il peut être facile de résoudre le problème en reliant la machine de découpe à la terre et à la pièce de travail. Dans d'autres circonstances, il peut s'agir de construire un écran électromagnétique qui entoure la source d'énergie et la zone de travail, ainsi que d'appliquer certains filtres d'entrée.

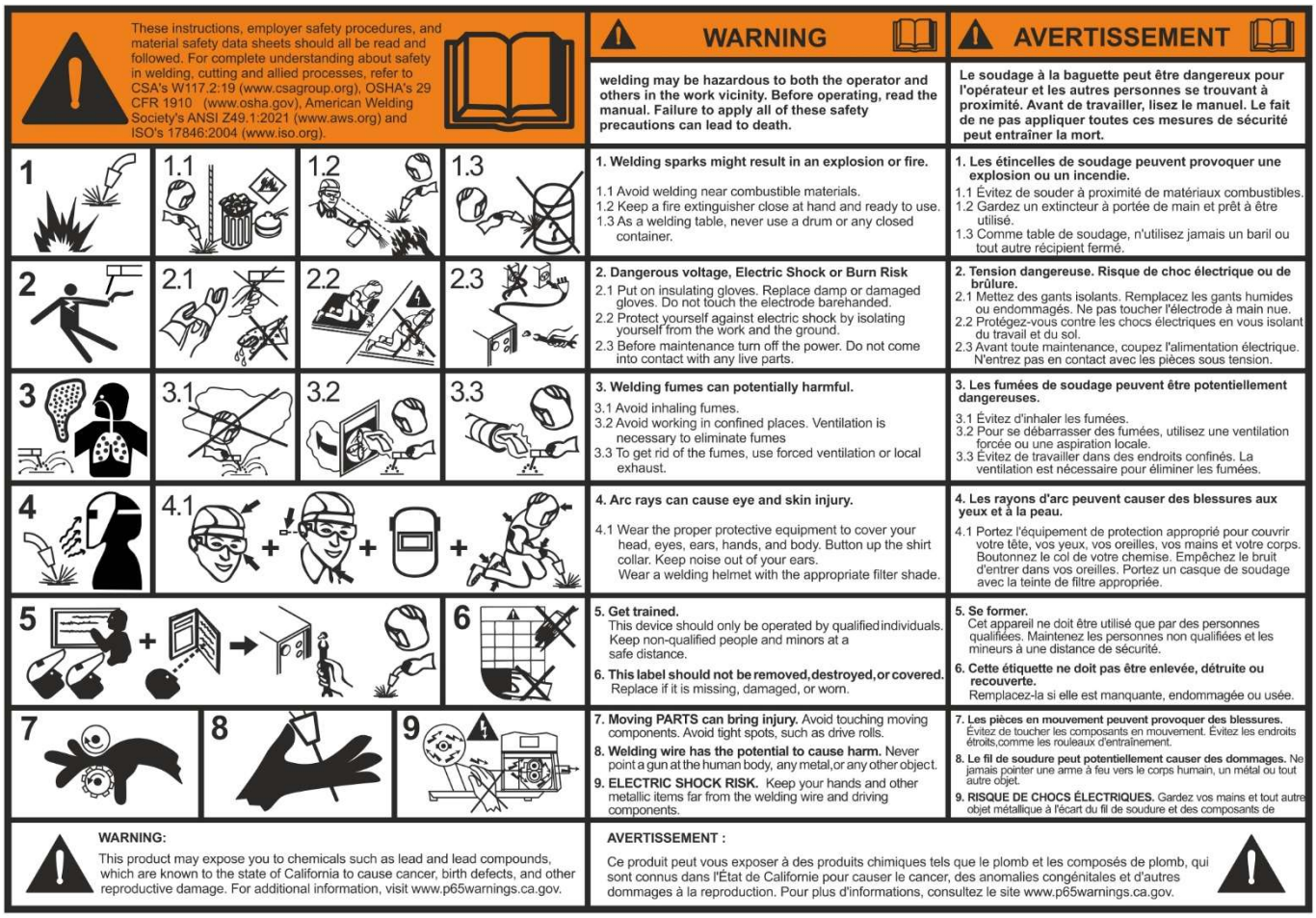
Les équipements de coupe doivent être connectés à la source d'alimentation conformément aux instructions du fabricant. Si des interférences se produisent, des précautions supplémentaires, telles que le filtrage de l'alimentation secteur, peuvent être nécessaires. Le blindage du câble d'alimentation de l'équipement de coupe installé en permanence dans un conduit métallique ou équivalent doit être envisagé. Le blindage doit être électriquement continu sur toute sa longueur. Le blindage doit être fixé à l'alimentation électrique du matériel de coupe afin de préserver un excellent contact électrique entre le conduit et le boîtier de la source d'alimentation. L'utilisateur doit analyser tout préoccuper électromagnétique dans la région environnante avant d'installer l'appareil. L'utilisateur doit confirmer que tous les autres appareils de la région sont compatibles. Cela peut nécessiter des précautions supplémentaires.

Lorsque la pièce de travail n'est pas reliée à la terre pour des raisons de sécurité électrique ou en raison de sa taille et de son emplacement, comme la coque d'un navire ou la construction d'un ouvrage en acier, une connexion reliant la pièce de travail à la terre peut minimiser les émissions dans certains cas. La pièce de travail sans mise à la terre augmente le risque de blessures pour les utilisateurs ou de dommages pour d'autres équipements électriques. La pièce de travail doit être reliée à la terre par une connexion directe à la pièce de travail. Si la connexion directe n'est pas autorisée, la mise à la terre doit être réalisée par des capacités adéquates déterminées conformément aux règles nationales.

La modification des dispositions du circuit de terre ne doit être autorisée que par une personne qualifiée pour évaluer si les modifications augmentent le risque de blessure, par exemple en activation des voies de retour de courant de coupe parallèles, qui peuvent endommager les circuits de terre d'autres équipements. La norme CEI 60974-9 fournit des conseils supplémentaires, Matériel de soudage à l'arc, partie 9 : Installation et utilisation. Les problèmes d'interférence peuvent être atténués par le blindage sélectif d'autres câbles et équipements situés à proximité directe. Pour certaines applications, le blindage de l'ensemble du système de découpe au plasma peut être envisagé.

1.6 Warning Label

This power supply has this warning notice attached to it. It is critical that the operator and maintenance professional comprehend the meaning of these warning symbols.


These instructions, employer safety procedures, and material safety data sheets should all be read and followed. For complete understanding about safety in welding, cutting and allied processes, refer to CSA's W117.2:19 (www.csagroup.org), OSHA's 29 CFR 1910 (www.osha.gov), American Welding Society's ANSI Z49.1:2021 (www.aws.org) and ISO's 17846:2004 (www.iso.org).
WARNING
welding may be hazardous to both the operator and others in the work vicinity. Before operating, read the manual. Failure to apply all of these safety precautions can lead to death.
AVERTISSEMENT
Le soudage à la baguette peut être dangereux pour l'opérateur et les autres personnes se trouvant à proximité. Avant de travailler, lisez le manuel. Le fait de ne pas appliquer toutes ces mesures de sécurité peut entraîner la mort.
1
1.1
1.2
1.3
1. Welding sparks might result in an explosion or fire.
1.1 Avoid welding near combustible materials.
1.2 Keep a fire extinguisher close at hand and ready to use.
1.3 As a welding table, never use a drum or any closed container.
1. Les étincelles de soudage peuvent provoquer une explosion ou un incendie.
1.1 Évitez de souder à proximité de matériaux combustibles.
1.2 Gardez un extincteur à portée de main et prêt à être utilisé.
1.3 Comme table de soudage, n'utilisez jamais un baril ou tout autre récipient fermé.
2
2.1
2.2
2.3
2. Dangerous voltage, Electric Shock or Burn Risk
2.1 Put on insulating gloves. Replace damp or damaged gloves. Do not touch the electrode barehanded.
2.2 Protect yourself against electric shock by isolating yourself from the work and the ground.
2.3 Before maintenance turn off the power. Do not come into contact with any live parts.
2. Tension dangereuse. Risque de choc électrique ou de brûlure.
2.1 Mettez des gants isolants. Remplacez les gants humides ou endommagés. Ne pas toucher l'électrode à main nue.
2.2 Protégez-vous contre les chocs électriques en vous isolant du travail et du sol.
2.3 Avant toute maintenance, coupez l'alimentation électrique. N'entrez pas en contact avec les pièces sous tension.
3
3.1
3.2
3.3
3. Welding fumes can potentially harmful.
3.1 Avoid inhaling fumes.
3.2 Avoid working in confined places. Ventilation is necessary to eliminate fumes
3.3 To get rid of the fumes, use forced ventilation or local exhaust.
3. Les fumées de soudage peuvent être potentiellement dangereuses.
3.1 Évitez d'inhaler les fumées.
3.2 Pour se débarrasser des fumées, utilisez une ventilation forcée ou une aspiration locale.
3.3 Évitez de travailler dans des endroits confinés. La ventilation est nécessaire pour éliminer les fumées.
4
4.1
4. Arc rays can cause eye and skin injury.
4.1 Wear the proper protective equipment to cover your head, eyes, ears, hands, and body. Button up the shirt collar. Keep noise out of your ears. Wear a welding helmet with the appropriate filter shade.
4. Les rayons d'arc peuvent causer des blessures aux yeux et à la peau.
4.1 Portez l'équipement de protection approprié pour couvrir votre tête, vos yeux, vos oreilles, vos mains et votre corps. Boutonnez le col de votre chemise. Empêchez le bruit d'entrer dans vos oreilles. Portez un casque de soudage avec la teinte de filtre appropriée.
5
6
5. Get trained.
This device should only be operated by qualified individuals. Keep non-qualified people and minors at a safe distance.
6. This label should not be removed, destroyed, or covered. Replace if it is missing, damaged, or worn.
5. Se former.
Cet appareil ne doit être utilisé que par des personnes qualifiées. Maintenez les personnes non qualifiées et les mineurs à une distance de sécurité.
6. Cette étiquette ne doit pas être enlevée, détruite ou recouverte.
Remplacez-la si elle est manquante, endommagée ou usée.
7
8
9
7. Moving PARTS can bring injury. Avoid touching moving components. Avoid tight spots, such as drive rolls.
8. Welding wire has the potential to cause harm. Never point a gun at the human body, any metal, or any other object.
9. ELECTRIC SHOCK RISK. Keep your hands and other metallic items far from the welding wire and driving components.
7. Les pièces en mouvement peuvent provoquer des blessures. Évitez de toucher les composants en mouvement. Évitez les endroits étroits, comme les rouleaux d'entraînement.
8. Le fil de soudure peut potentiellement causer des dommages. Ne jamais pointer une arme à feu vers le corps humain, un métal ou tout autre objet.
9. RISQUE DE CHOCS ÉLECTRIQUES. Gardez vos mains et tout autre objet métallique à l'écart du fil de soudure et des composants de
WARNING:
This product may expose you to chemicals such as lead and lead compounds, which are known to the state of California to cause cancer, birth defects, and other reproductive damage. For additional information, visit www.p65warnings.ca.gov.
AVERTISSEMENT :
Ce produit peut vous exposer à des produits chimiques tels que le plomb et les composés de plomb, qui sont connus dans l'État de Californie pour causer le cancer, des anomalies congénitales et d'autres dommages à la reproduction. Pour plus d'informations, consultez le site www.p65warnings.ca.gov.

❑Introduction

Thank you for buying our product. In order to get the best performance out of the equipment and ensure the maximum lifespan of its parts, the use and maintenance instructions contained in this manual must be read and strictly complied with, as well as the safety instructions contained in the relevant folder. If repairs to the equipment are required, we recommend that our clients contact our service centre workshops, as they have the necessary equipment and personnel that are specifically trained and constantly updated.

All our machines and equipment are constantly developed and so changes may be made in terms of their construction and features.

❑Description

MIG PULSE 202 INVERTER GENERATOR suitable for single-phase power supplies for MIG PULSE, MIG DOUBLE PULSE, MIG-MAG, STICK WELDING, and TIG WELDING (with “Lift” type ignition).

Multifunction synergic power source, based on the leadingedge IGBT inverter technology and fully digitally controlled, offer premium welding quality in both MIG/MAG and Pulsed / Dual-Pulsed MIG on all materials, especially stainless steel, aluminium and galvanized steel; the spatter-free welding feature minimises reprocessing work. It also ensures excellent performance in TIG and STICK welding prcesses.

Innovative, versatile, light-weight, easily portable, simple to use, MIG PULSE 202 is a very high level product that is absolutely irreplaceable technologically for all internal and external maintenance works, vehicle bodyworks, agricultural and small light metalwork jobs.

The principal characteristics of welding units are:

- Multifunction power source with premium welding quality in MIG pulse / double pulse, STICK WELDING and TIG with “Lift” type ignition welding processes.
- Standard polarity inversion for welding with the most common core wires and without gas.
- Central Euro connection on torch.
- Innovative practical design.
- Supporting structure in metal with front panel in special shockproof material.
- Robust handle integrated into the chassis.
- Professional 2-roller wire feeder that guarantees precise feeding of the wire.
- The double slot rollers can be replaced without using any tools.
- A graduated knob for precise adjustment of the wire pressure that stays unvaried when the arms open and close.
- Housing for coils of wire with max Ø 200 mm – 5 kg.
- Possibility of fitting coils of wire up to max Ø 300 mm - 15 kg thanks to the exclusive “retrofit kit adaptor” optional extra.
- Synergic digital control of all welding parameters, shown on the display, also featuring the following functions:
- Allows less expert operators to regulate all welding parameters, choosing the type of program on the basis of the material, wire diameter, and gas used.
- Innovative software “VISION ARC” for controlling all welding parameters.
- Digital Voltmeter / Ammeter with HOLD function (saving of latest data on both displays).
- “Energy Saving” function to operate the power source cooling fan only when necessary.
- Auto-diagnostic feature for trouble shooting.
- Ability to store personalized welding programmes (JOB).
- MIG-MAG welding:
- BURN BACK control. At the end of each weld, in any condition and with any material, the digital control ensures a perfect wire cut, prevents the typical “wire globule” from forming and ensures correct arc restriking.
- WSC Wire start control. This arc striking control device prevents wire from sticking to the workpiece or torch nozzle and ensures precise and smooth arc striking, particularly when welding aluminium.
- Welding parameters that are controlled digitally by a microprocessor, are monitored and modified in just a few seconds, maintaining a consistently precise and stable arc as the welding conditions continue to vary due to the movement of the torch and the irregularities of the parts to be welded.
- STICK welding:
- “Arc Force” adjustable to select the best dynamic characteristics for the welding arc.
- “Hot Start” adjustable to improve ignition with particularly difficult electrodes.
- Anti-sticking function to avoid the electrodes sticking.
- Vrd (Voltage Reduction Device), which makes it possible to use the machine in environments where the risk of electric shock or electrocution caused by arc welding is enormously increased by the presence of water, humidity, or heat, and particularly where the ambient temperature exceeds 32°C.
- TIG welding:
- “Lift” type ignition, with TCS “Thermal Control Start” device to further reduce tungsten inclusions.
- Exclusive SWS “Smart Welding Stop” system at the end of TIG welding. Lifting up the torch without switching off the arc will introduce a SLOPE DOWN and it will switch off automatically.

❑Technical data

The general technical data of the system are summarized in table 1.

Table 1

Model		MIG PULSE 202		
		MIG/MAG	TIG	STICK WELDING
Single-phase input 50/60 Hz	V	230 ± 15%		
Mains supply: Zmax (*)	Ω	0.21		
Primary current @ I_{2MAX}	A	43	27	31
Maximum I_1 eff	A	16.6	12.5	17.4
Power factor / cosφ		0.64 / 0.99		
Efficiency degree	η	0.83	0.8	0.83
Voltage without load	V	59		
Current range	A	30-200	5-175	10-150
Duty cycle @ 100% (40°C)	A	90	100	90
Duty cycle @ 60% (40°C)	A	105	110	105
Duty cycle @ X% (40°C)	A	200 (15%)	175 (20%)	150 (25%)
Wires diameter	inch(mm)	0.023-0.045 (0,6-1,2)	-	-
Spool Diameter / Weight	Inch(mm)/kg	8(200)/5 {12(300)/15 optional}	-	-
N° rollers		2	-	-
Power output of feeder motor	W	40	-	-
Rated wire feeding speed	Ipm(m/min)	39.3-630 (1–16)	-	-
STICK WELDING electrodes	Inch(mm)	-	-	0.062-0.125 (1.6-3.2)
TIG electrodes	Inch(mm)	-	0.039-0.125 (1.0-3.2)	-
Protection gas		•Co_2 • Pure Argon • Argon, Co_2, O_2 • Argon and Co_2 blends	-	-
Standards		IEC 60974-1, IEC 60974-5, IEC 60974-10 S		
Protection class		IP 21 S		
Insulation class		H		
Dimensions including handle (DxWXH)	Inch(mm)	21.2x9.6x17.5 (540x245x445)		
Weight	lb(kg)	44(20)		

(*) Mains supply Zmax: maximum impedance value allowed for the grid according to the **EN/IEC 61000-3-11** standard.

WARNING: This equipment does not comply with **EN/IEC 61000-3-12**. If it is connected to a public low voltage system, it is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment may be connected.

❑Usage limits (IEC 60974-1)

The use of a welder is typically discontinuous, in that it is made up of effective work periods (welding) and rest periods (for the positioning of parts, the replacement of wire and underflushing operations etc. This welder is dimensioned to supply a I2 max nominal current in complete safety for a period of work of X% of the total usage time. The regulations in force establish the total usage time to be 10 minutes. The work cycle is considered to be X% of this period of time. When the work cycle permitted is exceeded a trip switch trips, which protects the welding machine's internal components against dangerous overheating and prevents incorrect functioning of the machine (for further information see the TSP control panel manual). After several minutes the overheat cut-off rearms automatically and the welder is ready for use again (Automatic reset error). This equipment is built to have a protection level of IP 21 S, which means:

- That it is protected against the penetration of solid foreign bodies with diameters in excess of Ø 12 mm.
- That it is protected from damage due to any build up of moisture on surfaces which are in contact with the air.

❑How to lift up the machine

The weld machine has a strong handle all in one with the frame, used for transporting the machine manually only.

NOTE: These hoisting and transportation devices conform to local and national standards. Do not use other hoisting and transportation systems.

❑Open the packaging

The system essentially consists of:

- Welding unit **MIG PULSE 202**.
- Ground cable (3m long).
- MIG-MAG or TIG (optional) welding torches.
- Transport trolley (optional).
- Retrofit kit adaptor for Ø 12 inch (300 mm) - 15 kg coil of wire (optional).

Upon receiving the system:

- Remove the welding generator and all relevant accessories components from their packaging.
- Check that the weld machine is in good condition, if not report any problems immediately to the seller-distributor.
- Make sure all ventilation grilles are open and that no foreign bodies are blocking the air circulation.

❑Installation and connections

The installation site for the system must be carefully chosen in order to ensure its satisfactory and safe use. The user is responsible for the installation and use of the system in accordance with the producer's instructions contained in this manual. Before installing the system, the user must take into consideration the potential electromagnetic problems in the work area. In particular, we suggest that you should avoid installing the system close to:

- Signalling, control and telephone cables.
- Radio and television transmitters and receivers.
- Computers and control and measurement instruments.
- Security and protection instruments.

Persons fitted with pace-makers, hearing aids and similar equipment must consult their doctor before going near a machine in operation. The equipment's installation environment must comply to the protection level of the frame i.e. IP 21 S (IEC 60529 publication). The system is capable of working in environments where working conditions are particularly hard.
This system is cooled by means of the forced circulation of air, and must therefore be placed in such a way that the air may be easily sucked in and expelled through the apertures made in the frame. The equipment must be assembled as follows:

- Mount on the trolley (optional extra).
- Fit the kits ("Retrofit kit adaptor" - optional, etc.) on the welding unit.
- Fix the welding unit to the trolley.
- Connect the welding machine to the utility line.
- Connect up the welding cables.

Instructions for fitting the individual optional extras are contained in the relevant packaging.

❑Connecting the welding machine to the utility line

Connection of the machine to the user line (electrical current) must be performed by qualified personnel.
Before connecting the welding machine to the mains power supply, make sure that rated voltage and frequency correspond to those provided by the mains power supply and that the welding machine's power switch is turned to "O". Connection to the power supply must be carried out using the tripolar cable supplied with the system, of which:

- 2 conducting wires are needed for connecting the machine to the supply.
- The third, which is YELLOW GREEN in colour, is used for making the "GROUND" connection.

Connect a suitable load of normalised plug (2p + e) to the power cable and provide for an electrical socket complete with fuses or an automatic switch. The ground terminal must be connected to the ground conducting wire (YELLOW- GREEN) of the supply.
Table 2 shows the capacity values that are recommended for fuses in the line with delays.
NOTE: Any extensions to the power cable must be of a suitable diameter, and absolutely not of a smaller diameter than the special cable supplied with the machine.
Table 2

Model		MIG PULSE 202		
		MIG/MAG	TIG	STICK WELDING
Input power @ I_2 Max	KVA	9.8	6.2	7.1
Delayed fuse	A	D50		
Duty cycle @ X% (40°C)	A	200 (15%)	175 (20%)	150 (25%)
Mains cable Length Cross section	ft.(m) AWG	10 (3) AWG12		

❑ Command and control units (Fig. A)

Pos. 1 "TSP" control panel.
Pos. 2 Fast coupling straight polarity.
Pos. 3 Fast coupling reverse polarity.
Pos. 4 Centralised MIG-MAG torch connection.
Pos. 5 Power supply switch. In the "O" position the welder is off.
Pos. 6 Mains cable.
Pos. 7 Weld gas inlet coupling.
Pos. 8 Cable clamp for the welding wire to pass (with the "Retrofit kit adaptor" fitted).

Fig. A

❑Loading wire

- Open the side panel on the left and insert the coil (use coils with a MAX diameter of 200 mm and MAX weight of 5 kg) that suits the material to be welded on the relevant support so that the wire unwinds anticlockwise and aligning the protruding marker on the support with the relevant hole in the coil.
- Thread the end of the wire into the back guide (Pos. 7, Fig. B) on the drawing mechanism.
- Lift up the idle roller Ø 30 mm (Pos. 1, Fig. B) releasing the roller pressure mechanism (Pos. 6, Fig. B). Check that the drive roller (Pos. 4, Fig. B) has the diameter corresponding to the wire being used printed on the outer side.
- Thread the wire into the central wire guide and into the wire guide of the centralized attachment (Pos. 3, Fig. B) for a few centimetres. Lower the idle roll-holder arm making sure the wire goes into the slot of the drive roll. If necessary, adjust the pressure between the rollers with the screw provided (Pos. 5, Fig. B). The correct pressure is the minimum that does not allow the rollers to skid on the wire. Excessive pressure will case deformation of the wire and tangling on the entrance of the sheath; insufficient pressure can cause irregular welding.

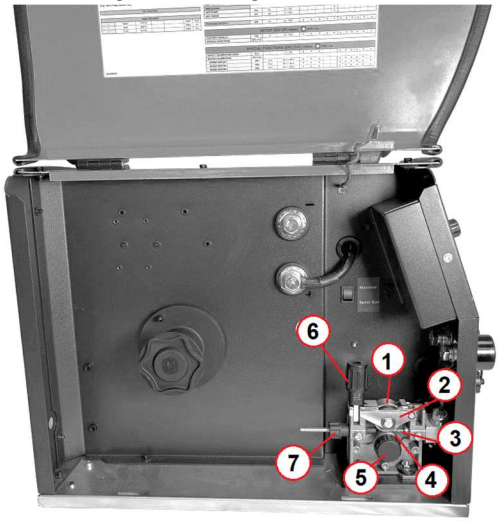


Fig. B

❑Assembly of drive roller

Follow instructions given below for mounting the drawing roller onto the mechanism:

- Unscrew the screw (Pos. 5, Fig. B).
- Lift up the idle roll-holder arm Ø 26 mm (Pos. 2, Fig. B).
- Each roller shows the type of wire and diameter on the two external sides.
- Mount the appropriate roller (Pos. 4, Fig. B) making sure the groove is in the right position for the diameter of the wire being used.
- Screw the screw (Pos. 5, Fig. B).

❑MIG-MAG / PULSE MIG / DOUBLE PULSE MIG welding with GAS

To begin MIG-MAG / PULSE MIG / DOUBLE PULSE MIG welding, carry out the following tasks (with the machine switched off):

1. Connecting the cables (Fig. C1-C2)

1) Connect the gas hose to the pressure reducer fitted on the cylinder beforehand. Gas cylinders are supplied with a pressure reducer to adjust pressure of the gas used for welding.
2) Screw the torch to the centralised connection on the front panel of the welding machine (Pos. 4, Fig. A).
3) Connect up the earthing system cable to the rapid coupling marked by a **-** (negative) symbol and then the relevant ground clamps to the piece being welded or to its support in an area free from rust, paint and grease. Using particularly long earthing cables reduces the voltage and causes some problems from increased resistance and inductance of the cables that could cause faulty welding. Follow instructions to avoid these problems:
   - Use earthing and extension cables with appropriate section.
   - Lay out the cables as a flat as possible to prevent them from coiling up.
4) Open the moving cover, (see Fig. C2) and make sure that the change polarity cable is connected to the positive pole (**+**).

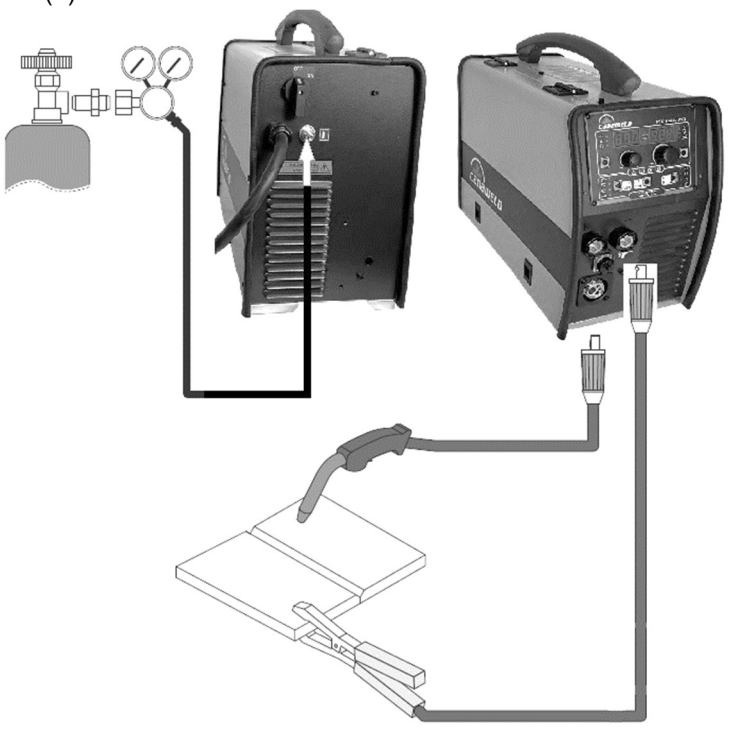


Fig. C1

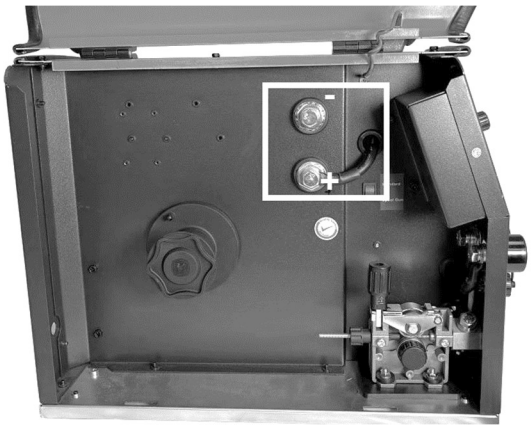


Fig. C2

2. Welding

1) Open the moving cover and fit the coil of wire.
2) Load the wire (see the “Loading the wire” paragraph).
3) Switch the welding machine on by moving the power supply switch to **I** (Pos. 5, Fig. A).
4) Carry out the following operations on the MIG-MAG torch:
   - Remove the gas-guide and wire-guide nozzles, allowing the wire to flow freely during loading. Remember that the contact tip must correspond to the wire diameter.
   - Push the torch push button or the motor check push button until the wire end comes out from the torch.
   - Tighten the contact tip on the torch.
   - Attach the correct gas-guide nozzle.
   - Protect the gas-guide nozzle and the wire-guide nozzle of the torch from sprays of solder.
5) Make the adjustments and select the parameters on the control panel (for further information see the TSP control panel manual).
6) Open the tap on the cylinder slowly and adjust the reducer knob to obtain a pressure of about 1.0 to 1.5 bar, and regulate the flow to about 15 lit/min (to suit the current to used for welding).
7) The welding machine is ready for welding. To begin welding, approach the point to be welded and press the button on the torch.
8) When you have finished welding, remove the waste, turn off the machine and close the gas cylinder.

❑MIG-MAG / PULSE MIG / DOUBLE PULSE MIG welding without GAS

To begin MIG-MAG / PULSE MIG / DOUBLE PULSE MIG welding without gas, carry out the following tasks (with the machine switched off):

1. Connecting the cables (Fig. D1-D2)

1) Screw the torch to the centralised connection on the front panel of the welding machine (Pos. 4, Fig. A).
2) Connect up the earthing system cable to the rapid coupling marked by a **+** (positive) symbol and then the relevant ground clamps to the piece being welded or to its support in an area free from rust, paint and grease. Using particularly long earthing cables reduces the voltage and causes some problems from increased resistance and inductance of the cables that could cause faulty welding. Follow instructions to avoid these problems:
   - Use earthing and extension cables with appropriate section.
   - Lay out the cables as a flat as possible to prevent them from coiling up.
3) Open the moving cover, (see Fig. D2) and move the change polarity cable, connecting it to the negative pole (**-**).

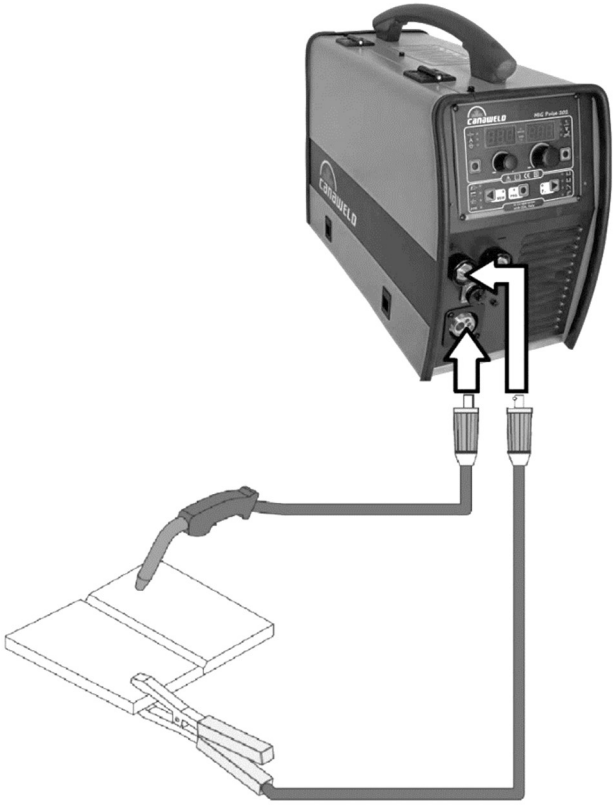


Fig. D1

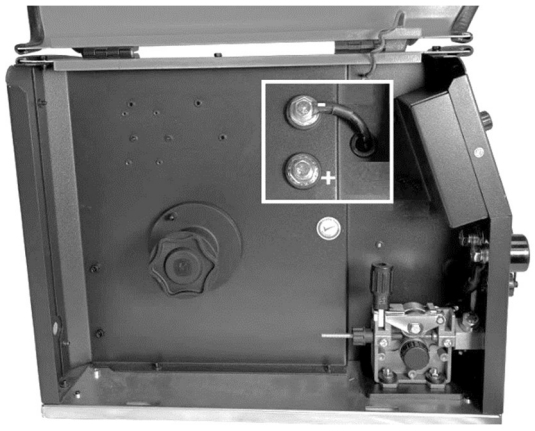


Fig. D2

2. Welding

1) Open the moving cover and fit a coil of wire with a core for welding without using gas.
2) Load the wire (see the “Loading the wire” paragraph).
3) Switch the welding machine on by moving the power supply switch to **I** (Pos. 5, Fig. A).
4) Carry out the following operations on the MIG-MAG torch:
   - Remove the gas-guide and wire-guide nozzles, allowing the wire to flow freely during loading.

Remember that the contact tip must correspond to the wire diameter.
- Push the torch push button or the motor check push button until the wire end comes out from the torch.
- Tighten the contact tip on the torch.
- Attach the correct gas-guide nozzle.
- Protect the gas-guide nozzle and the wire-guide nozzle of the torch from sprays of solder.

5) Make the adjustments and select the parameters on the control panel (for further information see the TSP control panel manual). Make sure that you have selected a program that is suitable for wire with a core.
6) The welding machine is ready for welding. To begin welding, approach the point to be welded and press the button on the torch.
7) Once welding has been completed remove the slag and switch off the machine.

❑Spot welding

Welding can be done with or without gas. The substantial difference with MIG-MAG welding is essentially related to the torch and the adjustments that must be made on the TSP control panel.

- Depending on the torch chosen and the work to be done, a gas guide nozzle can be fitted on the torch that is specifically for spot welding (see Fig. E).
- Use the control panel to select the spot-welding mode and, if necessary, make the changes to the related “Special functions - Fx” (for further information see the TSP control panel manual), which allows the machine to do this specific type of welding.

To begin spot welding:

- Place the gas guiding nozzle perpendicular on the workpiece to be spot welded.
- Press the torch button to start the welding current and wire feed.
- When the spot welding time expires (SPOT WELD TIME), the wire feed stops automatically.
- When the torch button is pushed again a new welding cycle starts.
- Release the torch button.

Fig. E

❑Interval welding (Stitch)

The substantial differences with the spot welding mainly concern the adjustments that must be carried on the welding machine.

Use the control panel to select the interval welding mode and then make the changes to the related “Special functions - Fx” (for further information see the TSP control panel manual), which allows the machine to do this specific type of welding.

To begin interval welding:

- Press the torch button to start the welding current and wire feed.
- At this point the welding machine automatically carries out a succession of welded portions (STITCH WELD TIME) followed by a pause (STITCH WELD PAUSE), according to the times entered previously. This procedure stops automatically only when the TORCH BUTTON is released.
- When the torch button is pushed again the torch begins a new interval welding cycle.

❑Aluminium welding

To weld with aluminum wire, proceed as follows:

- Replace the drive roller with the appropriate for aluminum wire.
- Use a torch with a 3m cable and a carbon Teflon sheath.
- Set the pressure between the drive rollers at the minimum, by turning the screw provided.
- Use argon gas at a pressure of 1.3 – 1.7 bar.

❑TIG welding with “Lift”

In the TIG process welding is achieved by melting the two metal pieces to be joined, with the possible addition of material from the outside, using an arc ignited by a tungsten electrode.

The “Lift” (TCS) type ignition used in MIG PULSE 202 equipments makes it possible to reduce tungsten inclusions on ignition to a minimum. The molten bath and the electrode are protected by and inert gas (for example, Argon). This type of welding is used to weld thin sheet metal or when elevated quality is required.

1) Connecting the welding cables (Fig. F):
   - Connect one end of the gas hose to the gas connecter on the TIG torch and the other end to the pressure reducer on the inert gas cylinder (Argon or similar).
   - With the machine switched off:
     - Connect the ground cable to the snap-on connector marked **+** (positive).
     - Connect the relative ground clamp to the workpiece or to the workpiece support in an area free of rust, paint, grease, etc...
     - Connect the TIG torch power cable to the snap-on connector marked **-** (negative).
2) Switch the welding machine on by moving the power supply switch to **I** (Pos. 5, Fig. A).
3) Make the adjustments and do the parameter settings on the control panel (for further information see the TSP control panel manual).
4) Open the gas cylinder and regulate the flow by adjusting the valve on the TIG torch by hand.
5) Ignite the electric arc by contact, using a decisive, quick movement without dragging the tungsten electrode on the piece to be welded (“Lift” type ignition - Fig. G).
6) The welder has a SWS “Smart Welding Stop” system for the end of TIG welding. Lifting up the torch without switching off the arc will introduce a slope down and it will switch off automatically.

7) When you have finished welding remember to shut the valve on the gas cylinder.

Table 3 shows the currents to use with the respective electrodes for TIG DC welding. This input is not absolute but is for your guidance only; read the electrode manufacturers' instructions for a specific choice. The diameter of the electrode to use is directly proportional to the current being used for welding.

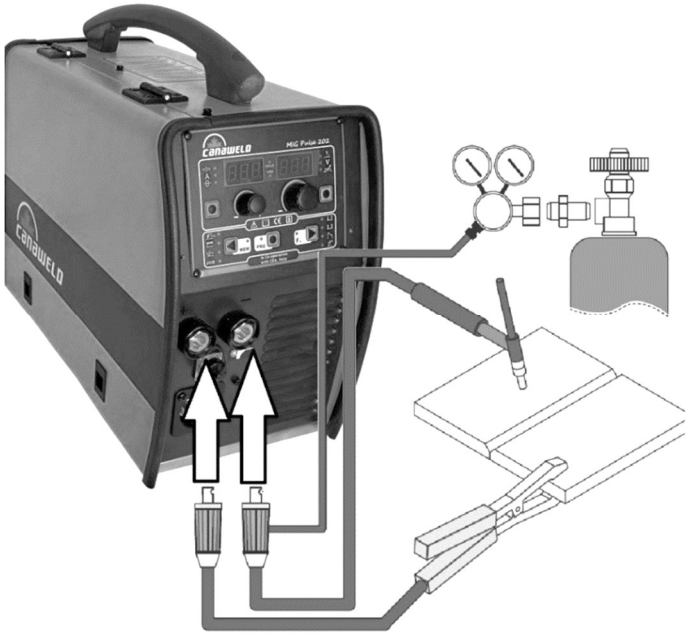


Fig. F

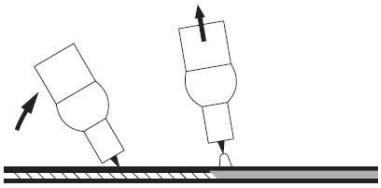


Fig. G

Table 3

Ø ELECTRODE Inch (mm)	ELECTRODE TYPE Current adjustment field (A)	
	TIG DC	
	Tungsten Ce 1% Grey	Tungsten Rare ground 2% Turchoise
0.039 (1)	10-50	10-50
0.063 (1,6)	50-80	50-80
0.094 (2.4)	80-150	80-150
0.126 (3.2)	150-250	150-250

❑Electrode welding (STICK WELDING)

Electrode welding is used to weld most metals (different types of steel, etc.) using coated rutilic and basic electrodes with diameters ranging from Ø 1.6 mm to Ø 3.2 mm.

1) Connecting the welding cables (Fig. H): Disconnect the machine from the mains power supply and connect the welding cables to the output terminals (Positive and Negative) of the welding machine, attaching them to the clamp and ground with the polarity specified for the type of electrode being used (Fig. H). Always follow the electrode manufacturer's instructions. The welding cables must be as short as possible; they must be near to one another, positioned at or near floor level. Do not touch the electrode clamp and the ground clamp simultaneously.
2) Switch the welding machine on by moving the power supply switch to **I** (Pos. 5, Fig. A).
3) Make the adjustments and select the parameters on the control panel (for further information see the TSP control panel manual).
4) Carry out welding by moving the torch to the workpiece. Strike the arc (press the electrode quickly against the metal and then lift it) to melt the electrode, the coating of which forms a protective residue. Then continue welding by moving the electrode from left to right, inclining it by about 60° compared with the metal in relation to the direction of welding.

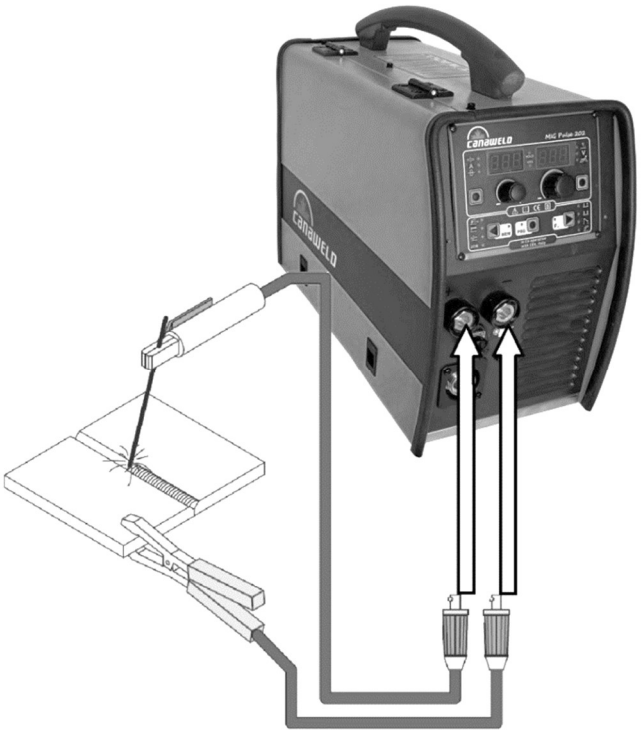


Fig. H

PART TO BE WELDED

The part to be welded must always be connected to ground in order to reduce electromagnetic emission. Much attention must be afforded so that the ground connection of the part to be welded does not increase the risk of accident to the user or the risk of damage to other electric equipment. When it is necessary to connect the part to be welded to ground, you should make a direct connection between the part and the ground shaft. In those countries in which such a connection is not allowed, connect the part to be welded to ground using suitable capacitors, in compliance with the national regulations.

WELDING PARAMETERS

Table 4 shows some general indications for the choice of electrode, based on the thickness of the parts to be welded. The values of current to use are shown in the table with the respective electrodes for the welding of common steels and low-grade alloys. These data have no absolute value and are

indicative data only. For a precise choice follow the instructions provided by the electrode manufacturer.

Table 4

WELDING THICKNESS inch (mm)	Ø ELECTRODE inch (mm)
0.047 - 0.079 (1.2 - 2)	0.063 (1.6)
0.059 – 0.12 (1.5 – 3)	0.079 (2)
0.12 – 0.197 (3 – 5)	0.098 (2.5)
0.197 – 0.47 (5 – 12)	0.126 (3.2)

The current to be used depends on the welding positions and the type of joint, and it increases according to the thickness and dimensions of the part.

The current intensity to be used for the different types of welding, within the field of regulation shown in table 5 is:

- High for plane, frontal plane and vertical upwards welding.
- Medium for overhead welding.
- Low for vertical downwards welding and for joining small preheated pieces.

Table 5

Ø ELECTRODE inch (mm)	CURRENT (A)
0.063 (1.6)	30 – 60
0.079 (2)	40 – 75
0.098 (2.5)	60 – 110
0.126 (3.2)	95 - 140

A fairly approximate indication of the average current to use in the welding of electrodes for ordinary steel is given by the following formula:

I = 50 × (Øe - 1)

Where:

I = intensity of the welding current

Øe = electrode diameter

Example:

For electrode diameter 4 mm

I = 50 × (4 - 1) = 50 × 3 = 150A

❑Maintenance

ATTENTION: Cut off the power supply to the equipment before effecting any internal inspection.

MIG PULSE 202

IMPORTANT: Since the welding machines are fully electronic, removing the dust that is sucked into the machine by the fans, is of utmost importance.

In order to achieve correct functioning of the machine, proceed as described:

- Periodic removal of accumulations of dirt and dust inside the equipment using compressed air. Do not point the jet of air directly at the electrical parts as this could damage them.
- Periodical inspection for worn cables or loose connections that could cause overheating.
- Make sure the air circuit is completely free of any impurities and that the connections are tight and free of any leaks. In this connection, inspect the solenoid valve very carefully.
- Check the wire feeder rolls periodically and replace them when wear impairs the regular flow of the wire (slipping etc).

TORCH, the torch is subjected to high temperatures and is also stressed by traction and torsion. We recommend not to twist the wire and not to use the torch to pull the welder. As a result of the above the torch will require frequent maintenance such as:

- Cleaning welding splashes from the gas diffuser so that the gas flows freely.
- Substitution of the contact tip when the hole is deformed.
- Cleaning of the wire guide liner using trichloroethylene or specific solvents.
- Check of the insulation and connections of the power cable; the connections must be in good electrical and mechanical condition.

SPARE PARTS

Original spares have been specifically designed for our equipment.

The use of spares that are not original may cause variations in the performance and reduce the safety level of the equipment. We are not liable for damage due to use of spare parts that are not original.

❑The pointing out of any difficulties and their elimination

The supply line is attributed with the cause of the most common difficulties. In the case of breakdown, proceed as follows:

1) Check the value of the supply voltage.
2) Check that the power cable is perfectly connected to the plug and the supply switch.
3) Check that the power fuses are not burned out or loose.
4) Check whether the following are defective:
   - The switch that supplies the machine.
   - The plug socket in the wall.
   - The generator switch.

NOTE: Given the required technical skills necessary for the repair of the generator, in case of breakdown we advise you to contact skilled personnel or our technical service department.

❑Replacing the digital interface PCB

Proceed as follows:

- Unscrew the 4 screws that fix the front rack panel.
- Remove both the adjustment knobs.
- Disconnect the electrical connectors for the board.
- Unscrew the support columns.
- Remove the electronic board by lifting it off its supports.
- To fit a new board, follow this procedure in reverse.

❑Troubleshooting table

WARNING: Any internal inspections or repairs are only to be done by qualified personnel!

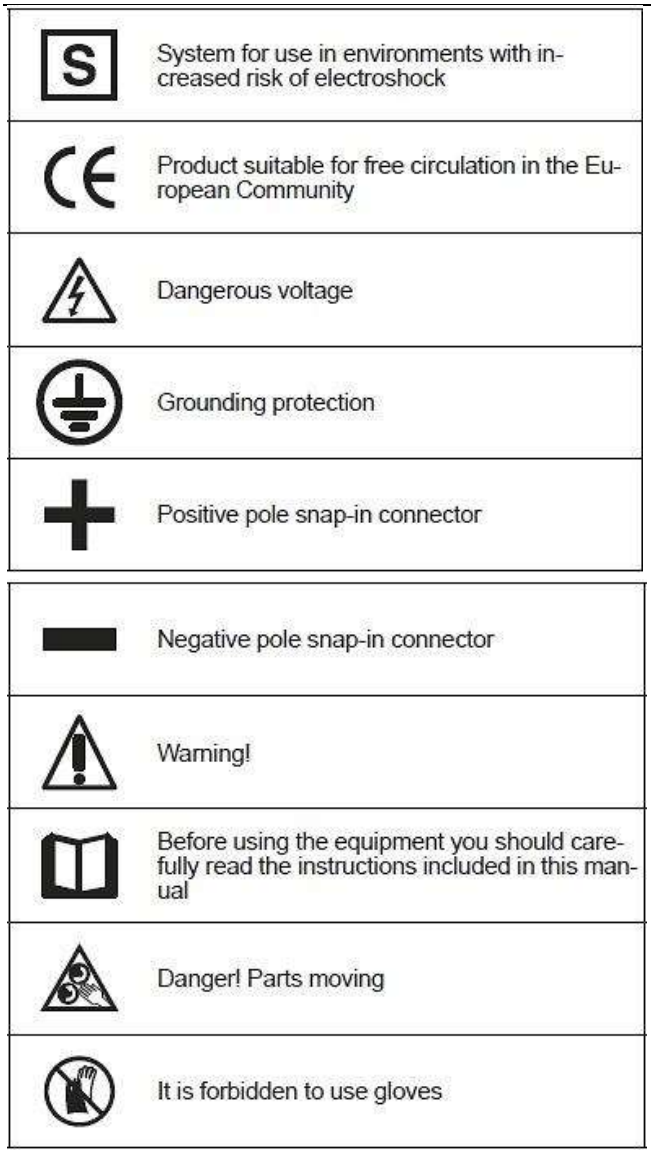
IMPORTANT: Remember to disconnect the mains power supply and wait for the internal capacitors to discharge (about 2 minutes) before starting to check and repair the machine if necessary.

Please refer to **Error! Reference source not found.**. There is a troubleshooting table that will help you figure out what the problem is.

Table 6

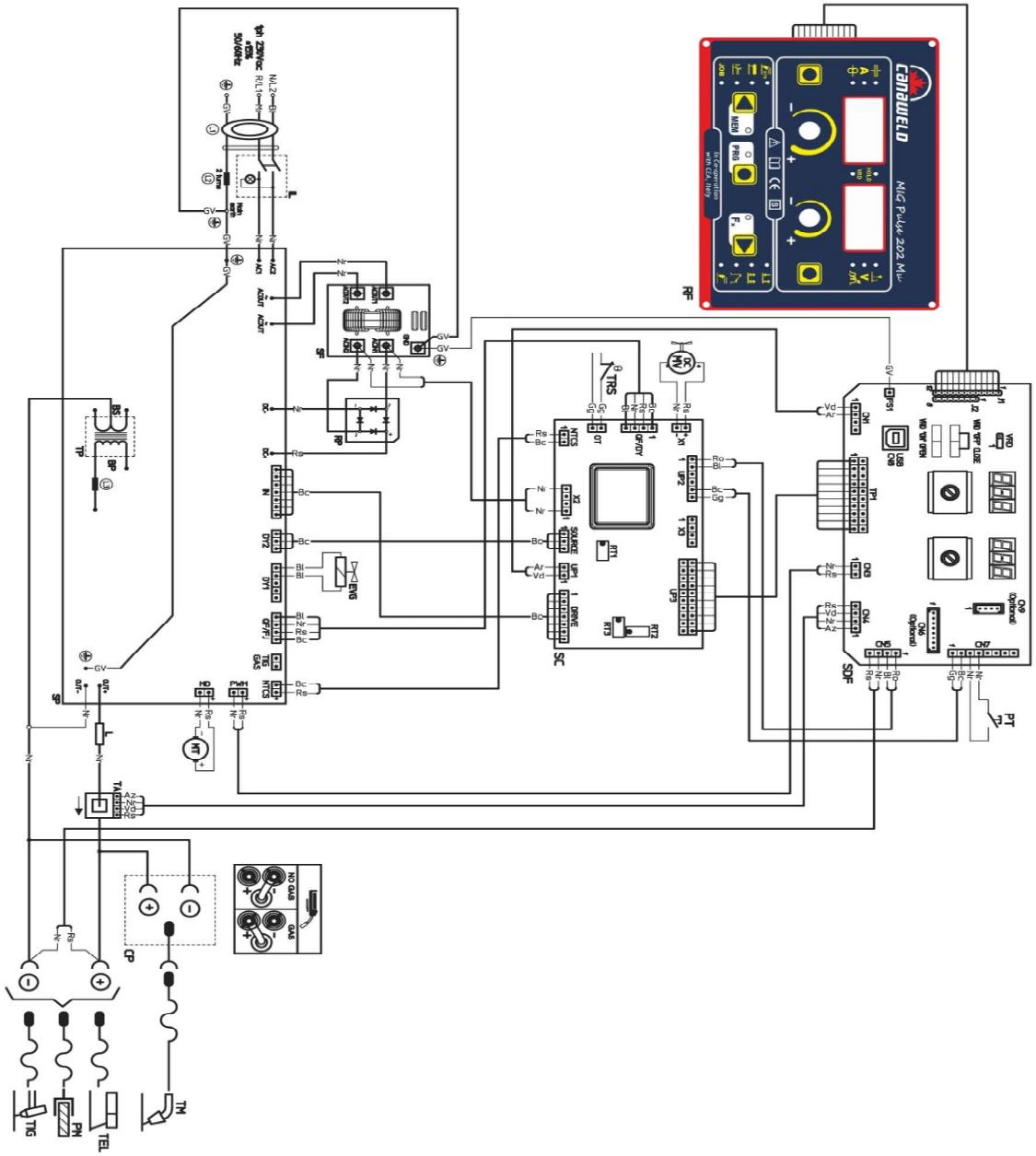
Defect	Solution
The welding machine does not switch on, TSP control panel switched off.	• Check that the welding machine is installed correctly and that the mains supply has sufficient power to supply the welding machine. • Check the switch, cable and plug on the power supply line and replace them if necessary. • Check, and if necessary replace, the digital interface PCB or the control PCB.
Line fuses fused "instantaneously".	• Check that the welding machine is installed correctly. • Check and if necessary replace the motor, transformer, or rectifier.
Line fuses fused after a work period.	• Check that you have fitted line fuses of adequate absorption capacity.
Welding machine on, TSP control panel on, fan stopped.	• Check the wiring that powers the fans. • Check that there are no mechanical impediments blocking the fans. • Check and if necessary replace the digital interface PCB.
Welding machine on, display does not show correct values.	• See the error codes and signals shown in the manual for the TSP control panel. • Check the wiring that powers the various boards. • Check, and if necessary replace, the digital interface PCB or the control PCB.
No gas coming out of the torch.	• Check and if necessary replace the solenoid valve or gas hose. • Check the wiring that powers the gas solenoid valve. • Check, and if necessary replace, the digital interface PCB or the control PCB.
The wire feed motor does not work during MIG-MAG welding.	• Check the wiring that powers the wire feed motor. • Check that there are no mechanical impediments blocking the motor. • Check that the motor is working correctly and if necessary replace it. • Check and if necessary replace the digital interface PCB.
Welding current insufficient or not constant.	• Check the power supply line. • Check and if necessary replace the wires (section or length inadequate). • Check the line voltage using a voltmeter.
Arc ignition difficult, the arc switches off immediately after ignition during MIGMAG welding.	• Use the TSP control panel manual to make sure you have set the various welding parameters correctly. • Check compatibility of the torch and the wire used.
	• Check that the torch and all its components are working correctly and replace them if necessary (e.g. worn components). • Check and if necessary replace the digital interface PCB.
The wire sticks to the workpiece to be welded.	• Check that there are no mechanical impediments blocking correct unwinding of the wire. • Check that the motor is working correctly and if necessary replace it. • Check and if necessary replace the digital interface PCB.

❑Meaning of graphic symbols on machine



❑Wiring diagram

▪**BP** Primary transformer coil ▪**BS** Secondary transformer coil ▪**CP** Polarity change terminal board ▪**EVG** Gas solenoid valve ▪**IL** Mains switch ▪**L** Secondary inductance ▪**L1-2-3** Toroidal ferrite ▪**MT** Drive motor ▪**MV** Fan motor ▪**PM** Earth terminal ▪**PT** Torch button ▪**RF** Rack panel ▪**RP** Primary rectifier ▪**SC** Control PCB ▪**SDF** Digital interface PCB ▪**SF** EMC filter PCB ▪**TA** Hall effect transformer ▪**TEL** STICK WELDING torch ▪**TIG** TIG torch ▪**TM** MIG-MAG torch ▪**TP** Main transformer ▪**TRS** Secondary diodes thermostat

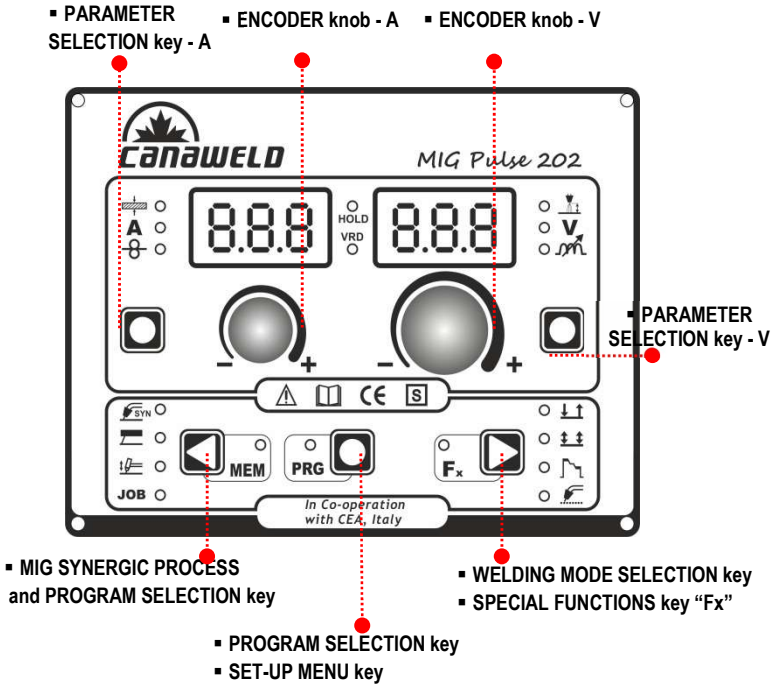


❑Introduction to the TSP20

This part of the manual describes the functions and the manner of utilization of the **TSP 20** control panel mounted on the **MIG PULSE 202** welder.

❑Control panel

KEY AND KNOB COMMANDS



▪ **PARAMETER SELECTION key - A**

This is used to select the following welding parameters (if activat-ed) and each time the key is pushed the welding machine moves on to select the next parameter in the following order:

- THICKNESS OF WELDED ITEM( ).
- WELDING CURRENT( ).
- WIRE SPEED( ).

▪ **ENCODER knob - A**

This is used to set and edit the PARAMETERS - A based on the corresponding LED switched on and the value highlighted on the DISPLAY PARAMETERS - A display, required for correct functioning of the machine.

▪ **PARAMETER SELECTION key - V**

This is used to select the following welding parameters:

- ARC LENGTH ADJUSTMENT( ).
- WELDING VOLTAGE( ).
- ELECTRONIC INDUCTANCE( ).

▪ **ENCODER knob – V**

This is used to set and edit the PARAMETERS - V based on the corresponding LED switched on and the value highlighted on the DISPLAY PARAMETERS - V display, required for correct functioning of the machine.

▪ **PROGRAM SELECTION key**

It can be used to select the individual welding PROGRAM for MIG-MAG and STICK welding processes.

▪ **SET-UP MENU key (T>3 s)**

This provides access to the SET-UP menu, which in turn provides access to a series of functions, suitable for an expert operator.

▪ **WELDING PROCESS SELECTION key**

It can also be used to select the following welding processes:
- MIG-MAG / PULSED MIG / DOUBLE PULSED MIG.
- STICK WELDING
- TIG
- JOB

▪ **SAVE "MEM" key (T ≥ 2 s)**

It allows the saving of the parameters in the JOB.
It also allows one to view / change the parameters previously saved in the JOB.
WARNING: No LED switches on when this key is activated!

▪ **WELDING MODE SELECTION key**

This is used to select the following welding modes (only for MIG welding processes) and each time the key is pushed the welding machine moves on to select the next welding mode in the following order:

TWO STROKE (2T)

2T LED ( ) switched on
Pressing the TORCH TRIGGER starts the welding cycle, which will stop when it is released.

FOUR STROKE (4T)

4T LED ( ) switched on

1) Pressing and releasing the TORCH TRIGGER will start the welding cycle.
2) Pressing and releasing the TORCH TRIGGER will start the welding cycle.

CRATER 2T

2T LED ( ) switched on - CRATER LED ( ) switched on

1) When the TORCH TRIGGER is pushed the arc ignites and the parameters assume the values for the "initial crater" for a time set by means of the CRATER START TIME (F10) function. After that the parameter values become those for "welding" for a time defined by the CRATER START SLOPE (F11) function.
2) When the TORCH TRIGGER is released the parameters take on the "final crater" values for a time set by means of the CRATER END TIME (F15) function, for a period of time set using the CRATER END SLOPE (F12) function.

CRATER 4T

4T LED ( ) switched on - CRATER LED ( ) switched on

1) When the TORCH TRIGGER is pushed the arc ignites and the parameters assume the values for the "initial crater".
2) When the TORCH TRIGGER is released the parameters take on the "welding" values for a time set using the CRATER START SLOPE (F11) function.
3) When the TORCH TRIGGER is pushed again the parameters take on the "final crater" values for a time defined using the CRATER END SLOPE (F12) function.

4) Releasing the TORCH TRIGGER will end the welding cycle.

SPOT WELDING 2T

2T LED ( ) switched on - SPOT LED ( ) switched on

This is used so that on pressing the TORCH TRIGGER spot welding is done for a time period set beforehand (in seconds), after which the arc switches off automatically. (SPOT WELD TIME F07 function).

STITCH WELDING 2T

2T LED ( ) switched on - SPOT LED ( ) flashing to begin stitch welding:

1) Press the TORCH TRIGGER to start the welding current and wire feed.
   At this point the welder will perform automatically a succession of a welded tracts followed by a pause, respecting the times set in the functions STITCH WELD TIME (F05) and STITCH WELD PAUSE (F06). This procedure stops automatically only when the TORCH TRIGGER is released.
2) When the TORCH TRIGGER is pushed again the torch begins a new interval welding cycle.

▪ SPECIAL FUNCTIONS key "Fx" (T ≥ 3 s)

This key is used to display and edit some parameters (ADJUSTABLE FUNCTIONS "Fx") that are necessary and fundamental for welding and that have already been set by the manufacturer in the factory.

The parameters vary depending on the welding process and mode used, and are saved in the memory for each automatic welding point (JOB).

WARNING: No LED switches on when this key is activated!

DISPLAY AND LED INDICATIONS

▪ PARAMETER SELECTION LED - A

When one of these LEDs is on it means that the corresponding welding parameter has been selected.

▪ PROGRAM SELECTION LED

This LED will be lit only when the operator selects a welding process (in which there welding programs present) and the relative associated program.

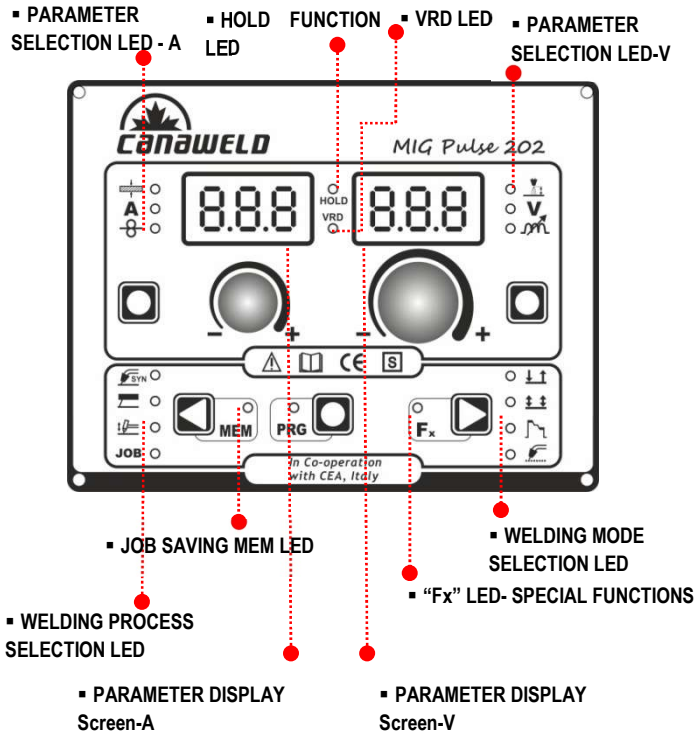
▪ PARAMETER DISPLAY screen - A

This Display shows the values / numbers (set or measured) of the following parameters (if active):

- THICKNESS OF WELDED ITEM ( ).
- WELDING CURRENT (A).
- WIRE SPEED ( ).
- WELDING PROGRAM (PRG)

▪ HOLD FUNCTION LED

Flashing, it indicates that the values of the parameters views on the PARAMETER DISPLAY - A and V are respectively the values that are set or measured at the conclusion of the last welding. The LED flashes for 15 seconds consecutively before turning itself off or until the moment that the operator varies any parameter by means of the use of the handles.



▪ WELDING PROCESS SELECTION LED

When one of these LEDs is on it means that the corresponding welding process has been selected.

▪ PARAMETER SELECTION LED - V

When one of these LEDs is on it means that the corresponding welding parameter has been selected.

▪ PARAMETER DISPLAY screen - V

This Display shows the values / numbers (set or measured) of the following parameters (if active):

- ARC LENGTH ADJUSTMENT ( ).
- WELDING VOLTAGE (V).
- ELECTRONIC INDUCTANCE ( ).

▪ JOB SAVING MEM LED

Flashes while saving a JOB.

▪ Fx LED- SPECIAL FUNCTIONS

Switched on when special FX parameters are displayed.

▪ VRD LED

The Voltage Reduction Device (VRD) is a safety device that reduces voltage. It prevents voltages forming on the output terminals that may pose a danger to people. Two-tone LED (off-red-green) indicates enabling of the VRD. In the welding process:

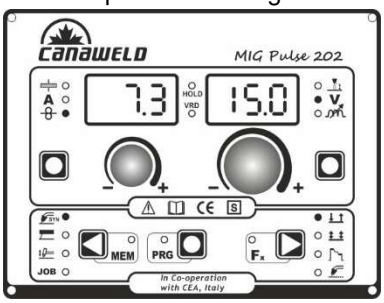
- MIG MAG (Synergic and Manual) / JOB: the VRD device is not managed and therefore the LED always will be off.
- STICK WELDING: the operator can decide whether or not to activate the VRD device (to activate the VRD device see the corresponding paragraph) based on its necessities and therefore the LED will be lit and will indicate the activation of the device.
- TIG Lift: the VRD device is always inserted, independently from the state of the JUMPER and therefore the LED always will be lit.

▪ **WELDING MODE SELECTION LED**

When one or a combination of these LED is lit, it means that the corresponding manner of welding has been selected.

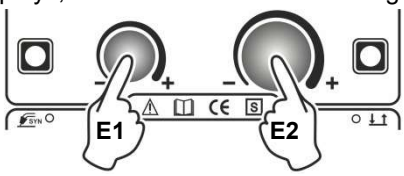
❑Switching on the welding machine and initial screen

At the switching on of the welder (press the switch, located on the back panel, at the position I), the control performs a short operation of MACHINE CHECK (all of the LED light themselves simultaneously so as to verify their actual operation), and the panel display the INITIAL SCREEN (see the demonstrative figure), after which the operator can begin to work.

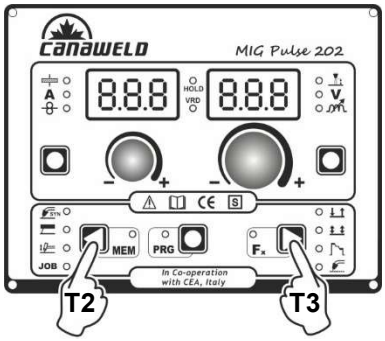


❑Viewing the software version installed

1) When the welding machine is working hold down the WELDING PROCESS SELECTION key (T2) and WELDING MODE SELECTION key (T3) together for about 2 consecutive seconds.
2) On both displays appears a running string that indicates the VERSION OF THE SOFTWARE installed on the welder. The rotation of one of the two ENCODER knobs – A (E1) or V (E2) by the operator during the display of the string version software provokes the block (for **1** seconds), on both the displays, of the movement of the string itself.



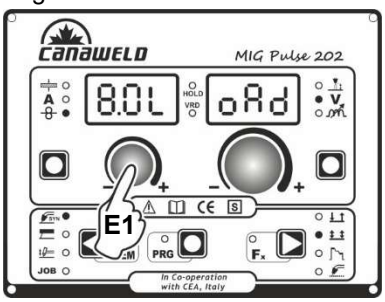
3) Ending viewing of the software version on the control panel can come about in 2 different ways:
   - Automatically: by waiting for the display time to elapse.
   - Manually: By pushing any key.



❑Loading of the wire

In the MIG-MAG-PULSE-DOUBLE PULSE welding processes, with the welder in operation, it is possible to load the wire inside the torch, following this simple procedure:

- Keep the torch button held down.
- After a time of about 2 seconds, the wire begins to load itself at a constant speed.
- The operation is indicated also by a message, made up of a numerical value for the wire speed, followed by “LoAd” (see figure).
- Rotate the ENCODER – A (E1) knob to change the wire loading speed.
- To finish the loading of the wire release the torch button.



❑Specials functions “Fx”

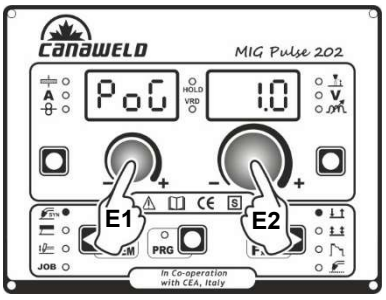
To access the SPECIAL FUNCTIONS “Fx” menu, hold the SPECIAL FUNCTIONS “Fx” key down for at least 3 consecutive seconds. The Fx LED switches on.

The special functions allow the operator to regulate further parameters, operations and do partial resetting, and are operative, in a different way, within each welding process. Table 1 shows the special functions available. Details of the meaning of the columns are as follows:

- **FUNCTION** column: name of the special function.
- **DISPLAY** column: symbol for the special function (message shown in the PARAMETERS DISPLAY - A screen).
- **FACTORY** column: Factory setting for the special function (message shown in the PARAMETERS DISPLAY - V screen).
- **RANGE** column: regulation field for the special function.
- The last two groups of columns, **WELDING PROCESS** and **MIG-MAG WELDING MODE** indicate the welding process and mode in which the special function can be selected. Example: the SPOT WELD TIME function can be selected only when one is welding in synergistic MIG-MAG-PULSE or manual SPOT 2T mode.

1) Rotate the ENCODER - A knob (E1) to select the SPECIAL FUNCTION required. Rotate the ENCODER - V knob (E2) to edit the VALUE for the special function selected.

WARNING: Changes to values are immediately activated (no further confirmation is required and they will be displayed immediately) or, at least they will become active the next time welding is done. The operator can edit the functions (not the wire speed and other parameters) when welding is underway and continue welding without having to exit the SPECIAL FUNCTIONS “Fx” menu.

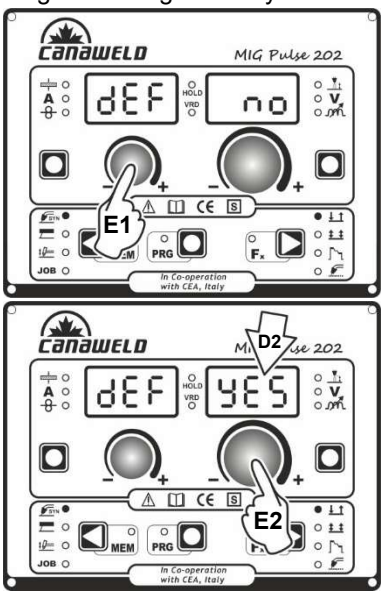


2) PROGRAM DEFAULT (def)

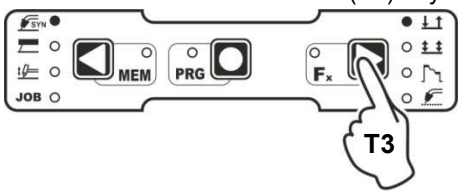
WARNING: If carried out, this operation resets the program in use to the factory default settings.

To carry out the reset of the settings / parameters, proceed in the following manner:

- Rotate the ENCODER - A (E1) knob until both the displays read **dEF no** (see figure).
- Rotate the ENCODER - V knob (E2) until the PARAMETERS DISPLAY - V screen (D2) reads **YES**.
- Hold the SAVE “MEM” key down for at least 2 consecutive seconds.
- The program in use has now been completed successfully. To confirmation the above, the control panel of the welder performs a short operation of MACHINE CHECK (all of the LED stay lit simultaneously so as to verify their actual operation), the generator itself starts, having memorized the new settings and is again ready to weld.



3) To exit the SPECIAL FUNCTIONS “Fx” menu, push and release the SPECIAL FUNCTIONS “Fx” (T3) key once.



WARNING: The functions that can be selected depend on the welding process activated. For this reason, details of each function are given on the next pages, along with a description of the welding processes.

❑SETUP Menu

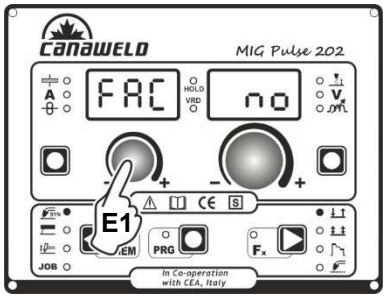
Hold the PRG key down for at least 3 seconds to open the SETUP menu, which provides access to various functions, which are suitable for expert operators. For further information, see Table 7.

FACTORY DEFAULT (FAC)

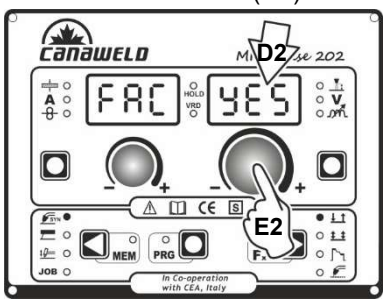
WARNING: If carried out, this operation results in complete resetting of all editable parameters to the factory settings (including cancellation of the JOBS).

To carry out the reset of the settings / parameters, proceed in the following manner:

1) Rotate the ENCODER - A (E1) knob until both the displays read **FAC no** (see figure).



2) Rotate the ENCODER - V knob (E2) until the PARAMETERS DISPLAY - V screen (D2) reads **YES**.



3) Hold the SAVE “MEM” key down for at least **2** consecutive seconds.
4) At this stage the total reset or factory default procedure has been completed successfully (the parameters have been taken back to the factory values and any JOBS saved have been deleted). To confirmation the above, the control panel of the welder performs a short operation of MACHINE CHECK (all of the LED stay lit simultaneously so as to verify their actual operation), the generator itself starts, having memorized the new settings and is again ready to weld.

❑Menu SPECIAL FUNCTIONS

From the **SEtUP** menu, push the **PRG** key (T5) for more than 3 seconds to access the SPECIAL FUNCTIONS menu, which provides access to additional functions that can only be managed by an expert, responsible operator. The two displays (D1-D2) will read **SPC FnC**.

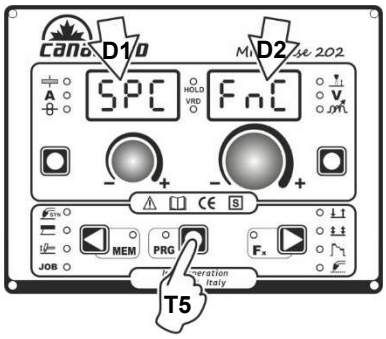


Table 7

FUNCTION	DISPLAY	SETTINGS RANGE		WELDING PROCESS					MIG-MAG WELDING MODE					
				MIG MAG / PULSE										
		FACTORY	RANGE	MiG PLS	dPL	MAn	TIG	MMA	2T	4T	Cra 2T	Cra 4T	Spot 2T	Spot 4T
	ADJUSTABLE FUNCTIONS "Fx"													
MIG-MAG process														
PRE GAS	PrG	0.1s	(0.0 to 2.0)s	●	●	●			●	●	●	●	●	●
STARTING SPEED	Sts	0	-30 to +30	●	●	●			●	●	●	●	●	●
HOT START	Hot	0	-30 to +30	●	●	●			●	●	●	●	●	●
CRATER														
INITIAL CRATER														
CRATER START CURRENT	F08	20%	(-50 to +100)%	●	●						●	●		
CRATER START SPEED	F08	5.0m/min	(1.5 to 22.0)m/min			●					●	●		
CRATER START VOLTAGE	F09	15.0V	(10.0 to 26.0)V			●					●	●		
CRATER START TIME	F10	1.0s	(0.0 to 20.0)s	●	●	●					●			
CRATER START SLOPE	F11	1.0s	(0.0 to 20.0)s	●	●	●					●	●		
FINAL CRATER														
CRATER END SLOPE	F12	1.0s	(0.0 to 20.0)s	●	●	●					●	●		
CRATER END CURRENT	F13	-30	(-99 to +50)%	●	●						●	●		
CRATER END SPEED	F13	5.0m/min	(0.6 to 22.0)m/min			●					●	●		
CRATER END VOLTAGE	F14	15.0V	(10.0 to 26.0)V			●					●	●		
CRATER END TIME	F15	0.0s	(0.0 to 20.0)s	●	●	●					●			
SPOT WELD TIME	F07	3.0s	(0.1 to 20.0)s	●	●	●							●	
STITCH WELD														
STITCH WELD TIME	F05	1.0s	(0.1 to 20.0)s	●	●	●								●
STITCH WELD PAUSE	F06	1.0s	(0.1 to 20.0)s	●	●	●								●
BURN BACK	bUb	0	-30 to +30	●	●	●			●	●	●	●	●	●
POST GAS	PoG	1.0s	(0.0 to 10.0)s	●	●	●			●	●	●	●	●	●
DUAL PULSE FUNCTIONS														
DUAL PULSE DELTA CURRENT	F23	40%	(-50 to +50)%		●				●	●	●	●	●	●
DUAL PULSE BALANCE	F25	0%	(-20 to +20)%		●				●	●	●	●	●	●
DUAL PULSE FREQUENCY	F26	1.5Hz	(0.1 to 2.5)Hz		●				●	●	●	●	●	●
TIG process														
UP SLOPE	F29	0.0s	(0.0 to 20.0)s				●							
DOWN SLOPE	F30	2.0s	(0.0 to 20.0)s				●							
SWS VOLTAGE LIMIT	F31	0	-30 to 30				●							
MMA process														
HOT START	Hot	50	0 to 100					●						
ARC FORCE	ArC	50	0 to 100					●						
PROGRAM DEFAULT	dEF	no	no - YES	●	●	●	●	●	●	●	●	●	●	●
	SETUP (SEtUP) menu													
FACTORY DEFAULT	FAC	no	no - YES	●	●	●	●	●	●	●	●	●	●	●
	SPECIAL FUNCTIONS (SPC FnC) menu													
SAFETY CALIBRATION CODE	SCC	7	0 to 100	●	●	●			●	●	●	●	●	●
MOTOR CALIBRATION	Mot CAL													
SPEED MOTOR 1	SM1	75.0	50.0 to 99.9	●	●	●			●	●	●	●	●	●
SPEED MOTOR 2	SM2	75.0	50.0 to 99.9	●	●	●			●	●	●	●	●	●
SPEED MOTOR 3	SM3	75.0	50.0 to 99.9	●	●	●			●	●	●	●	●	●

SAFETY CALIBRATION CODE (SCC)

ATTENTION: This operation, if carried on, optimizes the efficiency of the welding circuit (only in MIG welding processes). To set the length of the welding circuit (adjustable from 1 to 100 m) follow this procedure:

- Rotate the ENCODER knob - A (E1) until obtaining on the PARAMETER DISPLAY screen - A (D1) and the writing SCC.
- Rotate the ENCODER knob - V (E2) until obtaining on the PARAMETER DISPLAY screen - V (D2) the desired number.

CAUTION: The operation does not require confirmation!

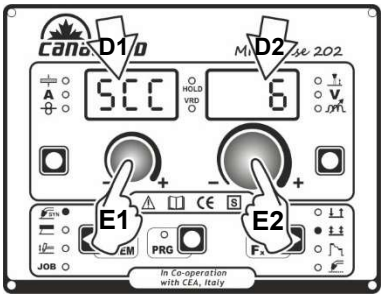
CAUTION: The data inserted is valid for all the MIG welding processes.

Example:

Length of cable mass 3 m.

Length of welding torch cable 3 m.

The overall length of the welding circuit is 6 m (6 is the number that will therefore be inserted).

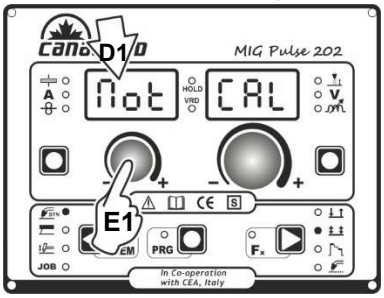


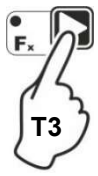
MOTOR CALIBRATION (Mot CAL)

ATTENTION: This procedure allows you to calibrate the wire speed (only in MIG welding processes).

Proceed as follows:

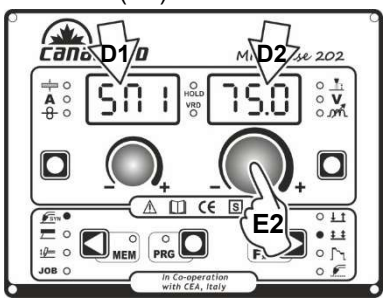
- Rotate the ENCODER - A (E1) knob until the PARAMETER DISPLAY - A (D1) screen reads **Mot CAL**.
- To open the CALIBRATION menu, push the PRG key (T3).



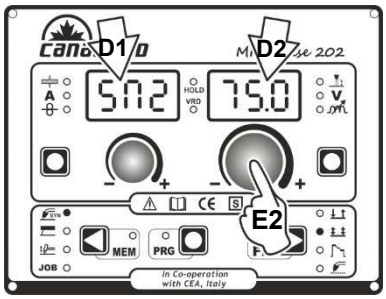


- The procedure of calibration is carried out in 3 different phases:

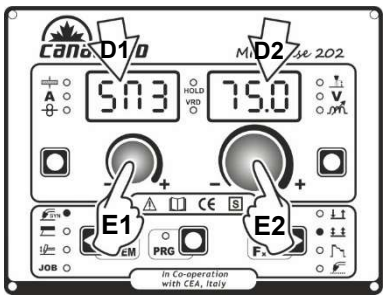
1. **Calibration parameter SM1 (MINIMUM SPEED)**
   Push and release the torch button, and then wait for the wire to stop automatically, and the **End MiS** message to appear. Measure (in cm) the dangling wire and insert the value shown, in the software of the welder, by means of the rotation of the ENCODER knob - V (E2) appearing on the PARAMETER DISPLAY screen - V (D2) is the desired value.



2. **Calibration parameter SM2 (MEDIUM SPEED)**
   Then turn the ENCODER - A knob (E1) until the PARAMETER DISPLAY - A screen (D1) shows the SM2 parameter. Push and release the torch button, and then wait for the wire to stop automatically, and the **End MiS** message to appear. Measure (in cm) the dangling wire and insert the value shown, in the software of the welder, by means of the rotation of the ENCODER knob - V (E2) appearing on the PARAMETER DISPLAY screen - V (D2) is the desired value.

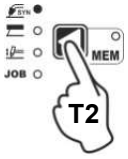


3. **Calibration parameter SM3 (MAXIMUM SPEED)**
   Then turn the ENCODER - A knob (E1) until the PARAMETER DISPLAY - A screen (D1) shows the SM3 parameter. Push and release the torch button, and then wait for the wire to stop automatically, and the End MiS message to appear. Measure (in cm) the dangling wire and insert the value shown, in the software of the welder, by means of the rotation of the ENCODER knob - V (E2) appearing on the PARAMETER DISPLAY screen - V (D2) is the desired value.



- At the end of the procedure, the software present in the welder will immediately re-calculate the characteristic curve of the engine, rendering it suitable to use.

- To exit from the CALIBRATION menu, press and release the SAVE “MEM” key (T2).



- To interrupt measuring, push the SAVE “MEM” (T2) Key.

❑MIG-MAG synergic / MIG pulse / double pulsed MIG

Start the welder by pressing the switch, located on the back panel, at the position **I**.

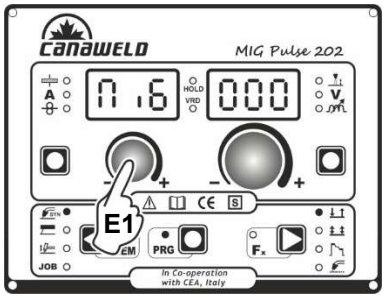
1. WELDING PROCESS SELECTION

Select the MIG welding PROCESS this way:

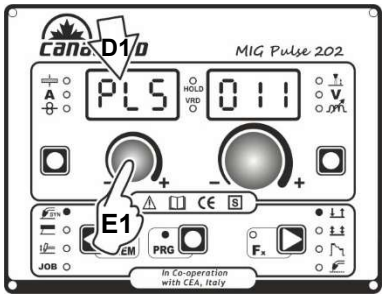
1) Push the SELECT WELDING PROCESS (T2) key, even a number of times if necessary, until the corresponding LED switches on.

2) Push the SELECT PROGRAM (T5) key. The corresponding LED switches on.

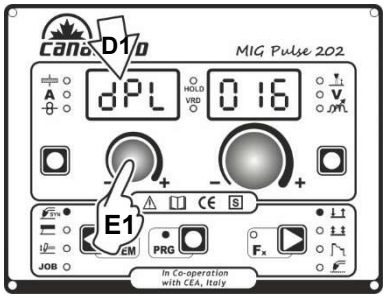
3A) To access the MIG-MAG synergic welding process: rotate the ENCODER knob - A (E1) until obtaining on the PARAMETER DISPLAY screen - A (D1) and the writing **MiG**.



3B) To access the MIG pulse welding process: rotate the ENCODER knob - A (E1) until obtaining on the PARAMETER DISPLAY screen - A (D1) and the writing **PLS**.



3C) To access the double pulsed MIG welding process: rotate the ENCODER knob - A (E1) until obtaining on the PARAMETER DISPLAY screen - A (D1) and the writing **dPL**.



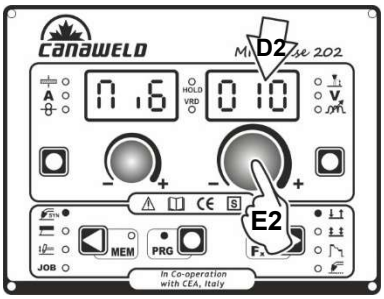
2. SELECTION OF WELDING PROGRAMME

PROGRAM TABLE						
MIG-MAG-PULSE PROCESS						
PROGRAM NUMBER	MATERIAL		WIRE Ø (mm)	GAS	DISPLAYS	
	TYPE	CLASS			MiG	PLS dPL
000	Fe	G3 Si-1	0.6	CO_2	●	
001	Fe	G3 Si-1	0.8	CO_2	●	
002	Fe	G3 Si-1	1.0	CO_2	●	
010	Fe	G3 Si-1	0.6	Ar/16-20%CO_2	●	
011	Fe	G3 Si-1	0.8	Ar/16-20%CO_2	●	●
012	Fe	G3 Si-1	1.0	Ar/16-20%CO_2	●	●
015	Fe	G3 Si-1	0,9	Ar/16-20%CO_2	●	●
051	Fe	G3 Si-1	0.8	Ar/21-25%CO_2	●	
055	Fe	G3 Si-1	0.9	Ar/21-25%CO_2	●	
195	Fe-rutil flux-cored	E71T-GS	0.9	-	●	
231	CrNi 308	G 19 9 LSI	0.8	Ar/2-3%CO_2	●	●
232	CrNi 308	G 19 9 LSI	1.0	Ar/2-3%CO_2	●	●
402	Al 99.9	S Al 1050	1.0	Ar	●	●
403	Al 99.9	S Al 1050	1.2	Ar	●	●
412	Al Mg 5	S Al 5356	1.0	Ar	●	●
413	Al Mg 5	S Al 5356	1.2	Ar	●	●
422	Al Si 5	S Al 4043A	1.0	Ar	●	●
423	Al Si 5	S Al 4043A	1.2	Ar	●	●
472	Al Si12	S Al 4047A	1.0	Ar	●	●
511	Cu Si 3	S CuSi3	0.8	Ar	●	●
512	Cu Si 3	S CuSi3	1.0	Ar	●	●
515	Cu Si 3	S CuSi3	0.9	Ar	●	●
911	Fe	BD140	0.8	Ar/16-20%CO_2	●	●
951	Fe	BD140	0.8	Ar/21-25%CO_2	●	
PLS / dPL= Pulse version only						

WARNING: This table is merely an example; the welding programs can be updated and extended. See the table on the welding machine for the correct list of the programs available.

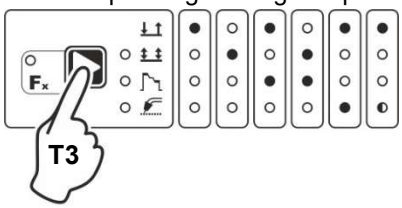
Select the welding PROGRAMME rotating ENCODER knob - V

(E2) until obtaining on the PARAMETER DISPLAY screen - V (D2) the desired number.



3. WELDING MODE SELECTION

Select the MODE of welding, pressing and releasing, even various times if necessary, the WELDING MODE SELECTION key (T3) until the corresponding LED lights up.



1. TWO STROKE (2T)
2. FOUR STROKE (4T)
3. CRATER 2T
4. CRATER 4T
5. SPOT WELDING 2T
6. STITCH WELDING 2T

4. SPECIAL FUNCTIONS "Fx" SELECTION

The SPECIAL FUNCTIONS "Fx" that are only available in the synergic MIG-MAG and pulsed / double pulsed MIG welding process are shown below. For all the other explanations regarding this menu make reference to the relative paragraph.

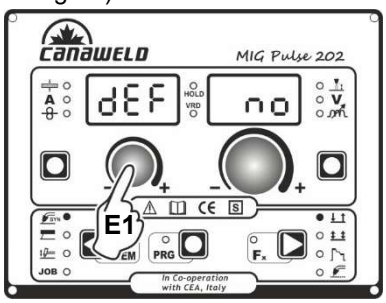
- **PRE GAS (PrG)** - Provides an additional quantity of gas for a defined time, before welding starts.
- **STARTING SPEED (StS)** - Regulates the speed at which the wire approaches the workpiece. The value indicated is a percentage variation in relation to the factory setting value.
- **HOT START (Hot)** - Regulates the current intensity for igniting the welding arc. The value indicated is a percentage variation in relation to the factory setting value.
- **CRATER START CURRENT (F08)** - Sets the initial starting current of the crater.
- **CRATER START TIME (F10)** - This function defines the time in which the current remains at the value of CRATER START CURRENT.
- **CRATER START SLOPE (F11)** - The time lapse for passing from the CRATER START CURRENT level to the welding current level.
- **CRATER END SLOPE (F12)** - Time required to go from the welding current level to the "CRATER END CURRENT" level.
- **CRATER END CURRENT (F13)** - Sets the final welding current of the crater.
- **CRATER END TIME (F15)** - This function defines the time in which the current remains at the value of CRATER END CURRENT.
- **SPOT WELD TIME (F07)** - The time during which spot welding takes place after the arc is ignited, after which the arc is extinguished automatically.
- **STITCH WELD TIME (F05)** - Time in which the welding in tracts is performed after the ignition of the arc, after which the arc switches off automatically.
- **STITCH WELD PAUSE (F06)** - Time of pause between one welding in tracts and another.
- **BURN BACK (bUb)** - Regulates the length of the wire after welding. The value indicated is a percentage variation in relation to the factory setting value. Higher numbers correspond to more burning of the wire.
- **POST GAS (PoG)** - Provides an additional quantity of gas for a defined time, after welding ends.
- **DUAL PULSE DELTA CURRENT (F23)** - This function determines the positive or negative percentage variation in the peak current, compared to the welding current set.
- **DUAL PULSE BALANCE (F25)** - This function determines the positive or negative percentage variation in the duration of the peak current, compared to that of the welding current.
- **DUAL PULSE FREQUENCY (F26)** - This function determines the variation in frequency (Hz) for double pulsed mode.

▪ **PROGRAM DEFAULT (dEF)**

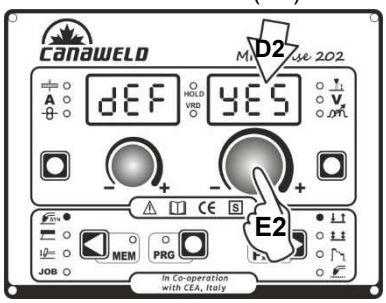
WARNING: If carried out, this operation resets the program in use to the factory default settings.

To carry out the reset of the settings / parameters, proceed in the following manner:

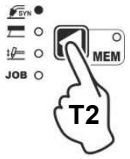
- Rotate the ENCODER - A (E1) knob until both the displays read **dEF no** (see figure).



- Rotate the ENCODER - V knob (E2) until the PARAMETERS DISPLAY - V screen (D2) reads **YES**.



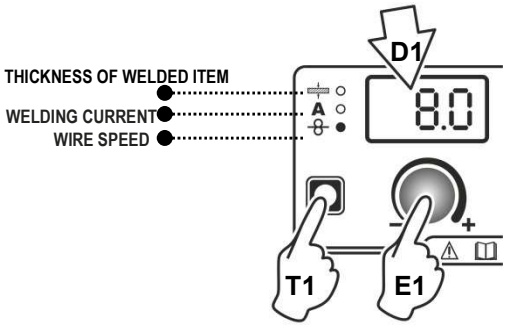
- Hold the SAVE "MEM" key (T2) down for at least **2** consecutive seconds.



- The program in use has now been completed successfully. To confirmation the above, the control panel of the welder performs a short operation of MACHINE CHECK (all of the LED stay lit simultaneously so as to verify their actual operation), the generator itself starts, having memorized the new settings and is again ready to weld.

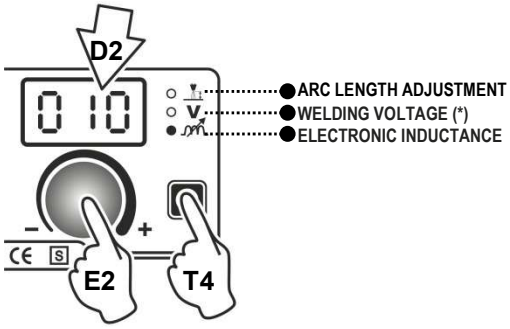
5. PRE-SETTING

Before welding it is possible to set the following parameters:



Example: WIRE SPEED

Press the PARAMETER SELECTION - A key (T1) until the LED that corresponds to the WIRE SPEED switches on. Turn the ENCODER - A knob (E1) to change the value shown on the PARAMETER DISPLAY - A screen (D1).



(*) The parameter is pre-set by means of synergy and can be changed by varying the ARC LENGTH ADJUSTMENT parameter.

Example: ELECTRONIC INDUCTANCE

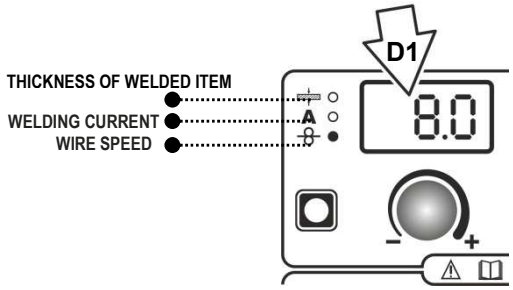
Press the PARAMETER SELECTION - V key (T4) until the LED that corresponds to the ELECTRONIC INDUCTANCE switches on. Turn the ENCODER - V knob (E2) to change the value shown on the PARAMETER DISPLAY - V screen (D2).

6. WELDING

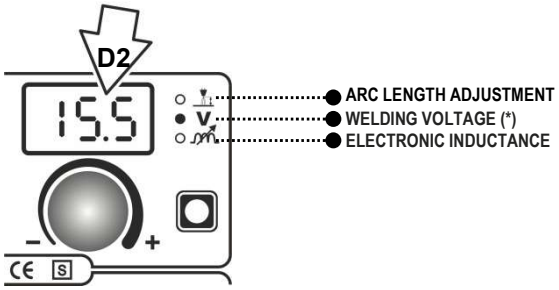
During the welding the display shows:

- PARAMETER DISPLAY screen - A (D1)

- THICKNESS OF WELDED ITEM: the value previously set.
- WELDING CURRENT: the measured value of the current of what is being welded.
- WIRE SPEED: the value previously set.



- PARAMETER DISPLAY screen - V (D2)



- ARC LENGTH ADJUSTMENT: the value previously set.
- WELDING VOLTAGE: the measured value of the voltage of what is being welded.
- ELECTRONIC INDUCTANCE: the value previously set.

During the welding the operator can change the following parameters:

- THICKNESS OF WELDED ITEM
- WELDING CURRENT
- WIRE SPEED
- ARC LENGTH ADJUSTMENT
- ELECTRONIC INDUCTANCE
- SPECIAL FUNCTIONS “Fx”.

WARNING: Remember that this process of welding is synergic and for this reason the alteration of an individual parameter synergically also influences other parameters according to the predefined settings that are not modifiable!

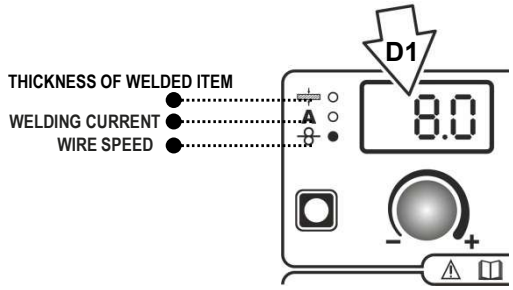
7. HOLD

This function automatically starts itself at the conclusion of every welding operation and it is indicated to the operator by means of a flashing light of the HOLD FUNCTION LED for a specific amount of time.

Once the welding has been terminated, for about **15** seconds, both the DISPLAYS should show the same values of the parameters during the welding.

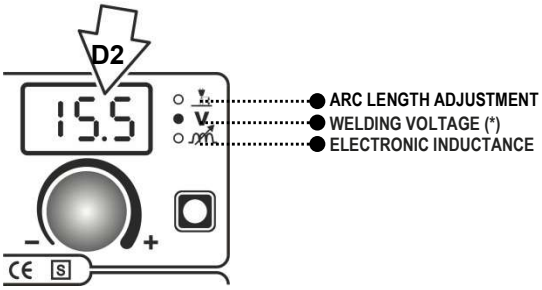
In this phase the displays show:

- PARAMETER DISPLAY screen - A (D1)



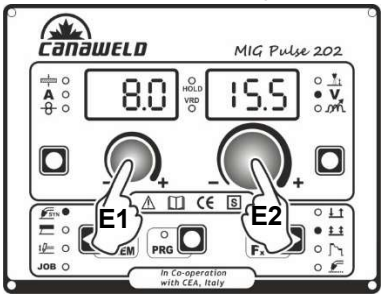
- THICKNESS OF WELDED ITEM: the value previously set.
- WELDING CURRENT: the last current value measured.
- WIRE SPEED: the value previously set.

- PARAMETER DISPLAY screen - V (D2)



- ARC LENGTH ADJUSTMENT: the value previously set.
- WELDING VOLTAGE: the last voltage value measured.
- ELECTRONIC INDUCTANCE: the value previously set.

To interrupt the HOLD function and go back to the PRESETTING phase before 15 seconds have passed, simply turn one of the two ENCODER knobs (E1-E2).
The HOLD function can be terminated ahead of time even while once again starting the welding.
Once **15** seconds have passed (HOLD FUNCTION) the control panel goes back to the PRESETTING phase.

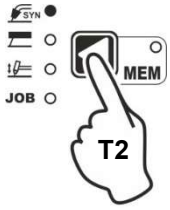


❑MIG-MAG manual

Start the welder by pressing the switch, located on the back panel, at the position **I**.

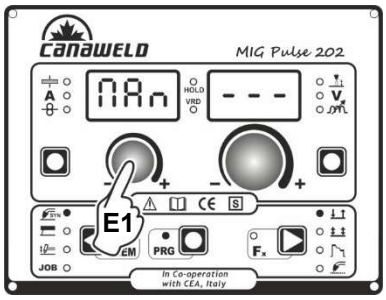
1) WELDING PROCESS SELECTION

Select the MIG-MAG manual PROCESS of welding, pressing and releasing, even various times if necessary, the WELDING PROCESS SELECTION key (T2) until the corresponding LED lights up.



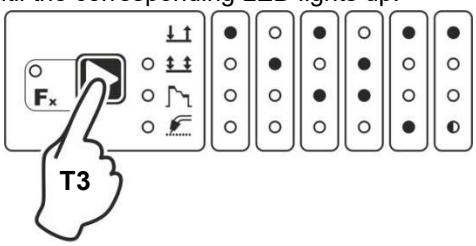
Push the SELECT PROGRAM (T5) key. The corresponding LED switches on.

To access the MIG-MAG synergic welding process: rotate the ENCODER knob - A (E1) until obtaining on the PARAMETER DISPLAY screen - A (D1) and the writing **MAn**.



2) WELDING MODE SELECTION

Select the MODE of welding, pressing and releasing, even various times if necessary, the WELDING MODE SELECTION key (T3) until the corresponding LED lights up.



1) TWO STROKE (2T)
2) FOUR STROKE (4T)
3) CRATER 2T
4) CRATER 4T
5) SPOT WELDING 2T
6) STITCH WELDING 2T

3) SPECIAL FUNCTIONS "Fx" SELECTION

The SPECIAL FUNCTIONS "Fx" that are only available in the MIGMAG manual welding process are shown below. For all the other explanations regarding this menu make reference to the relative paragraph.

- **PRE GAS (PrG)** - Provides an additional quantity of gas for a defined time, before welding starts.
- **STARTING SPEED (StS)** - Regulates the speed at which the wire approaches the workpiece. The value indicated is a percentage variation in relation to the factory setting value.
- **HOT START (HoT)** - Regulates the current intensity for igniting the welding arc. The value indicated is a percentage variation in relation to the factory setting value.
- **CRATER START SPEED (F08)** - Sets the initial speed of the welding wire for the crater.
- **CRATER START VOLTAGE (F09)** - Sets the initial welding voltage for the crater.
- **CRATER START TIME (F10)** - This function defines the time in which the current remains at the value of CRATER START SPEED or CRATER START VOLTAGE.
- **CRATER START SLOPE (F11)** - Time taken to go from the CRATER START SPEED or CRATER START VOLTAGE level to the welding speed or voltage level.
- **CRATER END SLOPE (F12)** - Time required to go from the welding speed or voltage level to the CRATER END SPEED or CRATER END VOLTAGE level.
- **CRATER END SPEED (F13)** - Sets the final speed of the welding wire for the crater.

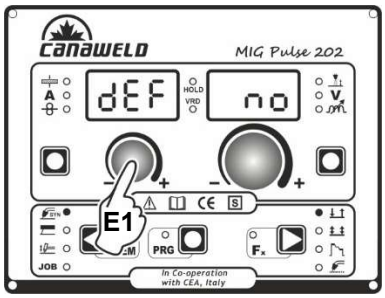
- **CRATER END VOLTAGE (F14)** - Sets the final welding voltage for the crater.
- **CRATER END TIME (F15)** - This function defines the time in which the current remains at the value of CRATER END SPEED or CRATER END VOLTAGE.
- **SPOT WELD TIME (F07)** - The time during which spot welding takes place after the arc is ignited, after which the arc is extinguished automatically.
- **STITCH WELD TIME (F05)** - Time in which the welding in tracts is performed after the ignition of the arc, after which the arc switches off automatically.
- **STITCH WELD PAUSE (F06)** - Time of pause between one welding in tracts and another.
- **BURN BACK (bUb)** - Regulates the length of the wire after welding. The value indicated is a percentage variation in relation to the factory setting value. Higher numbers correspond to more burning of the wire.
- **POST GAS (PoG)** - Provides an additional quantity of gas for a defined time, after welding ends.

▪ **PROGRAM DEFAULT (dEF)**

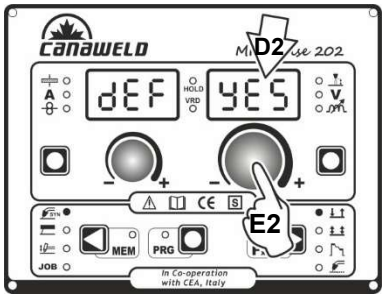
WARNING: If carried out, this operation resets the program in use to the factory default settings.

To carry out the reset of the settings / parameters, proceed in the following manner:

- Rotate the ENCODER - A (E1) knob until both the displays read **dEF no** (see figure).



- Rotate the ENCODER - V knob (E2) until the PARAMETERS DISPLAY - V screen (D2) reads YES.

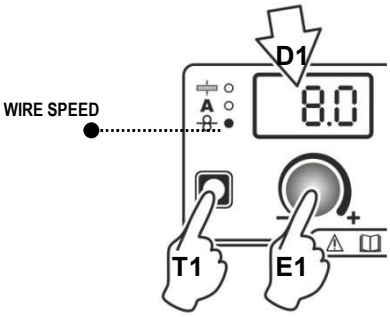


- Hold the SAVE “MEM” key (T2) down for at least 2 consecutive seconds.

- The program in use has now been completed successfully. To confirmation the above, the control panel of the welder performs a short operation of MACHINE CHECK (all of the LED stay lit simultaneously so as to verify their actual operation), the generator itself starts, having memorized the new settings and is again ready to weld.

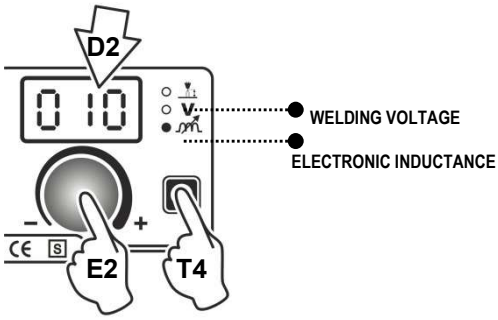
4) PRE-SETTING

Before welding it is possible to set the following parameters:



Example: WIRE SPEED

Press the PARAMETER SELECTION - A key (T1) until the LED that corresponds to the WIRE SPEED switches on. Turn the ENCODER - A knob (E1) to change the value shown on the PARAMETER DISPLAY - A screen (D1).



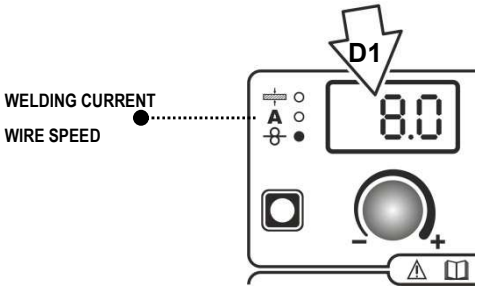
Example: ELECTRONIC INDUCTANCE

Press the PARAMETER SELECTION - V key (T4) until the LED that corresponds to the ELECTRONIC INDUCTANCE switches on. Turn the ENCODER - V knob (E2) to change the value shown on the PARAMETER DISPLAY - V screen (D2).

5) WELDING

During the welding the display shows:

- PARAMETER DISPLAY screen - A (D1)

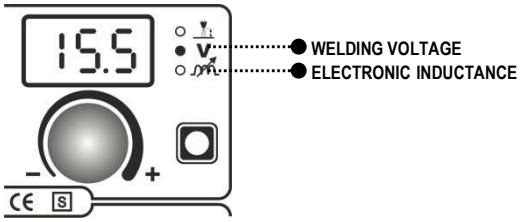


- WELDING CURRENT: the measured value of the current of what is being welded.
- WIRE SPEED: the value previously set.

- PARAMETER DISPLAY screen - V (D2)
- WELDING VOLTAGE: the measured value of the voltage of what is being welded.
- ELECTRONIC INDUCTANCE: the value previously set.

During the welding the operator can change the following parameters:

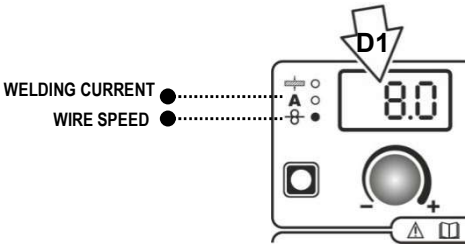
- WIRE SPEED
- WELDING VOLTAGE
- ELECTRONIC INDUCTANCE
- SPECIAL FUNCTIONS “Fx”



6) HOLD

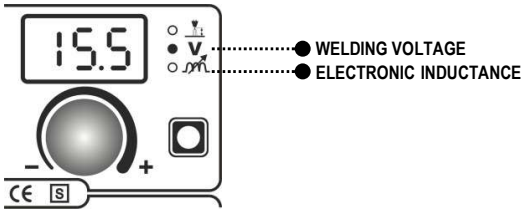
This function automatically starts itself at the conclusion of every welding operation and it is indicated to the operator by means of a flashing light of the HOLD FUNCTION LED for a specific amount of time. Once the welding has been terminated, for about 15 seconds, both the DISPLAYS should show the same values of the parameters during the welding. In this phase the displays show:

- PARAMETER DISPLAY screen - A (D1)



- WELDING CURRENT: the measured value of the current of what is being welded.
- WIRE SPEED: the value previously set.

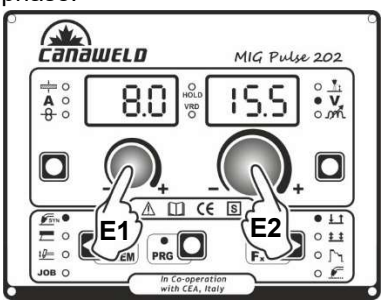
- PARAMETER DISPLAY screen - V (D2)



- WELDING VOLTAGE: the measured value of the voltage of what is being welded.
- ELECTRONIC INDUCTANCE: the value previously set.

To interrupt the HOLD function and go back to the PRESETTING phase before 15 seconds have passed, simply turn one of the two ENCODER knobs (E1-E2).

The HOLD function can be terminated ahead of time even while once again starting the welding. Once **15** seconds have passed (HOLD FUNCTION) the control panel goes back to the PRESETTING phase.



❑Electrode (STICK WELDING)

Start the welder by pressing the switch, located on the back panel, at the position **I**.

1. WELDING PROCESS SELECTION

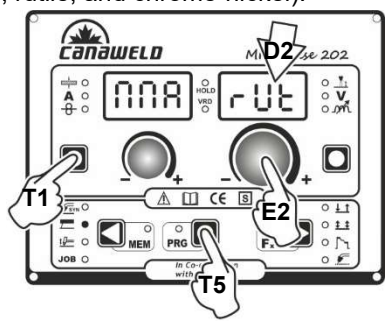
Select the ELECTRODE PROCESS of welding (for welding with “HOT START” and “ARC FORCE” devices, programmable by the user) pressing and releasing, even various times if necessary, the WELDING PROCESS SELECTION key (T2) until the corresponding LED lights up.

Push the SELECT PROGRAM (T5) key. The corresponding LED switches on.

2. SELECTION OF WELDING PROGRAM

PROGRAM TABLE			
STICK WELDING PROCESS			
MATERIAL		DISPLAY	
TYPE	CLASS		
Basic	E7018	STICK WELDING	bAS
Rutil	E6013	STICK WELDING	rUt
Cr-Ni	E316L	STICK WELDING	Crn

Select the welding PROGRAM by pushing the SELECT PROGRAM (T5) Key, and then rotate the ENCODER - V (E2) Knob until the VIEW PARAMETERS - V (D2) display shows the program required, chosen according to the type of electrode to be used (basic, rutile, and chrome-nickel).



3. SPECIAL FUNCTIONS “Fx” SELECTION

ADJUSTABLE FUNCTIONS “Fx”			
FUNCTION	DISPLAY	SETTINGS RANGE	
		FACTORY	RANGE
HOT START	Hot	50	0 to 100
ARC FORCE	ArC	50	0 to 100
PROGRAM DEFAULT	dEF	no	no - YES

The SPECIAL FUNCTIONS “Fx” that are only available in the STICK welding process are shown below. For all the other explanations regarding this menu make reference to the relative paragraph.

- **HOT START (Hot) -** At the start of the welding process it increases the current, adjustable in percentage, reducing in

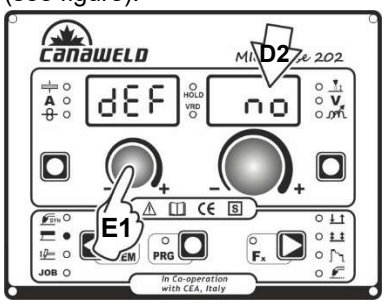
such a way the risk of low function at the start of the connection.

- **ARC FORCE (ArC) -** During the welding process, it increases the current in percentage, reducing in such a way the risk of fusing the electrode to the piece.

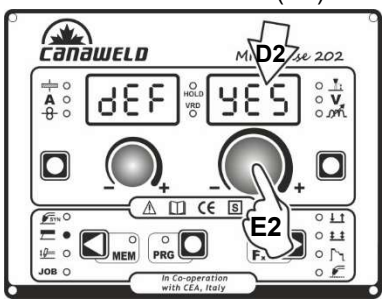
- **PROGRAM DEFAULT (dEF)**

WARNING: If carried out, this operation resets the program in use to the factory default settings.
To carry out the reset of the settings / parameters, proceed in the following manner:

- Rotate the ENCODER - A (E1) knob until both the displays read dEF no (see figure).



- Rotate the ENCODER - V knob (E2) until the PARAMETERS DISPLAY - V screen (D2) reads **YES**.

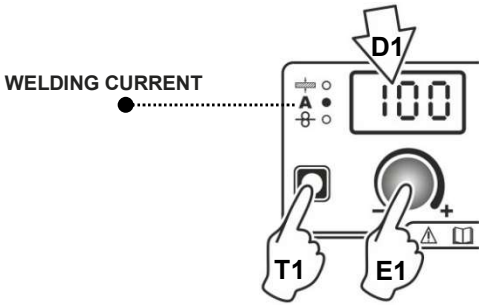


- Hold the SAVE "MEM" key (T2) down for at least **2** consecutive seconds.

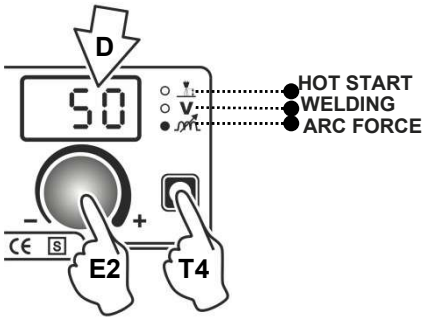
- The program in use has now been completed successfully. To confirmation the above, the control panel of the welder performs a short operation of MACHINE CHECK (all of the LED stay lit simultaneously so as to verify their actual operation), the generator itself starts, having memorized the new settings and is again ready to weld.

4. PRE-SETTING

Before welding it is possible to set the following parameters:



Example: WELDING CURRENT
Press the PARAMETER SELECTION - A key (T1) until the LED that corresponds to the WELDING CURRENT switches on. Turn the ENCODER - A knob (E1) to change the value shown on the PARAMETER DISPLAY - A screen (D1).

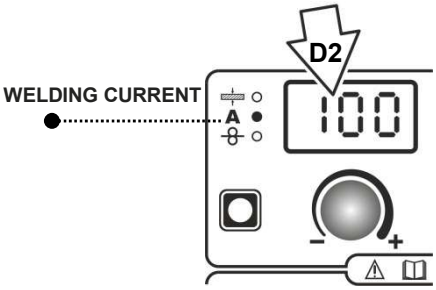


Example: ARC FORCE
Press the PARAMETER SELECTION - V key (T4) until the LED that corresponds to the ARC FORCE switches on. Turn the ENCODER - V knob (E2) to change the value shown on the PARAMETER DISPLAY - V screen (D2).

5. WELDING

During the welding the display shows:

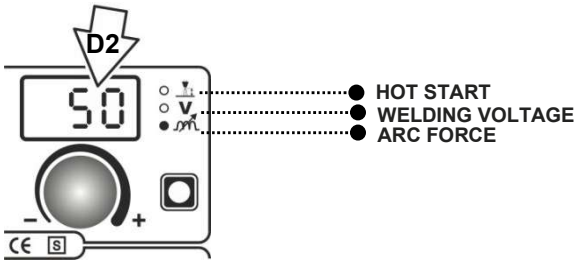
- PARAMETER DISPLAY screen - A (D1)



- WELDING CURRENT: the measured value of the current of what is being welded.

- PARAMETER DISPLAY screen - V (D2)
- HOT START: the value previously set.
- WELDING VOLTAGE: the measured value of the voltage of what is being welded.
- ARC FORCE: the value previously set.

During the welding the operator can change the following parameters:
• WELDING CURRENT
• HOT START
• ARC FORCE
• SPECIAL FUNCTIONS "Fx" - FIRST LEVEL MENU.

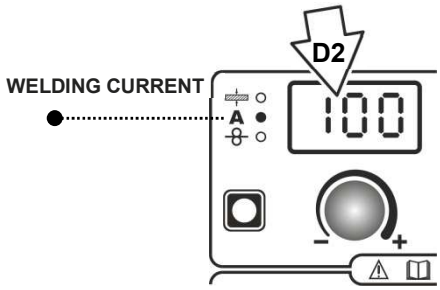


6. HOLD

This function automatically starts itself at the conclusion of every welding operation welding and it is indicated to the operator by means of a flashing light of the HOLD

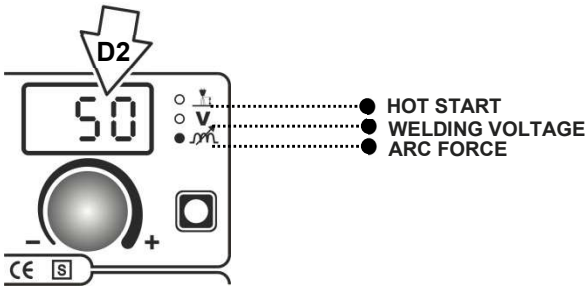
FUNCTION LED for a specific amount of time. Once the welding has been terminated, for about **15** seconds, both the DISPLAYS should show the same values of the parameters during the welding. In this phase the displays show:

- PARAMETER DISPLAY screen - A (D1)



- WELDING CURRENT: the last current value measured.

- PARAMETER DISPLAY screen - V (D2)

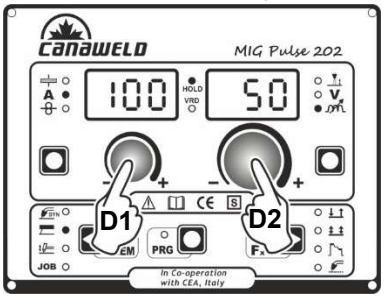


- HOT START: the value previously set.
- WELDING VOLTAGE: the measured value of the voltage of what is being welded.
- ARC FORCE: the value previously set.

To interrupt the HOLD function and go back to the PRESETTING phase before **15** seconds have passed, simply turn one of the two ENCODER (E1-E2) knobs.

The HOLD function can be terminated ahead of time even once again starting the welding.

Once **15** seconds have passed (HOLD FUNCTION) the control panel goes back to the PRESETTING phase.



7. ACTIVATING THE VRD DEVICE

The Voltage Reduction Device (VRD) is a safety device that reduces voltage. It prevents voltages forming on the output terminals that may pose a danger to people. The factory settings do NOT set out an active welding device during electrode welding.

If the operator wishes to weld in STICK WELDING using the VRD device (which must be done with the welding machine switched off), they must:

1) Use a suitable screwdriver to unscrew the 4 screws that fix the control panel to the welding machine.
2) Remove the "VRD" JUMPER on the DIGITAL INTERFACE PCB (Fig. A).
3) Use a suitable screwdriver to tighten the 4 screws that fix the control panel to the welding machine.
4) Start the welder by pressing the switch, located on the back panel, at the position **I**. After switching on, but with the machine at rest, the control panel will show the VRD LED on in the color GREEN and this means that the device is active. During the welding phase, this LED becomes RED, which however does not indicate a malfunctioning of the welder but the fact that the VRD device is in function and, at the conclusion of the welding operation, the tension will be reduced within a maximum greatest time of **0.3 seconds**.

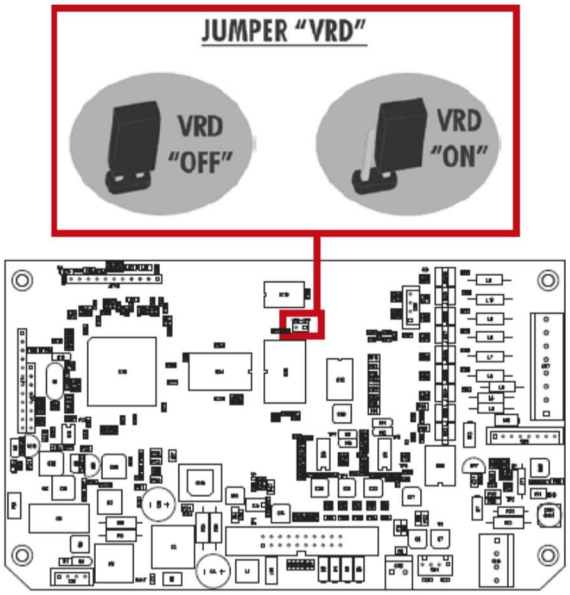


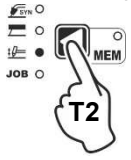
Fig. I

❑TIG with "Lift" striking

Start the welder by pressing the switch, located on the back panel, at the position **I**.

1. WELDING PROCESS SELECTION

Select the TIG PROCESS of welding with "Lift" type starter for welding without high frequency, pressing and releasing, also more times if necessary, the WELDING PROCESS SELECTION key (T2) until the corresponding LED lights.



2. SPECIAL FUNCTIONS "Fx" SELECTION

ADJUSTABLE FUNCTIONS "Fx"			
FUNCTION	DISPLAY	SETTINGS RANGE	
		FACTORY	RANGE
TIG process			
UP SLOPE	F29	0.0s	(0.0 to 20.0)s
DOWN SLOPE	F30	2.0s	(0.0 to 20.0)s
SWS VOLTAGE LIMIT	F31	0	-30 to 30
PROGRAM DEFAULT	dEF	no	no - YES

The SPECIAL FUNCTIONS “Fx” that are only available in the TIG Lift welding process are shown below. For all the other explanations regarding this menu make reference to the relative paragraph.

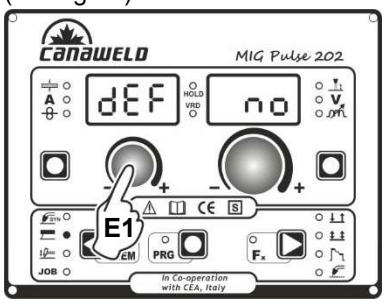
- **UP SLOPE (F29)** - Allows the joining of the WELDING CURRENT to the INITIAL CURRENT.
- **DOWN SLOPE (F30)** - Allows the joining of the WELDING CURRENT to the FINAL CURRENT.
- **SWS VOLTAGE LIMIT (F31)** - Regulates the voltage level for automatic extinguishing.

▪ **PROGRAM DEFAULT (dEF)**

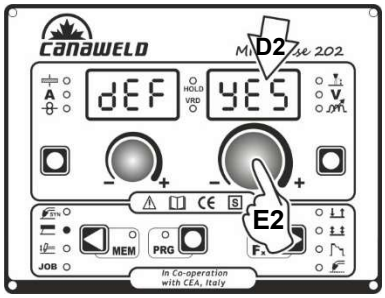
WARNING: If carried out, this operation resets the program in use to the factory default settings.

To carry out the reset of the settings / parameters, proceed in the following manner:

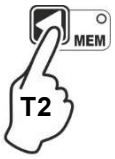
- Rotate the ENCODER - A (E1) knob until both the displays read dEF no (see figure).



- Rotate the ENCODER - V knob (E2) until the PARAMETERS DISPLAY - V screen (D2) reads YES.



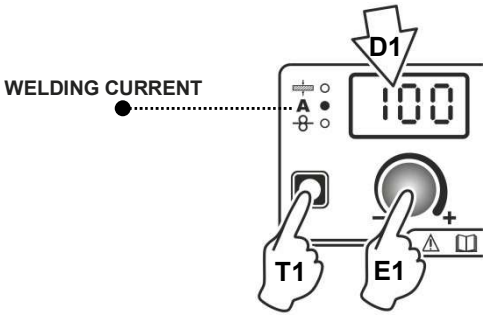
- Hold the SAVE “MEM” key (T2) down for at least **2** consecutive seconds.



- The program in use has now been completed successfully. To confirmation the above, the control panel of the welder performs a short operation of MACHINE CHECK (all of the LED stay lit simultaneously so as to verify their actual operation), the generator itself starts, having memorized the new settings and is again ready to weld.

3. PRE-SETTING

Before welding it is possible to set the following parameters:



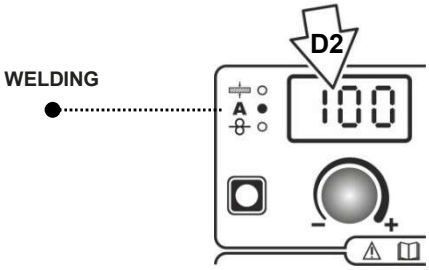
Example: WELDING CURRENT

Press the PARAMETER SELECTION - A key (T1) until the LED that corresponds to the WELDING CURRENT switches on. Turn the ENCODER - A knob (E1) to change the value shown on the PARAMETER DISPLAY - A screen (D1).

4. WELDING

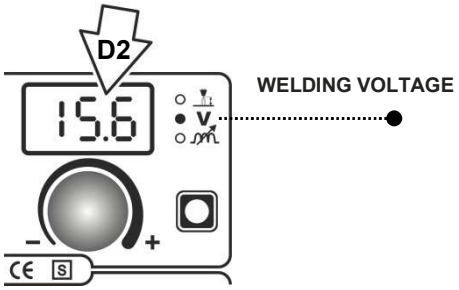
During the welding the display shows:

- PARAMETER DISPLAY screen - A (D1)



- WELDING CURRENT: the measured value of the current of what is being welded.

- PARAMETER DISPLAY screen - V (D2)



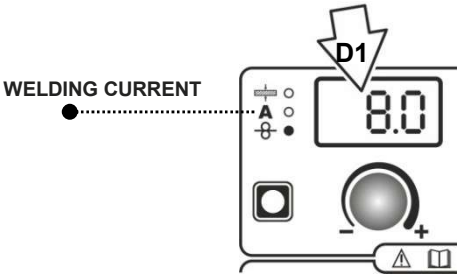
- WELDING VOLTAGE: the measured value of the voltage of what is being welded.

5. HOLD

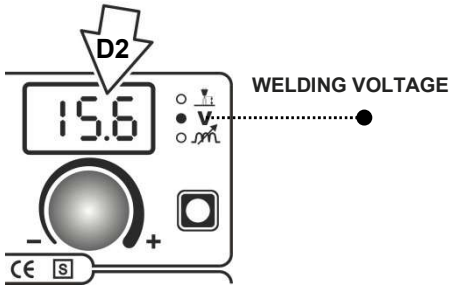
This function automatically starts itself at the conclusion of every welding operation welding and it is indicated to the operator by means of a flashing light of the HOLD FUNCTION LED for a specific amount of time. Once the welding has been terminated, for about 15 seconds, both the DISPLAYS should show the same values of the parameters during the welding.

In this phase the displays show:

- PARAMETER DISPLAY screen - A (D1)
- WELDING CURRENT: the last current value measured.

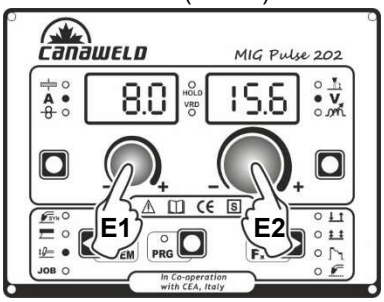


- PARAMETER DISPLAY screen - V (D2)



- WELDING VOLTAGE: the measured value of the last voltage of what is being previously welded.

To interrupt the HOLD function and go back to the PRESETTING phase before **15** seconds have passed, simply turn one of the two ENCODER (E1-E2) knobs.



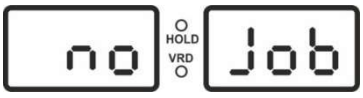
The HOLD function can be terminated ahead of time even once again starting the welding. Once **15** seconds have passed (HOLD FUNCTION) the control panel goes back to the PRESETTING phase.

❑JOB

1. CREATING AND SAVING A JOB

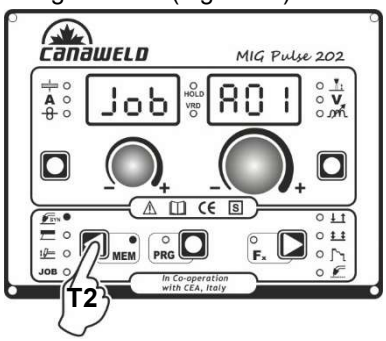
This operation makes it possible to create and save welding settings (points) that can be called up by the operator at any time. The control panel provides the possibility of saving a total of 99 JOBS spread over all the welding processes. There are not limits to the quantity or position of the points that can be saved for each process!

When it leaves the factory the welding machine does not have any JOBS saved in it and so the operator will find the control panel in this condition:

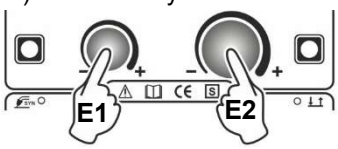


Having defined the parameters, the operator needs to do their work correctly, they can be saved by creating an AUTOMATIC WELDING POINT (JOB), proceeding as follows:

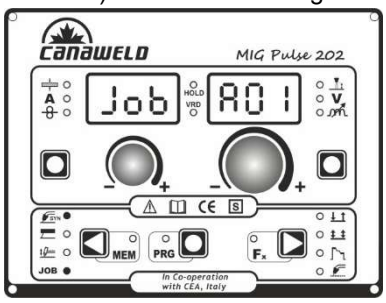
1) Hold the SAVE “MEM” key (T2) down for at least 2 consecutive seconds until both displays show the flashing wording that represent the first AUTOMATIC WELDING POINT (JOB) free and/or available to the operator that can be used for saving the data (e.g.: **A01**).



To be able to choose another automatic welding point (JOB) that is free for saving the data, simply turn one of the two ENCODER (E1-E2) knobs until you reach the required point.



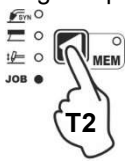
WARNING: If all the automatic welding points (JOBS) are occupied, the check automatically goes to the first automatic welding point (JOB A01) as shown in the figure below).



2) Hold down the SAVE “MEM” (T2) Key down for at least 2 consecutive seconds to save JOB and automatically load the settings / parameters (including special functions) for the JOB just saved.
3) To exit the JOB, press and release the WELDING PROCESS SELECTION key (T2).

2. JOB SELECTION

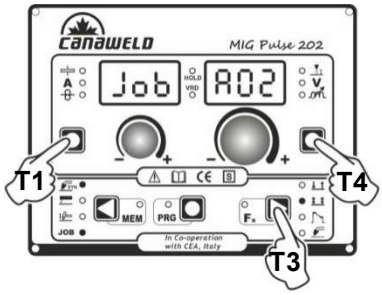
Select the JOB, pressing and releasing, even various times if necessary, the WELDING PROCESS SELECTION key (T2) until the corresponding LED lights up.



3. PRE-SETTING / VIEWING MEMORIZED JOB DATA

Since the parameters are memorized, within each JOB, viewable but not modifiable, the pre-setting phase does not exist, but the operator can see and verify the settings, previously saved and memorized, pressing and releasing the PARAMETER SELECTION key - A (T1) or in alternative the PARAMETER SELECTION key - V (T4).

The SPECIAL FUNCTIONS “Fx” Key (T3) contained within each individual JOB can be viewed (but not modified) by simply keeping the SPECIAL FUNCTIONS “Fx” key (T3) pressed for a duration of about **2** seconds. The display of the parameters (special functions included) lasts only a few seconds, then the panel shows, in an automatic way, the previous working condition.



4. WELDING

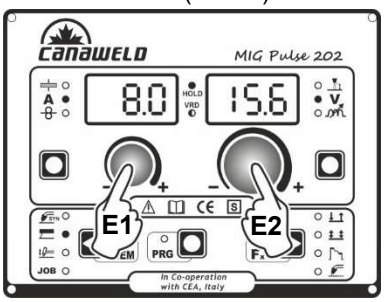
During the welding the display shows the values, if possible measured, of the active parameters, based on the type of welding process, memorized within the selected JOB.

As already indicated, the parameters can be viewed by pressing and releasing the PARAMETER SELECTION key - A (T1) or in alternative the PARAMETER SELECTION key - V (T4), while the SPECIAL FUNCTIONS “Fx” key (T3) contained within each individual JOB can be viewed (but not modified) by simply keeping the SPECIAL FUNCTIONS “Fx” key (T3) pressed for a duration of about **3** seconds.

5. HOLD

This function automatically starts itself at the conclusion of every welding operation and it is indicated to the operator by means of a flashing light of the HOLD FUNCTION LED for a specific amount of time. Once the welding has been terminated, for about **15** seconds, both the DISPLAYS should show the same values of the parameters during the welding.

To interrupt the HOLD function and go back to the PRESETTING phase before 15 seconds have passed, simply turn one of the two ENCODER (E1-E2) knobs.



The HOLD function can be terminated ahead of time even once again starting the welding.

Once **15** seconds have passed (HOLD FUNCTION) the control panel goes back to the PRESETTING phase.

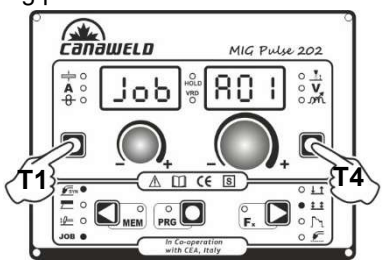
6. MODIFICATION AND OVERWRITING OF A MEMORISED JOB

To edit and overwrite a JOB proceed as follows:

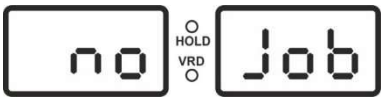
1) Select JOB, pressing and releasing, even various times if necessary, the WELDING PROCESS SELECTION key (T2) until the corresponding LED lights up.
2) Select the individual JOB to modify and overwrite rotating the ENCODER knob - V (E2).
3) Bring up and activate the JOB, loading its settings in the welding process it comes from, keeping the SAVE “MEM” key (T2) pressed for a duration of about **2** seconds.
4) Acquire the parameters necessary for editing the JOB.
5) Hold the SAVE “MEM” key (T2) down for at least 2 consecutive seconds until both displays show the flashing wording that represent the first AUTOMATIC WELDING POINT (JOB) free and/or available to the operator that can be used for saving the data.
6) Rotate the ENCODER knob - V (E2) until identifying the individual JOB that will be overwritten.
7) Keep pressed, for at least **3** consecutive seconds, the SAVE “MEM” key (T2) to confirm and make the operation effective.

7. DELETING A JOB SAVED

In JOB mode, holding down the PARAMETER SELECTION - A (T1) and PARAMETER SELECTION - V (T4) keys down simultaneously for about **5** seconds deletes the current automatic welding point.



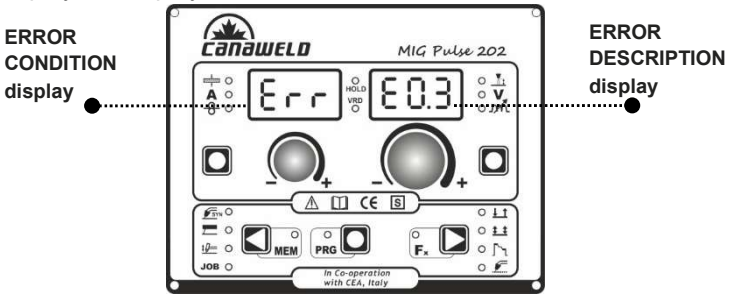
The control panel automatically goes to the first JOB saved or reads “**no JOB**” is no JOBS have been saved.



❑Error condition

This paragraph describes the error conditions that may arise on the welding machine, the codes and messages shown on both operator interface displays, and the diagnoses for attempting to correct and resolve them.

In an “error condition” the operator’s interface uses both displays to display:



Error condition	Error code	Error description and possible diagnosis
Err	E0.0	POWER SUPPLY FAILURE **NON automatic reset error.** This error can only arise when switching on and not when the welding equipment is working normally.
Err	E0.1	OVER AND UNDER VOLTAGE Automatic reset error.
Err	E0.2	OVER VOLTAGE Automatic reset error.
Err	E0.3	UNDER VOLTAGE Automatic reset error.
Err	E0.4	OVER CURRENT **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E1.0	CONFIG. FILE MISSING **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E1.1	USER FILE MISSING **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E1.3	CALIBRATION FILE MISSING **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E1.6	STICK WELDING DEFAULTS MISSING **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E1.7	DEFAULTS MISSING TIG **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E1.8	DEFAULTS MISSING MIG **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E1.9	WELDER DEFAULTS MISSING **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E2.0	FILE SYSTEM ERROR **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E3.2	STICKING This error is displayed when a short circuit has been formed between the machine's output terminals for more than 1.2 seconds. **NON automatic reset error.** To remove the error state, eliminate the short circuit so that the voltage on the torch goes above the threshold value again. At this stage the error condition disappears and the welding machine goes back to the mode prior to the sticking. If the torch trigger is still pushed, it must be released and pressed again to begin welding again.
Err	E3.4	SCC ERROR **NON automatic reset error.**
Err	E4.0	LAST SETUP NOT VALID **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E4.1	JOBS WRONG **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E4.2	MIG SYN SPECIAL FUNCTION "Fx" WRONG **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E4.3	MIG MAN SPECIAL FUNCTION "Fx" WRONG **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E4.4	SPECIAL "Fx" PULSED MIG FUNCTIONS NOT VALID **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E5.0	MIG PROGRAMS MISSING **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E5.1	NO PULSED MIG WELDING PROGRAMS **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E5.3	PROGRAMS MISSING **NON automatic reset error.** **Immediately contact technical assistance dept.**
Err	E5.4	NO WELDING PROGRAMS **NON automatic reset error.** **Immediately contact technical assistance dept.**
AUT	ADJ	POWER LIMITATION This alarm appears if the power limit is exceeded. The alarm alternates with the standard display every 1.5 seconds, despite which the machine continues to weld, supplying limited power, but complying with the values shown on the data plate.

The table includes 2 types of errors:

- **Automatic reset error:** Once the alarm condition has been resolved the welding machine starts working again and the operator can weld again!
- **NON automatic reset error:** To remove the alarm status and reinstate correct operation of the machine, the welding equipment must be switched off. The machine will then be working again and the operator can weld again!
  PLEASE NOTE: If, when switching on, the error status presents itself again, immediately contact the Technical Assistance Department.

This is necessary so that our technical assistance dept. **(that must be contacted each time the error messages appear on the welding machine's operator interface)** is able to resolve the problems more easily and as quickly as possible, thanks to the reports by the user, and also because, in the meantime the welding machine does not allow the operator to do their work.