RazorWeld TIG200CRZ ACDC

Operating Manual | XA-TIG200CRZ ACDC

XCEL-ARC
RazorWeld

3 YEAR MACHINE WARRANTY

Please read and understand this instruction manual carefully before the installation and operation of this equipment.

TIG STICK

WARRANTY

Thank you for your purchase of your RAZORWELD 200CRZ AC/DC Welding Machine.

We are proud of our range of welding equipment that has a proven track record of innovation, performance and reliability.

Our product range represents the latest developments in Inverter technology put together by our professional team of highly skilled engineers. The expertise gained from our long involvement with inverter technology has proven to be invaluable towards the evolution and future development of our equipment range. This experience gives us the inside knowledge on what the arc characteristics, performance and interface between man and machine should be.

Within our team are specialist welders that have a proven history of welding knowledge and expertise, giving vital input towards ensuring that our machines deliver control and performance to the utmost professional level.

We employ an expert team of professional sales, marketing and technical personnel that provide us with market trends, market feedback and customer comments and requirements. Secondly they provide a customer support service that is second to none, thus ensuring our customers have confidence that they will be well satisfied both now and in the future.

Xcel-Arc welders and plasma cutters are manufactured to be compliant with - AS/NZ 60974-1, guaranteeing you electrical safety and performance.

WARRANTY

- 3 Years from date of purchase.
- ESSETI New Zealand Limited warranties all goods as specified by the manufacturer of those goods.
- This Warranty does not cover freight or goods that have been interfered with.
- All goods in question must be repaired by an authorised repair agent as appointed by this company.
- Warranty does not cover abuse, misuse, accident, theft, general wear and tear.
- New product will not be supplied unless ESSETI New Zealand Limited has inspected product returned for warranty and agrees to replace product.
- Product will only be replaced if repair is not possible
- Please view full Warranty term and conditions supplied with machine or at **www.XcelArc.nz/warranty-terms/** or at the back of this manual.

ATTENTION! - CHECK FOR GAS LEAKAGE

At initial set up and at regular intervals we recommend to check for gas leakage

Recommended procedure is as follows:

1. Connect the regulator and gas hose assembly and tighten all connectors and clamps.
2. Slowly open the cylinder valve.
3. Set the flow rate on the regulator to approximately 8-10 L/min.
4. Close the cylinder valve and pay attention to the needle indicator of the contents pressure gauge on the regulator, if the needle drops away towards zero there is a gas leak. Sometimes a gas leak can be slow and to identify it will require leaving the gas pressure in the regulator and line for an extended time period. In this situation it is recommended to open the cylinder valve, set the flow rate to 8-10 L/min, close the cylinder valve and check after a minimum of 15 minutes.
5. If there is a gas loss then check all connectors and clamps for leakage by brushing or spraying with soapy water, bubbles will appear at the leakage point.
6. Tighten clamps or fittings to eliminate gas leakage.

IMPORTANT! - We strongly recommend that you check for gas leaks prior to operation of your machine. We recommend that you close the cylinder valve when the machine is not in use.

Esseti NZ Ltd, authorised representatives or agents of Esseti NZ Ltd will not be liable or responsible for the loss of any gas.

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REGISTER YOUR MACHINE ONLINE TO RECEIVE AN ADDITIONAL 6 MONTHS ON YOUR WARRANTY

Visit **XcelArc.nz/warranty-registration/** to register your machine.

SAFETY

Welding and cutting equipment can be dangerous to both the operator and people in or near the surrounding working area, if the equipment is not correctly operated. Equipment must only be used under the strict and comprehensive observance of all relevant safety regulations.

Read and understand this instruction manual carefully before the installation and operation of this equipment.

Machine Operating Safety

- Do not switch the function modes while the machine is operating. Switching of the function modes during welding can damage the machine. Damage caused in this manner will not be covered under warranty.
- Disconnect the electrode-holder cable from the machine before switching on the machine, to avoid arcing should the electrode be in contact with the work piece.
- Operators should be trained and or qualified.

Electric shock: It can kill. Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and internal machine circuits are also live when power is on. In MIG/MAG welding, the wire, drive rollers, wire feed housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is dangerous.

- Connect the primary input cable according to Australian and New Zealand standards and regulations.
- Avoid all contact with live electrical parts of the welding/cutting circuit, electrodes and wires with bare hands.
- The operator must wear dry welding gloves while he/she performs the welding/cutting task.
- The operator should keep the work piece insulated from himself/herself.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cable for wear and tear, replace the cable immediately if damaged, bare wiring is dangerous and can kill.
- Do not use damaged, under sized, or badly joined cables.
- Do not drape cables over your body.
- We recommend (RCD) safety switch is used with this equipment to detect any leakage of current to earth.

Fumes and gases are dangerous. Smoke and gas generated whilst welding or cutting can be harmful to people's health. Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

Do not breathe the smoke and gas generated whilst welding or cutting, keep your head out of the fumes

- Keep the working area well ventilated, use fume extraction or ventilation to remove welding/cutting fumes and gases.
- In confined or heavy fume environments always wear an approved air-supplied respirator.
- Welding/cutting fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld/cut in locations near de-greasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapours to form highly toxic and irritating gases.
- Materials such as galvanized, lead, or cadmium plated steel, containing elements that can give off toxic fumes when welded/cut. Do not weld/cut these materials unless the area is very well ventilated, and or wearing an air supplied respirator.

Arc rays: harmful to people's eyes and skin. Arc rays from the welding/cutting process produce intense visible and invisible ultraviolet and infrared rays that can burn eyes and skin.

Always wear a welding helmet with correct shade of filter lens and suitable protective clothing including welding gloves whilst the welding/cutting operation is performed.

- Measures should be taken to protect people in or near the surrounding working area. Use protective screens or barriers to protect others from flash,glare and sparks; warn others not to watch the arc.

Fire hazard. Welding/cutting on closed containers, such as tanks,drums, or pipes, can cause them to explode. Flying sparks from the welding/cutting arc, hot work piece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding/cutting.

- The welding/cutting sparks & spatter may cause fire, therefore remove any flammable materials well away from the working area. Cover flammable materials and containers with approved covers if unable to be moved from the welding/cutting area.
- Do not weld/cut on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to the required Safety Standards to insure that flammable or toxic vapours and substances are totally removed, these can cause an explosion even though the vessel has been "cleaned". Vent hollow castings or containers before heating, cutting or welding. They may explode.
- Do not weld/cut where the atmosphere may contain flammable dust, gas, or liquid vapours (such as petrol)
- Have a fire extinguisher nearby and know how to use it. Be alert that welding/cutting sparks and hot materials from welding/cutting can easily go through small cracks and openings to adjacent areas. Be aware that welding/cutting on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.

Gas Cylinders. Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Because gas cylinders are normally part of the welding/cutting process, be sure to treat them carefully. CYLINDERS can explode if damaged.

- Protect gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Insure cylinders are held secure and upright to prevent tipping or falling over.
- Never allow the welding/cutting electrode or earth clamp to touch the gas cylinder, do not drape welding cables over the cylinder.
- Never weld/cut on a pressurised gas cylinder, it will explode and kill you.
- Open the cylinder valve slowly and turn your face away from the cylinder outlet valve and gas regulator.

Gas build up. The build up of gas can causes a toxic environment, deplete the oxygen content in the air resulting in death or injury. Many gases use in welding/cutting are invisible and odourless.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.

Electronic magnetic fields. MAGNETIC FIELDS can affect Implanted Medical Devices.

- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near any electric welding, cutting or heating operation.

Noise can damage hearing. Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

Hot parts. Items being welded/cut generate and hold high heat and can cause severe burns.

Do not touch hot parts with bare hands. Allow a cooling period before working on the welding/cutting gun. Use insulated welding gloves and clothing to handle hot parts and prevent burns.

CAUTION

1. **Working Environment.**
   - **i.** The environment in which this welding/cutting equipment is installed must be free of grinding dust, corrosive chemicals, flammable gas or materials etc, and at no more than maximum of 80% humidity.
   - **ii.** When using the machine outdoors protect the machine from direct sun light, rain water and snow etc; the temperature of working environment should be maintained within -10°C to +40°C.
   - **iii.** Keep this equipment 30cm distant from the wall.
   - **iv.** Ensure the working environment is well ventilated.
2. **Safety Tips.**
   - **i. Ventilation**
     This equipment is small-sized, compact in structure, and of excellent performance in amperage output. The fan is used to dissipate heat generated by this equipment during the welding/cutting operation. Important: Maintain good ventilation of the louvres of this equipment. The minimum distance between this equipment and any other objects in or near the working area should be 30 cm. Good ventilation is of critical importance for the normal performance and service life of this equipment.
   - **ii. Thermal Overload protection.**
     Should the machine be used to an excessive level, or in high temperature environment, poorly ventilated area or if the fan malfunctions the Thermal Overload Switch will be activated and the machine will cease to operate. Under this circumstance, leave the machine switched on to keep the built-in fan working to bring down the temperature inside the equipment. The machine will be ready for use again when the internal temperature reaches safe level.
   - **iii. Over-Voltage Supply**
     Regarding the power supply voltage range of the machine, please refer to "Main parameter" table. This equipment is of automatic voltage compensation, which enables the maintaining of the voltage range within the given range. In case that the voltage of input power supply amperage exceeds the stipulated value, it is possible to cause damage to the components of this equipment. Please ensure your primary power supply is correct.
   - **iv.** Do not come into contact with the output terminals while the machine is in operation. An electric shock may possibly occur.

MAINTENANCE

Exposure to extremely dusty, damp, or corrosive air is damaging to the welding/cutting machine. In order to prevent any possible failure or fault of this welding/cutting equipment, clean the dust at regular intervals with clean and dry compressed air of required pressure.

Please note that: lack of maintenance can result in the cancellation of the guarantee; the guarantee of this welding/cutting equipment will be void if the machine has been modified, attempt to take apart the machine or open the factory-made sealing of the machine without the consent of an authorized representative of the manufacturer.

TROUBLE SHOOTING

Caution: Only qualified technicians are authorized to undertake the repair of this welding/cutting equipment. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed in this manual.

INSTALLATION & OPERATION

Please install the machine strictly according to the steps. The protection class of this machine is IP21S, so avoid using it in rain.

CONNECTION OF INPUT CABLES

Primary input cable is supplied with this welding equipment. Connect the primary input cable with power supply of required input voltage. Refer to data plate on machine for Input voltage, IMAX and IEFF.

PRODUCT INFORMATION

TIG/MMA - 200 Amp 230V AC/DC Inverter Welder

Welds: Aluminium, Magnesium, Zinc Alloys, Steels, Stainless, Cast Iron, Bronze, Copper

RAZORWELD TIG200CRZ AC/DC

Intelligent Digital Control, 43KHz Inverter

3 YEAR MACHINE WARRANTY

Features

- Latest 43KHz inverter frequency technology
- AC/DC TIG
  - HF Arc Ignition
  - Adjustable AC Square Wave frequency 20~250Hz
  - Adjustable AC Balance control +/- 10
  - Adjustable Pulse Frequency control 0.2~200Hz
  - Adjustable Pulse % 1~99%
  - Adjustable Start Current 5~160A
  - Adjustable Base Current 20~200A
  - Adjustable Up Slope 0~10 sec
  - Adjustable Down Slope 0~15 seconds
  - Adjustable Pre Gas 0.1~3 seconds
  - Adjustable Post Gas 0.5~15 seconds
  - Trigger control 2/4T-Spot
  - Remote Amperage Control - Optional
- MMA (stick electrode)
  - Adjustable Arc Force (adjusts arc energy to suit electrode application)
  - Excellent arc stability with all electrodes
- Tolerant to variable power supply

XA-TIG200CRZ ACDC
Standard Package

Optional machine accessories available - refer www.xcelarc.nz

Technical Data

Power Supply	240V 1-Phase ±15%
Rated Input Power	6.0 kVA
I *ieff* as per AS/NZ60974-1	15.0 Amps
Rated Output	10~160A/26.4V MMA 5~200A/18.0V TIG
No Load Voltage	62V
Duty Cycle @ 40ºC as per AS/NZ60974-1	30% @ 160 Amps MMA 25% @ 200 Amps TIG
Duty Cycle @ 25ºC (approximate)	60% @ 160 Amps MMA 55% @ 200 Amsps TIG
Efficiency	85%
Power Factor	0.70
Protection Class	IP21S
Insulation Class	B
Dimensions (LxWxH)	410 x 162 x 326mm
Weight	10.5 kg
Certification Approval	AS/NZ60974-1

Overview

The Razorweld TIG200CRZ ACDC from Xcel-Arc is a new generation AC/DC-TIG inverter welding machine with HF Arc Ignition, full Pulse capability and MMA (stick electrode) welding function. Built using the latest 43KHz IGBT inverter technology, this machine offers outstanding arc characteristics and an incredibly smooth Square Wave AC-TIG welding current with adjustable AC Balance control. The Digital Weld Program Sequence Control provides a complete range of TIG functionality using intelligent MCU software, providing a high degree of accuracy whilst being simple to use. Adjustable pre-sets include Pre-Gas time, Start Current, Up and Down Slope times as well as Finish Current level and Post-Gas time. 2/4T Trigger function gives you flexibility over controlling the start and finish of the weld process. Adjustable TIG-AC Frequency allows for adjustment of the arc condition and penetration profile to suit any job, making this machine an ideal choice for TIG welding of aluminium alloys. Digital Pulse parameter pre-sets include Peak & Base welding current; Pulse Frequency & Pulse Width, providing better heat control into the work to help minimize distortion. The Remote Control Interface provides for connection of remote amperage control via either optional Torch Remote or Foot Pedal. MMA welding function delivers a smooth, stable arc with high quality welds, an adjustable Arc Force allows you to set the ideal arc condition no matter what type of electrode. Weighing only 10.5kg, the machine is highly portable and perfect for the workshop and site welding situations. The TIG200CRZ ACDC sets a new benchmark for 230V AC/DC TIG welders and is ideal for high-end aluminium and stainless steel fabrication, marine and industrial engineering.
Designed and built to our specification and manufactured in compliance to AS/NZ60974-1.

Product Code: XA-TIG200CRZ ACDC-T3

Standard Package includes: XA-TIG200CRZ ACDC Machine, ARC T3FX Flexi-Neck Tig Torch x 4m, Earth Lead & Arc Lead 25mm x 4m, Argon Regulator

MACHINE PARTS LAYOUT

Front Machine Layout Description

1. Digital control panel
2. Postive output terminal
3. Negative output terminal
4. Quick lock gas connector
5. Torch switch - remote connector
6. Encoder knob
7. Handle

Rear Machine Layout Description

8. Power switch - on/off
9. Caution notice
10. Mains power input cable
11. Fan
12. Inlet gas connector

FRONT PANEL OPERATION

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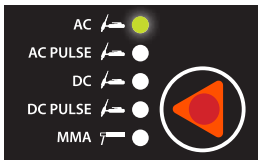
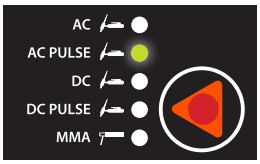
Front Panel Functions

Indicates Active Selector Pad

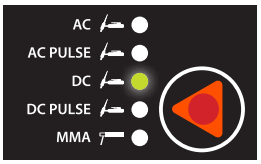
1. Mode Selector - Enables selection of required welding mode - **AC TIG - AC PULSE TIG - DC TIG - DC PULSE TIG DC MMA** (Stick)



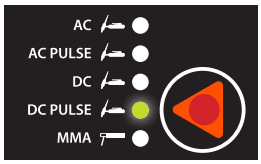
AC Tig: Select by pushing the selector pad to cycle through to illuminate the **AC** icon.



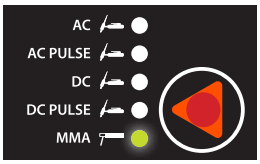
AC Pulse Tig: Select by pushing the selector button to cycle through to illuminate the **AC PULSE** icon.



DC Tig: Select by pushing the selector button to cycle through to illuminate the **DC** icon.



DC Pulse Tig: Select by pushing the selector button to cycle through to illuminate the **DC PULSE** icon.



DC MMA: Select by pushing the selector button to cycle through to illuminate the **MMA** icon.

2. Torch Switch Mode Selector - Controls the on/off cycle of the machine using the torch switch while incorporating the weld program parameters selections.

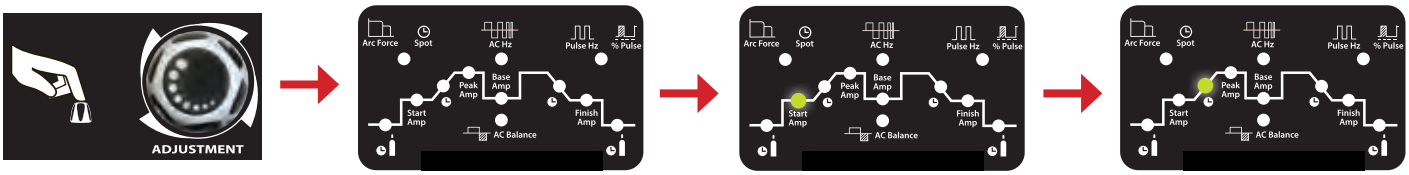
2T: Select the 2T icon using the selector pad. **2T** uses 2 actions of the torch switch while incorporating the weld program parameter selections.
(refer to page 10 for instruction of 2T function)

4T: Select the 4T icon using the selector pad. **4T** uses 4 actions of the torch switch while incorporating the weld program parameter selections. 4T provides operator control of the start and finish portions of the weld sequence.
(refer to page 11 for instruction of 4T function)

SPOT: Select the SPOT icon using the selector pad.
Spot uses a single action of the torch switch 1) Pressing the torch switch gives arc ignition and initializes the welding sequence for the period of time set using the spot timer.
(refer to page 11 for instruction of SPOT function)

3. Encoder Knob - provides digital adjustment of welding parameters and provides step by step motion through the weld cycle parameters.

Encoder knob weld parameter value selection
Turning the encoder will adjust the value of the parameters required.
The value selected will show in the digital display screen.

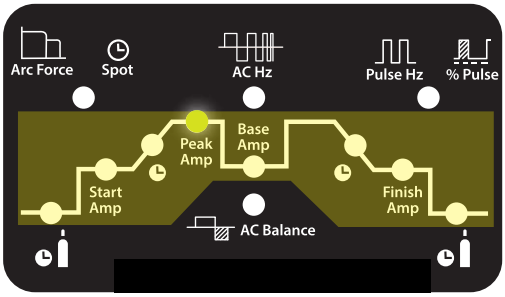


Encoder knob weld cycle function selection
Pushing the encoder will allow step by step selection of the weld cycle function.
The weld function selected will shown by the illuminated LED
Turning the Encoder Knob will allow adjustment and setting of value for the weld function parameter selected.

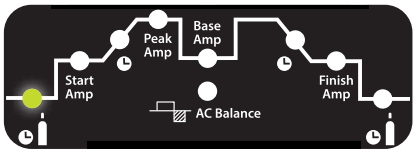
4A - Weld Program - Selection weld program parameters

Parameter selection: Select by pushing the Encoder Knob repeatedly to cycle through the weld parameter icons.
The icon will illuminate when selected.
Each push of the encoder knob will move the icon illumination in a clockwise cycle.

Shows selected icon



Pre Gas Timer - Provides selection for gas flow time prior to the arc starting.

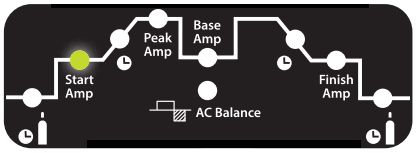


Pre Gas Time: Select by pushing the encoder to cycle through to illuminate the Pre Gas Timer icon.

Turn the Encoder to set the Pre-Gas Time (Range is 0-3 Sec)

The value selected shows on the digital display. It is the length of time the gas will flow before the arc starts.

Start Amp - Provides selection for the amount of amps required at the start of the weld.



Start Amp: Select by pushing the encoder to cycle through to illuminate the Start Amp icon.

Turn the Encoder to set the Start Amp value (Range is 10-200A)

The value selected shows on the digital display. It is the amount of amps the machine will deliver at the start of the welding sequence.

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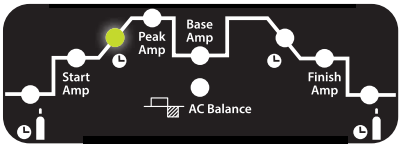
Up Slope Time - Sets the transition time from Start Amperage to Welding Amperage

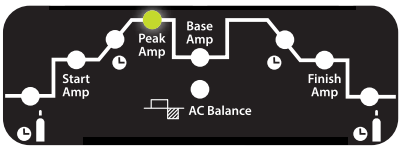


Up Slope Time: Select by pushing the encoder to cycle through to illuminate the Up Slope icon.

Turn the Encoder to set the Up Slope value (Range is 0-10 Sec)

The value selected shows on the digital display. It is the amount of time the welding current takes to climb from start amperage to welding amperage.

Peak Amp - Provides selection for the Maximum Welding Amperage required during welding.

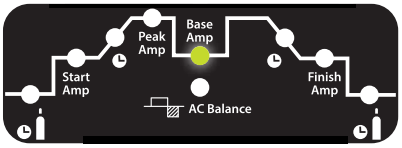


Peak Amp: Select by pushing the encoder to cycle through to illuminate the Peak Amp icon.

Turn the Encoder to set the Peak Amp value (Range is 10-200A)

The value selected shows on the digital display. It is the maximum set value of amperage the machine will deliver.

Base Amp - Provides selection for the Base Amperage during the Pulse Welding cycle.

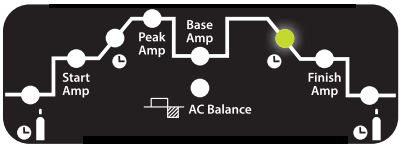


Base Amp: Select by pushing the encoder to cycle through to illuminate the Base Amp icon.

Turn the Encoder to set the Base Amp value (Range is 5-200A)

The value selected shows on the digital display. It is the set value of amperage the machine will deliver during the Base Amp period of the pulse cycle.

Down Slope Time - Sets the transition time from Welding Amperage to Finish Amperage

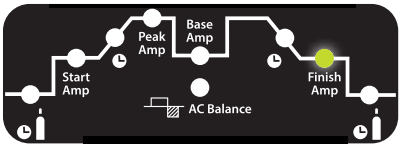


Down Slope Time: Select by pushing the encoder knob to cycle through to illuminate the Down Slope icon.

Turn the Encoder to set the Down Slope time (Range is 0-15 Sec)

The value selected shows on the digital display. It is the amount of time it takes for the welding amperage to drop down to the set finish amperage.

Finish Amp - Provides selection for the amount of amperage required at the end of the weld.

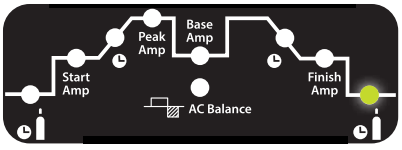


Finish Amp: Select by pushing the encoder knob to cycle through to illuminate the Finish Amp icon.

Turn the Encoder to set the Finish Amp value (Range is 10-200A)

The value selected shows on the digital display. It is the amount of amps the machine will deliver at the finish of the welding sequence.

Post Gas Timer - Provides selection for continued gas flow time at the end of the welding after the arc is out.



Post Gas Time: Select by pushing the encoder knob to cycle through to illuminate the Post Gas Timer icon.

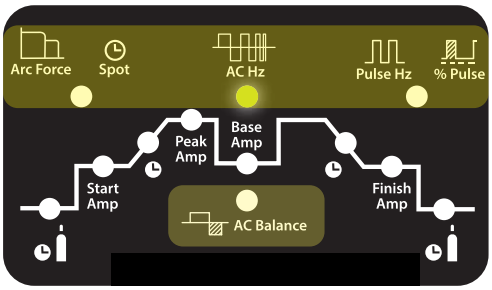
Turn the Encoder to set the Up Slope value (Range is 0.5-15 Sec)

The value selected shows on the digital display. It is the length of time the gas will flow after the arc is finished.

4B Weld Program - Selection of further weld program parameters

Parameter selection: Select by pushing the Encoder Knob repeatedly to cycle through the weld parameter icons.
The icon will illuminate when selected.
Each push of the encoder knob will move the icon illumination in a clockwise cycle.

Shows selected icon



AC Balance - Provides selection to adjust the balance of the AC wave form in AC TIG mode. Allows adjustment of the arc to be balanced, penetrating or oxide cleaning during AC TIG welding.

Start Amp: Select by pushing the encoder to cycle through to illuminate the AC Balance icon.
(see page 31 for detailed AC Balance information)

Turn the Encoder to set the AC Balance value Range is (-10 - 0 -10+)

The value selected shown on the digital display represents a more penetrating arc set at -10, a balanced arc at 0, or a more oxide cleaning action arc at 10+

AC Hz - Provides selection to adjust the frequency of the AC square wave in AC TIG mode. Allows adjustment of frequency of the AC square wave cycle (transistion from + to -) during AC TIG welding.

AC Hz: Select by pushing the encoder to cycle through to illuminate the AC Hz icon.

Turn the Encoder to adjust the AC Hz (Range is 20-250Hz)

The value selected shown on the digital display represents the number of times per second that the AC square wave transitions from + to - cycle.

Pulse Hz - Provides selection of the pulse frequency of the welding output current. Allows adjustment of frequency that the output current transistions from Peak Amp to Base Amp.

Pulse Hz: Select by pushing the encoder to cycle through to illuminate the Pulse Hz icon.

Turn the Encoder to adjust the Pulse Hz (Range is 0.02 - 200Hz)

The value selected shown on the digital display represents the number of times per second that the output welding current switches from Peak Amp to Base Amp

% Pulse - Provides selection of the on time ratio of the Peak Amp during the pulse welding cycle (Pulse Width). Allows adjustment of the % of time that the Peak Amp is on during each pulse cycle.

% Pulse: Select by pushing the encoder to cycle through to illuminate the Pulse Hz icon. Push the encoder a 2nd time to access % Pulse adjustment mode

Turn the Encoder to adjust the % Pulse (Range is 10-90%)

The value selected shown on the digital display represents the % of time that the Peak Amp is on during the pulse cycle.

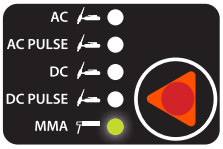
Spot - Provides selection of a pre-set time period for welding current output.
Allows adjustment of the time that machine will deliver amperage output from trigger activation.

Spot: Select SPOT using the Torch Mode Selector. Select Spot time by pushing the encoder to cycle through to illuminate the Spot icon. The Spot icon will only activate when in TIG mode and SPOT torch mode is selected..

Turn the Encoder to adjust the Spot time (Range is 0.5-10 sec)

The value selected shown on the digital display represents the time in seconds that the welding current will be delivered once the torch switch is pressed.

Arc Force - Provides selection for adjustment of the ARC FORCE during MMA (Stick) welding.
Allows setting from a soft buttery arc characteristic through to a more digging, penetrating type of arc.



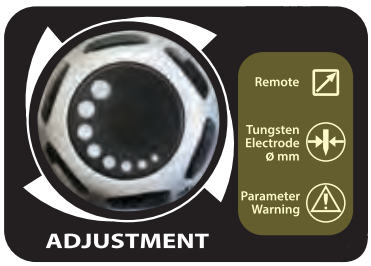
Spot: Select MMA using the Weld Mode Selector. Select ARC FORCE by pushing the encoder to cycle through to illuminate the Arc Force icon. The Arc Force icon will only activate when in MMA mode.

Turn the Encoder to adjust the Arc Force (Range is 0-40)

The value selected shown on the digital display represents extra current over time applied to the electrode when short circuit is about to occur. Low value allows a soft arc, a higher value allows stronger digging arc.

4C - Other front panel Icon selection

Icon selection: Select by pushing the Encoder Knob repeatedly to cycle through the weld parameter icons. The icon will illuminate when selected.



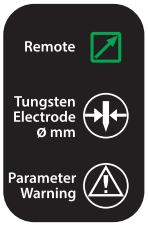
Tungsten electrode Ømm - for selection of Tungsten electrode and MMA electrode diameter

Tungsten electrode : Select by pushing the encoder knob to cycle through to illuminate the Tungsten electrode Ømm icon.

Turn the encoder to set the electrode Ømm value

The electrode diameter value selected will in the digital display.

Remote - indicates remote control activation

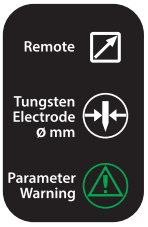


The remote icon illuminates when the remote function is active.

Remote Hand Control. Press the torch switch and hold for 5 seconds the icon will illuminate when remote function is activated.

Remote Foot Control. Remote function will become active when the foot control is connected .

Parameter Warning - indicates weld parameters do not match the electrode Ømm selection



The warning parameter icon illuminates when the the weld parameter settings do not match the electrode size selection.
The machine will still function but it is a warning to the opertor that the weld parameters chosen are outside the generally accepted capabilties of the electrode size selected. For example excessive amperage selected may overheat and destroy the tungsten electrode.

INSTALLATION SET UP FOR MMA (STICK) WELDING

1. **Connecting the Welding Lead Set:** Various electrodes require a different polarity for optimum results refer to the electrode manufacturers information for the correct polarity. Most GP electrodes are electrode connected to ⊖ output socket, Earth Connected to the ⊕ output socket
2. Turn the power source on using the on/off switch located on the rear machine panel.

(3) Select DC MMA Function.
Push the button until the **DC** icon illuminates

(4) Set the amperage by selecting the Peak Amp icon pressing the Encoder Knob until the Peak Amp icon illuminates. Turn the encoder knob to set the amperage according to the electrode type and size being used as recommended by the electrode manufacturer. The set amperage will show in the digital display panel.

(5) Set the Arc Force by selecting the Arc Force icon pressing the Encoder Knob until the Arc Force icon illuminates.
Turn the encoder knob to set the Arc Force according to the electrode type and size being used. The set Arc Force will show in the digital display panel.

Refer to Page 12 for instruction and explanation on Arc Force Control

INSTALLATION SET UP FOR MMA (STICK) WELDING

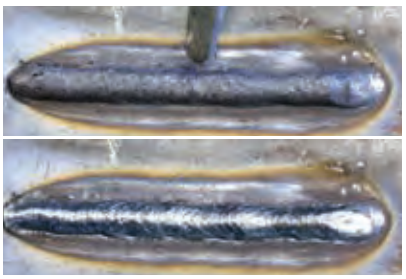
6) Connect the Earth Clamp securely to the work piece or the work bench.

4) Place the electrode into the electrode holder and clamp tight.

5) Strike the electrode against the work piece to create and arc and hold the electrode steady to maintain the arc

6) Hold the electrode slightly above the work piece to maintain the arc while travelling at an even speed to create and even weld deposition.

7) To finish the weld, break the arc by quickly snapping the electrode away from the work piece.



8) Wait for the weld to cool and carefully chip away the slag to reveal the weld metal below.

IMPORTANT NOTES - For MMA (Stick) Welding

ELECTRODE POLARITY - What is the electrode polarity and why is it important.

When using a DC power source, the question of whether to use electrode negative or positive polarity arises.
The first important point is that not all electrodes can be used with all polarities. Electrode manufacturer information and specifications such as BS EN ISO 2560:2005 and AWS A5.1-2004, define the polarity with which different electrodes may be used. The choice of polarity also depends on the type of the material and joint design. A welding procedure should specify the polarity to be used for the electrode choice and joint design.

Direct current flows in one direction in an electrical circuit and the direction of current flow and the composition of the electrode coating will have a definite effect on the welding arc and weld bead. Refer to the electrode manufacturers recommendation for polarity choice.

With DC electrode (+) positive (reverse) polarity, more heat is generated at the workpiece. This produces welds with deep penetration and a narrower weld bead and can reduce the incidence of lack-of-fusion defects in the weld.

DC electrode (-) negative (straight) polarity generates more heat at the electrode and produces welds with shallower penetration. DC (-) negative electrode results in a higher burn off rate, and therefore a higher deposition rate at a given current. It is often used for welding thin sheet materials, or joints with poor fit-up, where more control of the weld pool is needed due to the increased risk of burn through.

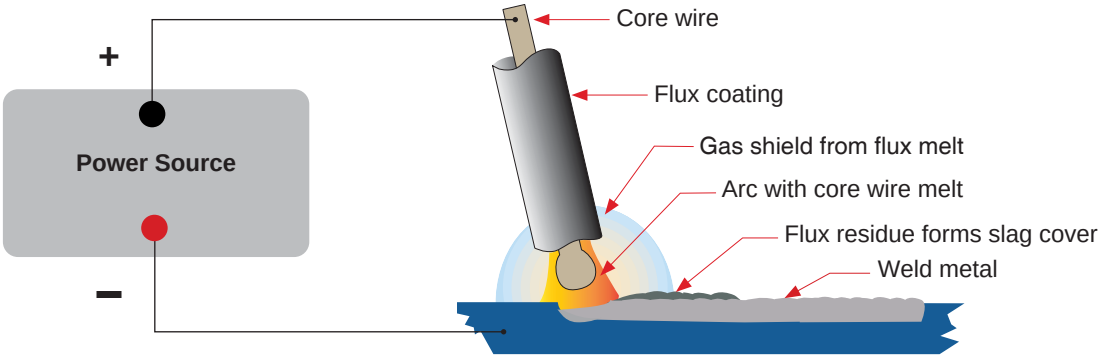
ARC FORCE - What is the Arc Force Control and what does it do?

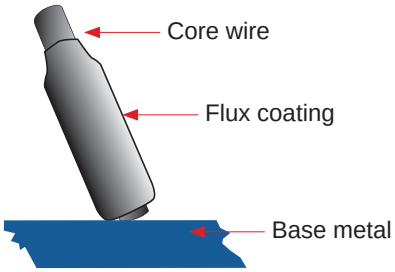
During welding arc voltage drops as the arc gets tighter and can cause the electrode to stick/short circuit to the work piece. Arc force should be set according to the electrode diameter, electrode type, welding current and the technical requirement. When you set the arc force high the machine senses the drop in voltage, as the electrode is about to stick/short circuit to the work piece the machine responds by increasing the arc voltage and welding current momentarily (per millisecond). This boost in arc voltage/current blasts away base metal and electrode to prevent the electrode from sticking itself to the work piece. High arc force means the molten droplet from the melting electrode is larger with quicker transistion preventing the electrode from sticking, however too much arc force may create excessive spatter. Low arc force will result in a softer arc with minimal spatter and a nice shaped weld bead, however it may lead to the electrode sticking to the work piece easier, therefore the arc force should be adjusted to provide a smooth arc transistion between the electrode and workpiece without it sticking and without providing excessive spatter. Higher Arc Force is more suited to thicker electrodes under low amperage settings, out of postion welding, low hydrogen type electrodes where a forceful arc characteristic is preferred to maintain the arc and better control penetration. Lower Arc Force is better suited to hardfacing and cast Iron electrodes where a soft buttery arc is preferred to prevent the electrode material diluting too much with the base metal.

MMA(STICK) WELDING GUIDE

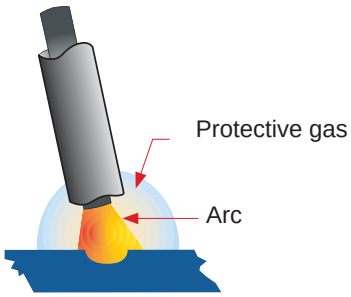
MMA (Stick) Welding Fundamentals

One of the most common types of arc welding is manual metal arc welding (MMA) or stick welding. An electric current is used to strike an arc between the base material and a consumable electrode rod or 'stick'. The electrode rod is made of a material that is compatible with the base material being welded and is covered with a flux that gives off gaseous vapours that serve as a shielding gas and providing a layer of slag, both of which protect the weld area from atmospheric contamination. The electrode core itself acts as filler material the residue from the flux that forms a slag covering over the weld metal must be chipped away after welding.





- The arc is initiated by momentarily touching the electrode to the base metal.
- The heat of the arc melts the surface of the base metal to form a molten pool at the end of the electrode.
- The melted electrode metal is transferred across the arc into the molten pool and becomes the deposited weld metal.
- The deposit is covered and protected by a slag which comes from the electrode coating.
- The arc and the immediate area are enveloped by an atmosphere of protective gas



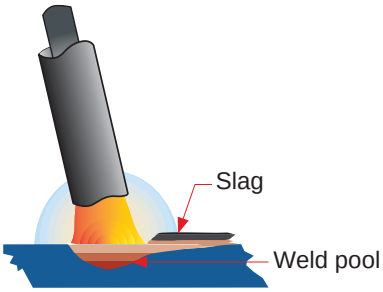
Manual metal arc (stick) electrodes have a solid metal wire core and a flux coating. These electrodes are identified by the wire diameter and by a series of letters and numbers. The letters and numbers identify the metal alloy and the intended use of the electrode.

The **Metal Wire Core** works as conductor of the current that maintains the arc. The core wire melts and is deposited into the welding pool.

The covering on a shielded metal arc welding electrode is called **Flux**. The flux on the electrode performs many different functions. These include:

- producing a protective gas around the weld area
- providing fluxing elements and deoxidizers
- creating a protective slag coating over the weld as it cools
- establishing arc characteristics
- adding alloying elements.

Covered electrodes serve many purposes in addition to adding filler metal to the molten pool. These additional functions are provided mainly by the covering on the electrode.



Electrode Selection

As a general rule, the selection of an electrode is straight forward,in that it is only a matter of selecting an electrode of similar composition to the parent metal. However, for some metals there is a choice of several electrodes, each of which has particular properties to suit specific classes of work. It is recommend to consult your welding supplier for the correct selection of electrode.

Electrode Size

Average Thickness of Material	Maximum Recommended Electrode Diameter
1.0 - 2.0mm	2.5mm
2.0 - 5.0mm	3.2mm
5.0 - 8.0mm	4.0mm
8.0 - > mm	5.0mm

The size of the electrode generally depends on the thickness of the section being welded, and the thicker the section the larger the electrode required. The table gives the maximum size of electrodes that maybe used for various thicknesses of section base on using a general purpose type 6013 electrode.

Welding Current (Amperage)

Electrode Size ø mm	Current Range (Amps)
2.5mm	60 - 95
3.2mm	100 - 130
4.0mm	130 - 165
5.0mm	165 - 260

Correct current selection for a particular job is an important factor in arc welding. With the current set too low, difficulty is experienced in striking and maintaining a stable arc. The electrode tends to stick to the work, penetration is poor and beads with a distinct rounded profile will be deposited. Too high current is accompanied by overheating of the electrode resulting undercut and burning through of the base metal and producing excessive spatter. Normal current for a particular job may be considered as the maximum, which can be used without burning through the work, over-heating the electrode or producing a rough spattered surface. The table shows current ranges generally recommended for a general purpose type 6013 electrode.

Arc Length

To strike the arc, the electrode should be gently scraped on the work until the arc is established. There is a simple rule for the proper arc length; it should be the shortest arc that gives a good surface to the weld. An arc too long reduces penetration, produces spatter and gives a rough surface finish to the weld. An excessively short arc will cause sticking of the electrode and result in poor quality welds. General rule of thumb for down hand welding is to have an arc length no greater than the diameter of the core wire.

Electrode Angle

The angle that the electrode makes with the work is important to ensure a smooth, even transfer of metal. When welding in down hand, fillet, horizontal or overhead the angle of the electrode is generally between 5 and 15 degrees towards the direction of travel. When vertical up welding the angle of the electrode should be between 80 and 90 degrees to the work piece.

Travel Speed

The electrode should be moved along in the direction of the joint being welded at a speed that will give the size of run required. At the same time, the electrode is fed downwards to keep the correct arc length at all times. Excessive travel speeds lead to poor fusion, lack of penetration etc, while too slow a rate of travel will frequently lead to arc instability,slag inclusions and poor mechanical properties.

Material and Joint Preparation

The material to be welded should be clean and free of any moisture, paint, oil, grease, mill scale, rust or any other material that will hinder the arc and contaminate the weld material. Joint preparation will depend on the method used include sawing, punching, shearing, machining, flame cutting and others. In all cases edges should be clean and free of any contaminates. The type of joint will be determined by the chosen application.

INSTALLATION SET UP FOR DC TIG WELDING

DC HF TIG Welding Setup and Operation

1. Connect the Tig Torch connector to the negative terminal and tighten it.
2. Insert the torch gas connector into the quick lock gas receptacle.
3. Connect the torch switch remote lead into the torch remote socket.
4. Connect the Earth Cable connector into the positive terminal and tighten it.
5. Connect the gas line to the quick lock gas inlet connector at the rear of the machine.
   Check for gas leaks - Esseti NZ Ltd nor it's representatives will be responsible for any gas loss.
6. Connect gas line to Gas Regulator and connect the gas regulator to the Gas Cylinder.
   Slowly open the valve on the gas cylinder and set gas flow to the required rate.
7. Switch on the machine using the On/Off switch at the rear of the machine.
8. Set the weld parameters using the front panel set procedure on the following page.

Weld start procedure for HF DC TIG welding

1. Assemble the front end torch parts use the correct size and type of tungsten electrode for the job, the tungsten electrode requires a sharpened point for DC welding

2. Lay the outside edge of the Gas Cup on the work piece with the Tungsten Electrode 1- 3mm from the work piece

3. Press the torch switch and the arc will ignite across the gap between the tungsten and work piece. Hold even distance of about 2mm gap between the tungsten and work piece to maintain the arc.

4. Release the torch switch to bring in the end of the welding sequence dependant of 2T or 4T trigger function choice

DC HF TIG WELDING STANDARD SET UP PROCEDURE

RazorWeld

Front panel set up procedure for basic HF DC TIG welding

1. Select DC Tig Function.

Select DC TIG by pressing the button until the **DC** icon illuminates. Select **2T** or **4T** trigger function as required by the pushing the button to cycle through the trigger options. The icon will illuminate for the selected trigger option.

2. Select Tungsten Diameter.

(2) Select the tungsten diameter required by pushing the encoder repeatedly, cycle through to illuminate the Tungsten Electrode icon. Set the size required by turning the encoder knob. The set size will appear in the digital display.

3. Set Pre-gas Time

Set the pre gas time by pushing the encoder repeatedly, cycle through to illuminate the Pre Gas icon. Set the time by turning the encoder knob. The set time will appear in the digital display

4. Set Start Amps

Set the Start Amps by pressing the encoder to cycle through to illuminate the Start Amp icon. Set the start amps by turning the encoder knob. The set start amps will appear in the digital display

5. Set Up Slope Time

Set the Up Slope by pressing the encoder to cycle through to illuminate the Up Slope icon. Set the up slope time by turning the encoder knob. The set up slope time will appear in the digital display

6. Set Welding Amperage

Set welding amps by pressing the encoder to cycle through to illuminate the Peak Amp icon. Set the amperage by turning the encoder knob. The set welding amperage will appear in the digital display

7. Set Down Slope Time

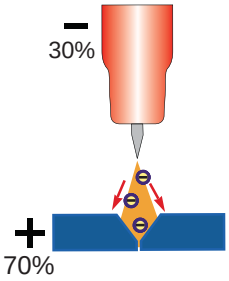
Set the down slope by pressing the encoder to cycle through to illuminate the Down Slope icon. Set the down slope time by turning the encoder knob. The set down slope time will appear in the digital display

8. Set Finish Amps

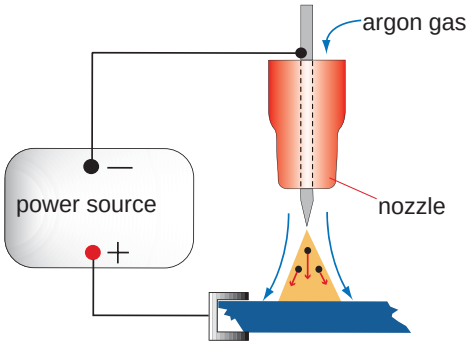
Set the finish amps by pressing the encoder to cycle through to illuminate the Finish Amps icon. Set the finish amps by turning the encoder knob. The set finish amps will appear in the digital display

9. Set Post Gas Time

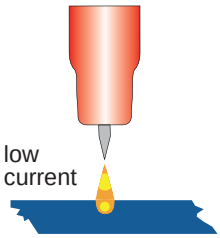
Set the post gas time by pressing the encoder to cycle through to illuminate the Post Gas icon. Set the post gas time by turning the encoder knob. The set post gas time will appear in the digital display



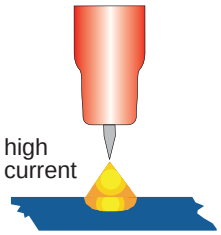
The DC power source uses what is known as DC (direct current) in which the main electrical component known as electrons flow in only one direction from the negative pole (terminal) to the positive pole (terminal). In the DC electrical circuit there is an electrical principle at work which should always be taken into account when using any DC circuit. With a DC circuit 70% of the energy (heat) is always on the positive side. This needs to be understood because it determines what terminal the TIG torch will be connected to (this rule applies to all the other forms of DC welding as well).



DC TIG welding is a process in which an arc is struck between a TUNGSTEN electrode and the metal work piece. The weld area is shielded by an inert gas flow to prevent contamination of the tungsten, molten pool and weld area.
When the TIG arc is struck the inert gas is ionized and superheated changing it's molecular structure which converts it into a plasma stream. This plasma stream flowing between the tungsten and the work piece is the TIG arc and can be as hot as 19,000°C. It is a very pure and concentrated arc which provides the controlled melting of most metals into a weld pool. TIG welding offers the user the greatest amount of flexibility to weld the widest range of material and thickness and types. DC TIG welding is also the cleanest weld with no sparks or spatter.

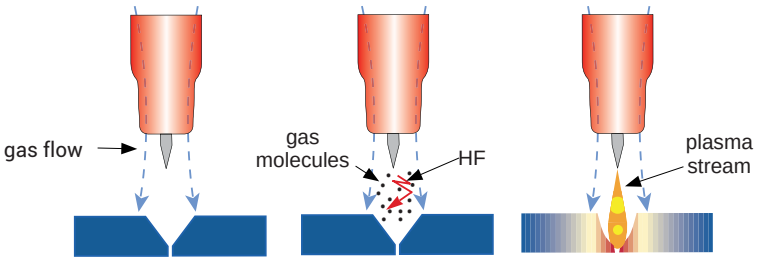


The intensity of the arc is proportional to the current that flows from the tungsten. The welder regulates the welding current to adjust the power of the arc. Typically thin material requires a less powerful arc with less heat to melt the material so less current (amps) is required, thicker material requires a more powerful arc with more heat so more current (amps) are necessary to melt the material.



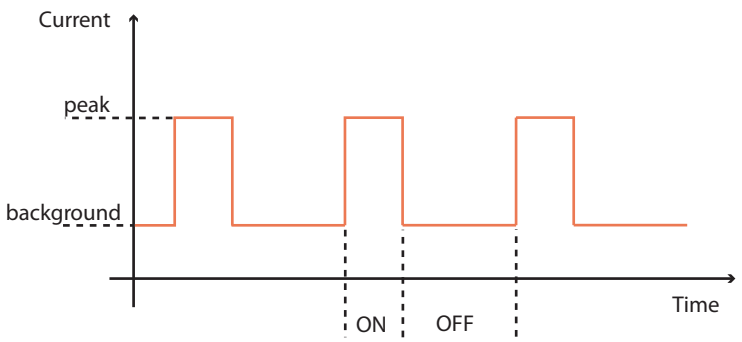
HF ARC IGNITION for TIG (tungsten inert gas) Welding

HF (high frequency) ignition allows the arc to be started in Tig welding without touching the tungsten to the work piece. By pressing the torch switch the machine will activate the gas flow and introduce the HF (high frequency) (high voltage) spark, this "ionizes" the air gap making it conductive allowing an arc to be created without touching the tungsten to the work piece. The gas molecules are superheated by the arc creating a stream of super heated gas that changes the molecular structure into producing a plasma stream. This plasma stream provides heat and energy that allows us to melt and fuse metals in an inert gas shielded environment know as TIG (tungsten inert gas) welding.

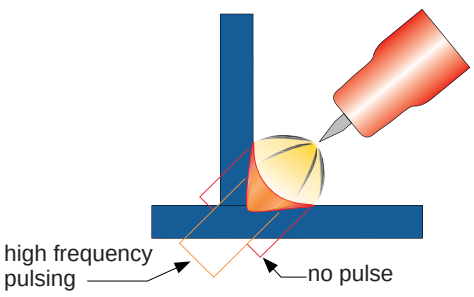


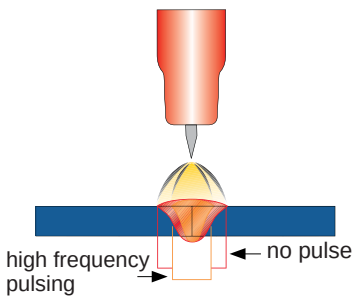
Pulse TIG welding is when the current output (amperage) changes between high and low current. Electronics within the welding machine create the pulse cycle. Welding is done during the high-amperage interval (this high amperage is referred to as peak current). During the low amperage period, the arc is maintained but the current output of the arc is reduced (this low amperage is referred to as base current). During pulse welding the weld pool cools during the low amperage period. This allows a lower overall heat input into the base metal. It allows for controlled heating and cooling periods during welding providing better control of heat input, weld penetration, operator control and weld appearance.
There are 4 variables within the pulse cycle:
Peak Current - Base Current - Pulse Frequency - Pulse Width
Setting and manipulation of these variables will determine the nature of the weld current output and is at the discretion of the operator.

Peak Current is the main welding current (amps) set to melt the material being welded and works much the same as setting maximum amperage values for regular DC TIG: as a guide use 30-40 amps for every 1mm of material thickness.
Base Current is the set level of background current (amps) which cools the weld puddle and affects overall heat input. Background Amps is a percentage of peak amperage. As a rule, use enough background current to reduce the weld pool to about half its normal size while still keeping the weld pool fluid. As a guide start by setting the background amperage at 20 to 30 percent of peak amperage.
Pulse Frequency is the control of the amount of times per second (Hz) that the welding current switches from Peak Current to Base Current. DC Pulse TIG frequency generally ranges from 20 to 300 HZ depending on the job application. Control of the pulse frequency also determines the appearance of the weld.
Pulse Width is the control of the percentage of time during one pulsing cycle the power source spends at the peak current (main amperage). Example is with the Pulse Width set at 80 percent and a rate of 1 pulse per second (PPS), the machine will spend 80% of the pulse at peak amperage and 20% at the base current. Increasing the pulse width percentage adds more heat to the job, while decreasing pulse width percentage reduces heat



DC Pulse Tig welding allows faster welding speeds with better control of the heat input to the job, reducing the heat input minimising distortion and warping of the work and is of particular advantage in the welding of thin stainless steel and carbon steel applications. The high pulse frequency capability of the advanced inverter agitates the weld puddle and allows you to move quickly without transferring too much heat to the surrounding metal. Pulsing also constricts and focuses the arc thus increasing arc stability, penetration and travel speeds.





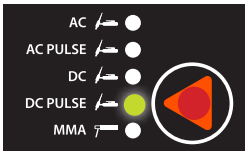
DC Pulse Welding Set Up Procedure

The Razorweld 200 machine has digital pulse frequency control. All the parameters for DC Pulse Tig welding - Peak Amp, Base Amp, Pulse Frequency and Pulse Width are easy to set via the digital control panel.

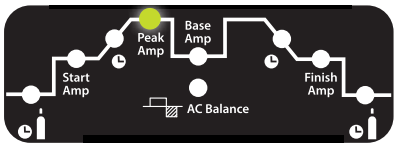
EXAMPLE OF PULSE DC TIG WELDING - SETUP PARAMETERS:

Material = Stainless Steel x 2.0mm / Tungsten Electrode = 1.6mm 2% Thoriated / Gas = Argon

The following steps are a guide as a starting point for you to set the machine up in Pulse mode to give an example of welding in Pulse mode function. You can experiment by changing any of the variables to see what effect it has over the welding and what the end result can be, but it is suggested to change only one variable at a time and then check the welding to see what the result is, in this way you acquire a better understanding of how each variable affects the welding current.

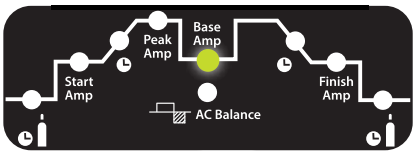


1. Select DC Pulse by pushing selector button to cycle through to illuminate DC Pulse icon.

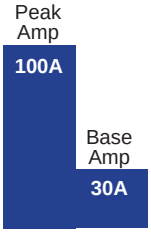


2. Select Peak Amp by pressing the encoder knob to cycle through to illuminate the Peak Amp Icon

3. Rotate the Encoder Knob to set the Peak Amp at 100A, it will show in the digital display. (Range is 10-200 Amps)

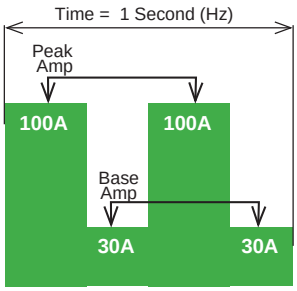


4. Select the Base Amp by pushing the encoder knob to cycle through to illuminate the Base Amp Icon



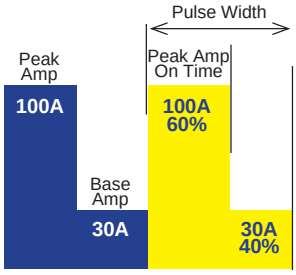
5. Rotate the Encoder Knob to set the Base Amp at 30A - (Range is 5-200 Amps)

6. Select the Pulse Frequency by pushing the encoder knob to cycle through to illuminate the Pulse Hz Icon

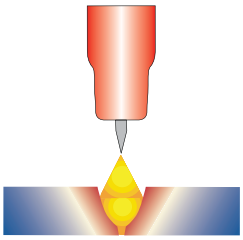


7. Rotate the Adjustment Encoder Knob to set the Pulse Frequency to 2 Hz - (0.5 - 200Hz)

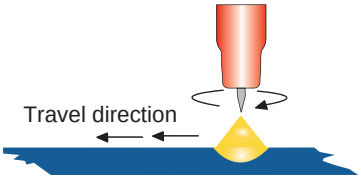
8. Select the Pulse Width (on time of the Peak Amp) by pushing the selector button to cycle through to illuminate the % Pulse Icon



9. Rotate the Adjustment Encoder Knob to set the Pulse Width at 60% - (Range is 10 - 90%).

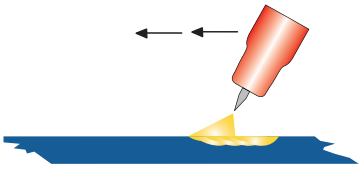


Manual TIG welding is often considered the most difficult of all the welding processes. Because the welder must maintain a short arc length, great care and skill are required to prevent contact between the electrode and the workpiece. Similar to Oxygen Acetylene torch welding, Tig welding normally requires two hands and in most instances requires the welder to manually feed a filler wire into the weld pool with one hand while manipulating the welding torch in the other. However, some welds combining thin materials can be accomplished without filler metal like edge, corner, and butt joints. This is known as Fusion welding where the edges of the metal pieces are melted together using only the heat and arc force generated by the TIG arc. Once the arc is started the torch tungsten is held in place until a weld pool is created, a circular movement of the tungsten will assist is creating a weld pool of the desired size. Once the weld pool is established tilt the torch at about a 75° angle and move smoothly and evenly along the joint while fusing the materials together.



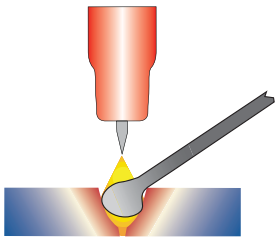
Form a weld pool

Angle torch

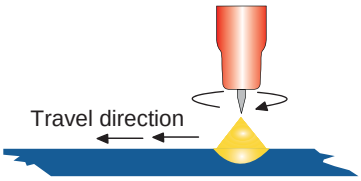


Move the torch slowly and evenly forward

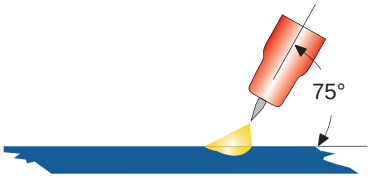
TIG Welding with Filler Wire Technique



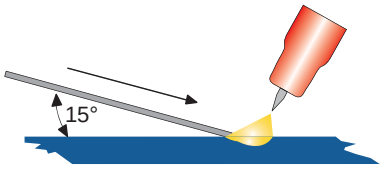
It is necessary in many situations with TIG welding to add a filler wire into the weld pool to build up weld reinforcement and create a strong weld. Once the arc is started the torch tungsten is held in place until a weld pool is created, a circular movement of the tungsten will assist is creating a weld pool of the desired size. Once the weld pool is established tilt the torch at about a 75° angle and move smoothly and evenly along the joint. The filler metal is introduced to the leading edge of the weld pool. The filler wire is usually held at about a 15° angle and fed into the leading edge of the molten pool, the arc will melt the filler wire into the weld pool as the torch is moved forward. Also a dabbing technique can be used to control the amount of filler wire added, the wire is fed into the molten pool and retracted in a repeating sequence as the torch is moved slowly and evenly forward. It is important during the welding to keep the molten end of the filler wire inside the gas shield as this protects the end of the wire from being oxidised and contaminating the weld pool.



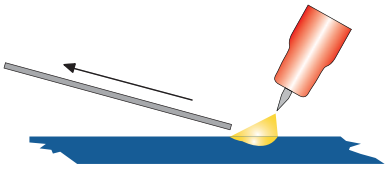
Form a weld pool



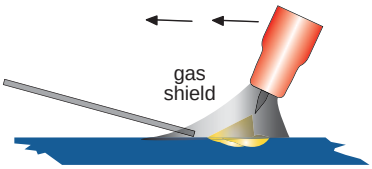
Angle torch



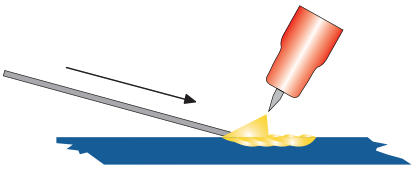
Add Tig filler wire



Retract the filler wire



Move the torch forward to the front of the weld pool



Repeat the process

TIG WELDING GUIDE

Tungsten Electrodes

Tungsten is a rare metallic element used for manufacturing TIG welding electrodes. The TIG process relies on tungsten's hardness and high-temperature resistance to carry the welding current to the arc. Tungsten has the highest melting point of any metal, 3,410 degrees Celsius. Tungsten electrodes are nonconsumable and come in a variety of sizes, they are made from pure tungsten or an alloy of tungsten and other rare earth elements. Choosing the correct tungsten depends on the material being welded, amps required and whether you are using AC or DC welding current.Tungsten electrodes are colour-coded at the end for easy identification. Below are the most commonly used tungsten electrodes found in the New Zealand and Australian market.

Thoriated
Thoriated tungsten electrodes (AWS classification EWTh-2) contain a minimum of 97.30 percent tungsten and 1.70 to 2.20 percent thorium and are called 2 percent thoriated. They are the most commonly used electrodes today and are preferred for their longevity and ease of use. Thorium however is a low-level radioactive hazard and many users have switched to other alternatives. Regarding the radioactivity, thorium is an alpha emitter but when it is enclosed in a tungsten matrix the risks are negligible. Thoriated tungsten should not get in contact with open cuts or wounds. The more significant danger to welders can occur when thorium oxide gets into the lungs. This can happen from the exposure to vapours during welding or from ingestion of material/dust in the grinding of the tungsten. Follow the manufacturer's warnings, instructions, and the Material Safety Data Sheet (MSDS) for its use.

E3 (Color Code: Turquoise)
E3 tungsten electrodes (AWS classification EWG) contain a minimum of 98% percent tungsten and up to 1.5 percent Lanthanum and small percentages of Zirconium and Yttrium they are called E3 Tungsten. E3 Tungsten Electrodes provide conductivity similar to that of thoriated electrodes. Typically, this means that E3 Tungsten Electrodes are exchangeable with thoriated electrodes without requiring significant welding process changes. E3 deliver superior arc starting, electrode lifetime, and overall cost-effectivenes. When E3 Tungsten Electrodes are compared with 2% thoriated tungsten, E3 requires fewer re-grinds and provides a longer overall lifetime. Tests have shown that ignition delay with E3 Tungsten Electrodes actually improves over time, while 2% thoriated tungsten starts to deteriorate after only 25 starts. At equivalent energy output, E3 Tungsten Electrodes run cooler than 2% thoriated tungsten, thereby extending overall tip lifetime. E3 Tungsten Electrodes work well on AC or DC. They can be used DC electrode positive or negative with a pointed end, or balled for use with AC power sources.

Ceriated (Color Code: Grey)
Ceriated tungsten electrodes (AWS classification EWCe-2) contain a minimum of 97.30 percent tungsten and 1.80 to 2.20 percent cerium and are referred to as 2 percent ceriated. Ceriated tungstens perform best in DC welding at low current settings. They have excellent arc starts at low amperages and become popular in such applications as orbital tube welding, thin sheet metal work. They are best used to weld carbon steel, stainless steel, nickel alloys, and titanium, and in some cases it can replace 2 percent thoriated electrodes. Ceriated tungsten is best suited for lower amperages it should last longer than Thoriated tungsten higher amperage applications are best left to Thoriated or Lanthanated tungsten.

Lanthanated (Color Code: Gold)
Lanthanated tungsten electrodes (AWS classification EWLa-1.5) contain a minimum of 97.80 percent tungsten and 1.30 percent to 1.70 percent lanthanum, and are known as 1.5 percent lanthanated. These electrodes have excellent arc starting, a low burn off rate, good arc stability, and excellent re-ignition characteristics. Lanthanated tungstens also share the conductivity characteristics of 2 percent thoriated tungsten. Lanthanated tungsten electrodes are ideal if you want to optimise your welding capabilities. They work well on AC or DC electrode negative with a pointed end, or they can be balled for use with AC sine wave power sources. Lanthanated tungsten maintains a sharpened point well, which is an advantage for welding steel and stainless steel on DC or AC from square wave power sources.

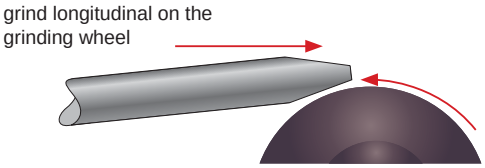
Zirconiated (Color Code: White)
Zirconiated tungsten electrodes (AWS classification EWZr-1) contain a minimum of 99.10 percent tungsten and 0.15 to 0.40 percent zirconium. Most commonly used for AC welding Zirconiated tungsten produces a very stable arc and is resistant to tungsten spitting. It is ideal for AC welding because it retains a balled tip and has a high resistance to contamination. Its current-carrying capacity is equal to or greater than that of thoriated tungsten. Zirconiated tungsten is not recommended for DC welding.

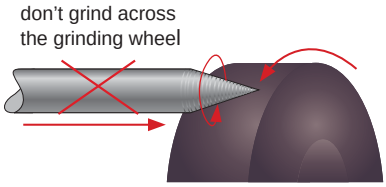
Tungsten Electrodes Rating for Welding Currents

Tungsten Diameter mm	DC Current Amps Torch Negative 2% Thoriated	AC Current Amps Un-Balanced Wave 0.8% Zirconiated	AC Current Amps Balanced Wave 0.8% Zirconiated
1.0mm	15 - 80	15 - 80	20 - 60
1.6mm	70 -150	70 - 150	60 - 120
2.4mm	150- 250	140 - 235	100 - 180
3.2mm	250 - 400	225 - 325	160 - 250
4.0mm	400 - 500	300 - 400	200 - 320

Tungsten Preparation

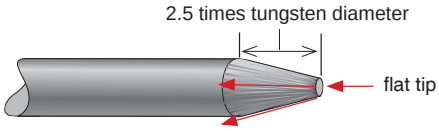
Always use **DIAMOND** wheels when grinding and cutting. While tungsten is a very hard material, the surface of a diamond wheel is harder, and this makes for smooth grinding. Grinding without diamond wheels, such as aluminium oxide wheels, can lead to jagged edges, imperfections, or poor surface finishes not visible to the eye that will contribute to weld inconsistency and weld defects.
Always ensure to grind the tungsten in a longitudinal direction on the grinding wheel. Tungsten electrodes are manufactured with the molecular structure of the grain running lengthwise and thus grinding crosswise is “grinding against the grain.” If electrodes are ground crosswise, the electrons have to jump across the grinding marks and the arc can start before the tip and wander. Grinding longitudinally with the grain, the electrons flow steadily and easily to the end of the tungsten tip. The arc starts straight and remains narrow, concentrated, and stable.

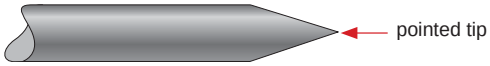




Electrode Tip/Flat

The shape of the tungsten electrode tip is an important process variable in precision arc welding. A good selection of tip/flat size will balance the need for several advantages. The bigger the flat, the more likely arc wander will occur and the more difficult it will be to arc start. However, increasing the flat to the maximum level that still allows arc start and eliminates arc wonder will improve the weld penetration and increase the electrode life. Some welders still grind electrodes to a sharp point, which makes arc starting easier. However, they risk decreased welding performance from melting at the tip and the possibility of the point falling off into the weld pool.

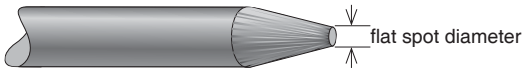


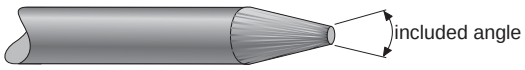


Electrode Included Angle/Taper - DC Welding

Tungsten electrodes for DC welding should be ground longitudinally and concentrically with diamond wheels to a specific included angle in conjunction with the tip/flat preparation. Different angles produce different arc shapes and offer different weld penetration capabilities. In general, blunter electrodes that have a larger included angle provide the following benefits:

- Last Longer
- Have better weld penetration
- Have a narrower arc shape
- Can handle more amperage without eroding.





Sharper electrodes with smaller included angle provide:

- Offer less arc weld
- Have a wider arc
- Have a more consistent arc

The included angle determines weld bead shape and size. Generally, as the included angle increases, penetration increases and bead width decreases.

Tungsten Diameter	Diameter at the Tip - mm	Constant Included Angle - Degrees	Current Range Amps	Current Range Pulsed Amps
1.0mm	.250	20	05 - 30	05 - 60
1.6mm	.500	25	08 - 50	05 - 100
1.6mm	.800	30	10 - 70	10 - 140
2.4mm	.800	35	12 - 90	12 - 180
2.4mm	1.100	45	15 - 150	15 - 250
3.2mm	1.100	60	20 - 200	20 - 300
3.2mm	1.500	90	25 - 250	25 - 350

INSTALLATION SET UP FOR AC TIG WELDING

AC HF TIG Welding Setup and Operation

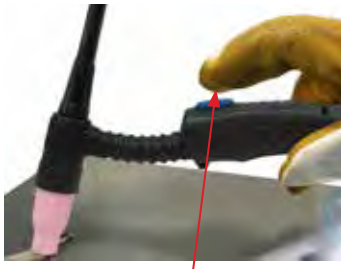
1. Connect the Tig Torch connector to the negative terminal and tighten it.
2. Insert the torch gas connector into the quick lock gas receptacle.
3. Connect the torch switch remote lead into the torch remote socket.
4. Connect the Earth Cable connector into the positive terminal and tighten it.
5. Connect the gas line to the quick lock gas inlet connector at the rear of the machine.
   Check for gas leaks - Esseti NZ Ltd nor it's representatives will be responsible for any gas loss.
6. Connect gas line to Gas Regulator and connect the gas regulator to the Gas Cylinder.
   Slowly open the valve on the gas cylinder and set gas flow to the required rate.
7. Switch on the machine using the On/Off switch at the rear of the machine.
8. Set the weld parameters using the front panel set procedure on the following page.

Weld start procedure for HF AC TIG welding

1. Assemble the front end torch parts use the correct size and type of tungsten electrode for the job. Use a tungsten type suitable for AC welding.

2. Lay the outside edge of the Gas Cup on the work piece with the Tungsten Electrode 1- 3mm from the work piece

3. Press the torch switch and the arc will ignite across the gap between the tungsten and work piece. Hold even distance of about 2mm gap between the tungsten and work piece to maintain the arc.



4. Release the torch switch to bring in the end of the welding sequence dependant of 2T or 4T trigger function choice

Front panel set up procedure for basic AC HF TIG welding

1. Select AC Tig Function.

Select AC TIG by pressing the button until the **AC** icon illuminates. Select **2T** or **4T** trigger function as required by the pushing the button to cycle through the trigger options. The icon will illuminate for the selected trigger option.

2. Select Tungsten Diameter.

(2) Select the tungsten diameter required by pushing the encoder repeatedly, cycle through to illuminate the Tungsten Electrode icon. Set the size required by turning the encoder knob. The set size will appear in the digital display.

3. Set Pre-gas Time

Set the pre gas time by pushing the encoder repeatedly, cycle through to illuminate the Pre Gas icon. Set the time by turning the encoder knob. The set time will appear in the digital display

4. Set Start Amps

Set the Start Amps by pressing the encoder to cycle through to illuminate the Start Amp icon. Set the start amps by turning the encoder knob. The set start amps will appear in the digital display

5. Set Up Slope Time

Set the Up Slope by pressing the encoder to cycle through to illuminate the Up Slope icon. Set the up slope time by turning the encoder knob. The set up slope time will appear in the digital display

6. Set Welding Amperage

Set welding amps by pressing the encoder to cycle through to illuminate the Peak Amp icon. Set the amperage by turning the encoder knob. The set welding amperage will appear in the digital display

7. Set AC Square Wave Frequency (AC Hz)

Set the AC Hz by pressing the encoder cycle through to illuminate the AC Hz icon. Set the AC Hz by turning the encoder knob. The set AC Hz will appear in the digital display

8. Set AC Balance

Set the AC Balance by pressing the encoder to cycle through to illuminate the AC Balance icon. Set the AC Balance by turning the encoder knob. The set AC balance will appear in the digital display. Refer page 30-31 for detailed AC balance information.

9. Set Down Slope Time

Set the down slope by pressing the encoder to cycle through to illuminate the Down Slope icon. Set the down slope time by turning the encoder knob. The set down slope time will appear in the digital display

continued - Front panel set up procedure for basic AC TIG welding

10. Set Finish Amps

Set the finish amps by pressing the encoder to cycle through to illuminate the Finish Amps icon. Set the finish amps by turning the encoder knob. The set finish amps will appear in the digital display

11. Set Post Gas Time

Set the post gas time by pressing the encoder to cycle through to illuminate the Post Gas icon. Set the post gas time by turning the encoder knob. The set post gas time will appear in the digital display

AC TIG Welding - AC Square Wave Frequency Control

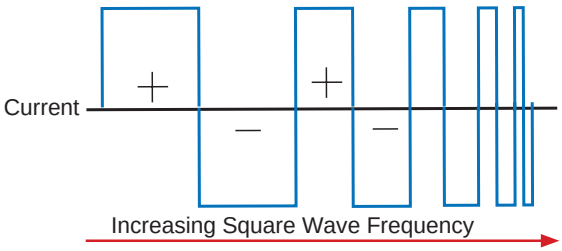
It is possible with the RAZOR200ACDC machine to adjust the frequency of the AC Square Wave output. It means that the amount of time that it takes the AC square wave to complete a full cycle switch from postive (+) to negative (-) can be adjusted from 20Hz (20 times per second) to 200Hz

Increasing frequency (Hz) causes the current to change direction more often, which means that it spends less time per cycle in both DC electrode negative and DC electrode positive mode. By spending less time at each polarity, the arc cone has less time to expand.

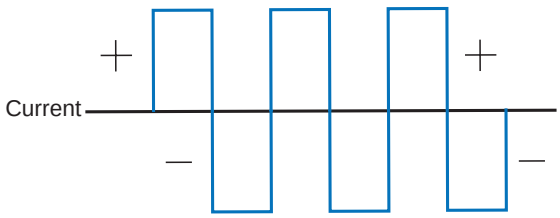
A higher frequency produces a narrower arc cone producing an arc that is tighter with more focus at the exact spot the electrode is pointing. The result is improved arc stability, ideal for fillet welds and other fit ups requiring precise penetration.

Decreasing the frequency softens the arc and broadens the weld pool producing a wider bead, produces good overall penetration and ideal for build up applications.

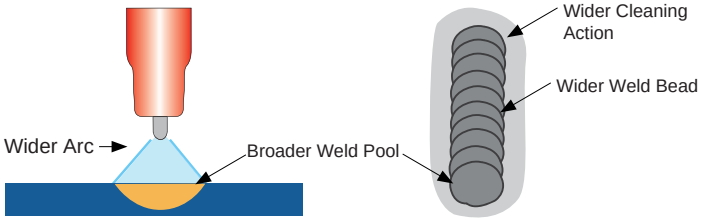
AC Square Wave Hz



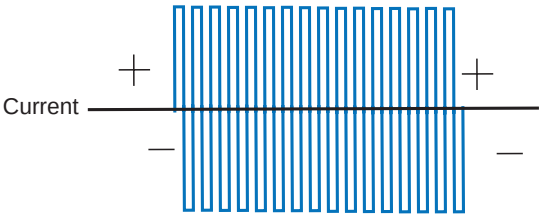
Slower AC Square Wave Hz



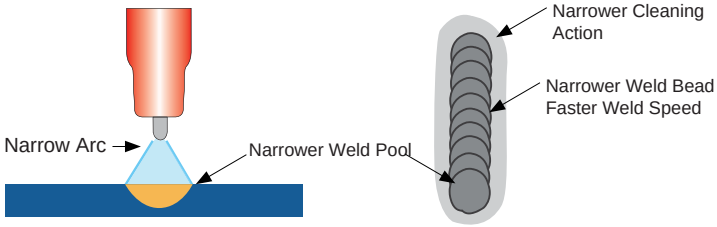
Slower AC Square Wave Hz



Faster AC Square Wave Hz

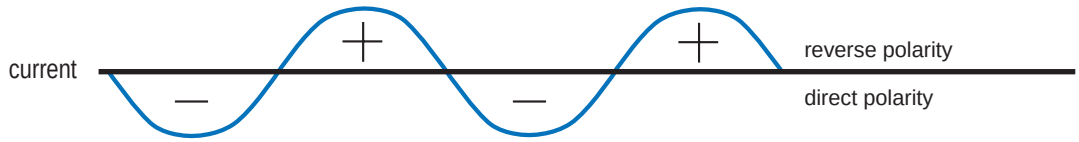


Faster AC Square Wave Hz

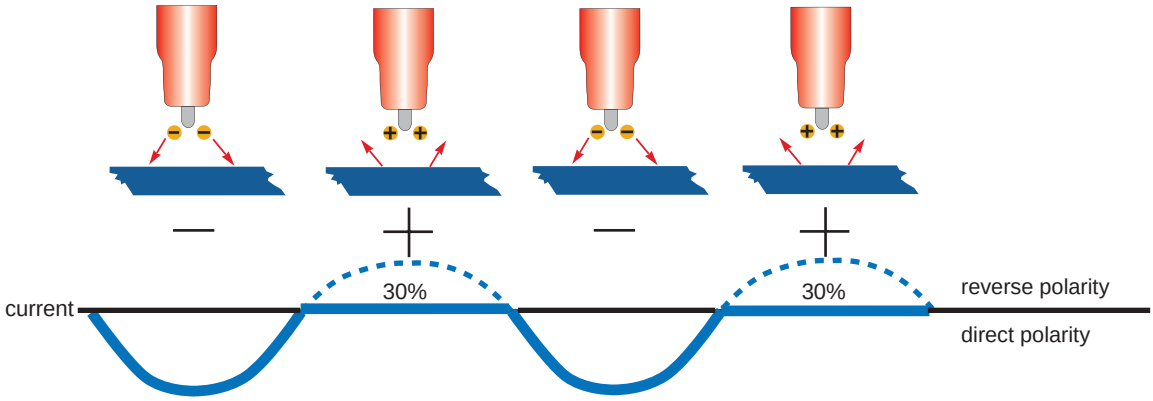


AC TIG Welding - AC Wave Balance Control

The use of Alternating Current enables us to TIG weld non-ferrous alloys like Aluminium, Magnesium and Aluminium Alloys. These materials have an insulating surface oxide layer that melts at a higher temperature than the base metal beneath, making it difficult to weld if the oxides are not removed. AC welding current is ideal because the nature of the AC wave form assists in breaking the surface oxide layer, often referred to as the “cleaning action”. AC current has a cycle where the flow changes direction between Electrode Negative (-, direct polarity) and Electrode Positive (+, reverse polarity). The Electrode Positive phase of this cycle breaks down the surface oxides while the direct polarity Electrode Negative phase melts the base material and provides weld penetration.

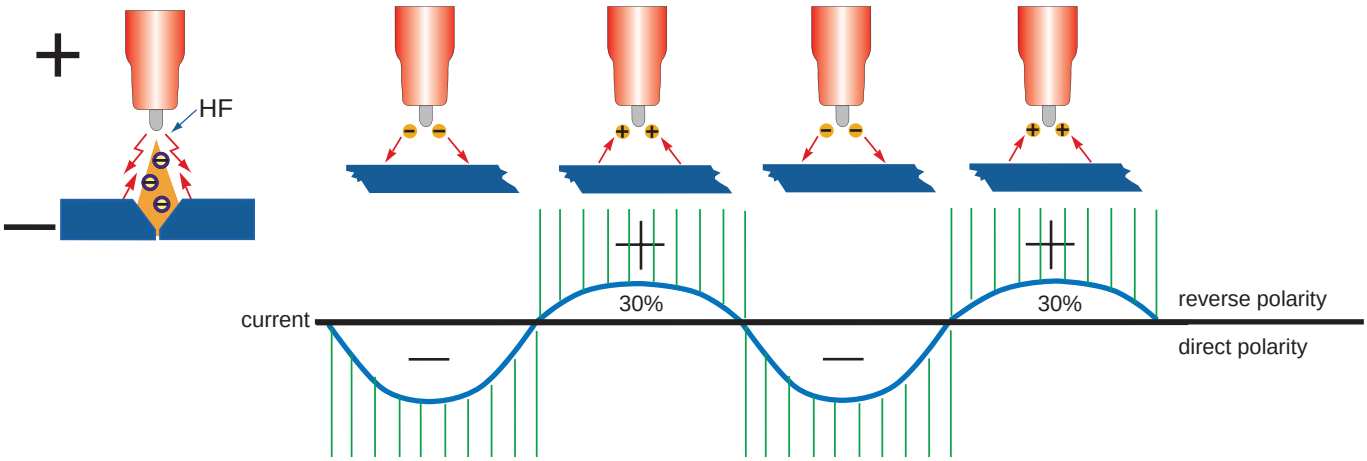


There are inherent problems that come with AC TIG arc rectification: arc stutter, arc wandering and arc stoppage. These problems typically occur during the transition between positive and negative phase of the alternating cycles. The current reduces by as much as 30% during the electrode positive phase and there is a resistance of the electron flow during this half cycle (rectification). The lack of current flow during this half cycle makes the AC arc unstable.

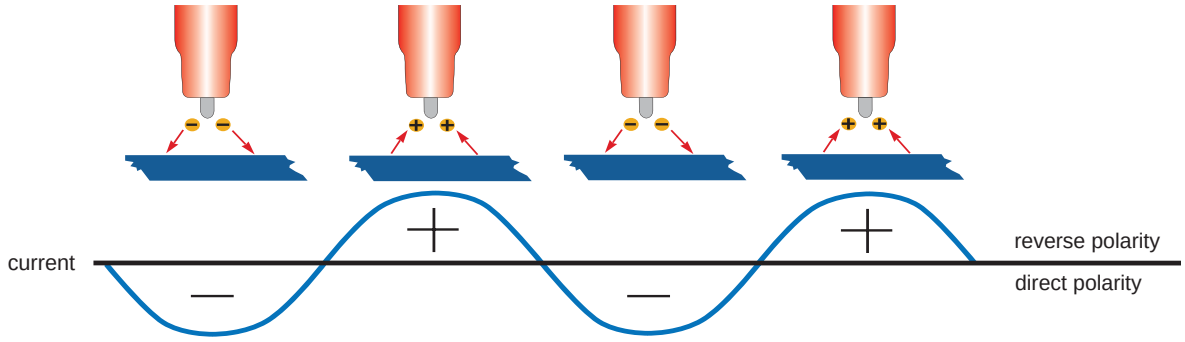


In older welding machines, to overcome this lack of flow during the Electrode Positive phase of the cycle, high-frequency (HF) voltage is generated and fed continually into the welding circuit. The HF energizes the arc and maintains arc stability during the Electrode Positive phase of the AC cycle. Although the welding arc is maintained, less current flows during the Electrode Positive phase of the AC cycle, resulting in an unbalanced wave form.

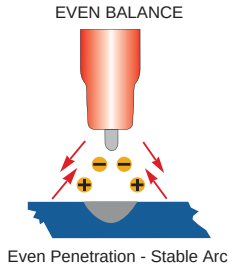
UNBALANCED WAVE FORM



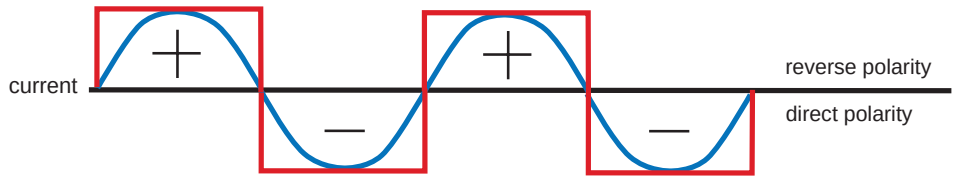
In older machines, a balanced current output wave was maintained using several capacitors in series or a battery in the welding machine. Modern inverter based TIG power sources use electronics to create and maintain a balanced wave and now most AC TIG power sources produce a Square Wave current output.



An AC TIG power supply with Square Wave output can change the direction of current flow from Electrode Positive to Electrode Negative almost instantly. This fast switching speed results in high voltage as the current switches polarity, allowing the arc to retain stability without the use of continual HF or any other arc stabilising methods. HF is still retained for the initial ignition of the TIG welding arc as the preferred method of arc starting.

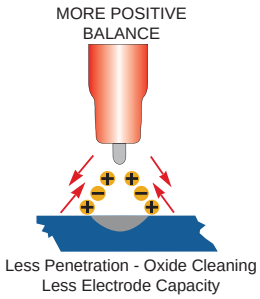


BALANCED SQUARE WAVE FORM

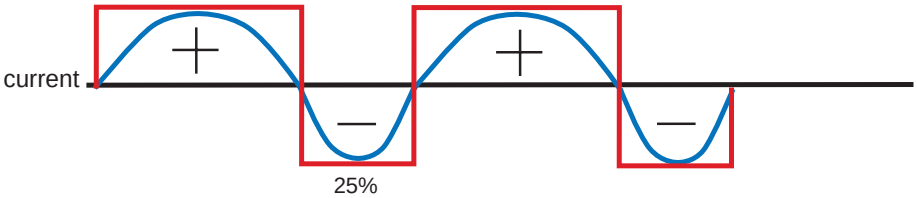


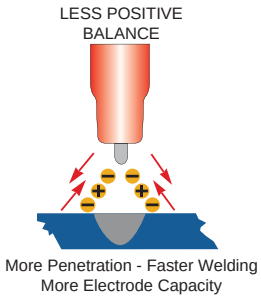
For many years, much of the AC TIG welding equipment available did not have the luxury of adjusting AC Balance. The balance was typically fixed at a 50/50 percentage, with half the cycle time on Electrode Positive and half the cycle time on Electrode Negative. Such a high duration in Electrode Positive would cause the Tungsten Electrode to become very hot and often result in the tip melting and dropping into the weld puddle. To help mediate that problem, welders would prepare the tungsten by melting or “balling” of the tip on a scrap surface before welding. This preparation allows the Tungsten Electrode to better cope with the excessive heat generated in the excessively long Electrode Positive phase of the AC cycle. In modern AC TIG machines that is no longer an issue as AC Balance allows us to reduce the cycle time in Electrode Positive, making it unnecessary to ball the tungsten before welding.

In modern AC TIG machines, the current polarity changes between Electrode Positive and Electrode Negative is controlled electronically so the balance between each can be adjusted manually by the operator. This allows adjustment between the amount of cleaning action and the amount of penetration. Adjusting AC Balance to give more time in the Electrode Positive phase produces more current flow from the workpiece to the Tungsten and increases the de-oxidisation or cleaning action of the workpiece surface. Electrode Positive current also results in more heat being driven into the Tungsten Electrode and excessive Electrode Positive can still result in the Tungsten overheating and melting.

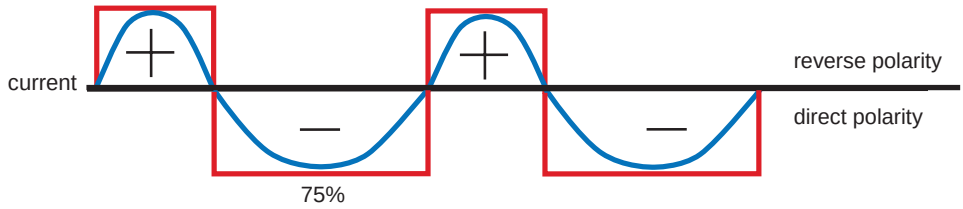


Balance Adjusted for Higher Oxide Cleansing Action - Hotter Tungsten
More time spent in postive + polarity cycle





Balance Adjusted for Better Penetration - Cooler Tungsten
More time spent in the negative _ polarity cycle



KNOWING HOW YOUR MACHINE MEASURES ITS AC BALANCE

Knowing how your AC TIG machine measures and displays its AC Balance is important.

Different machine manufacturers express the AC Balance by referencing the percentage (%) of time spent in either the Electrode Positive or Electrode Negative phase of the AC cycle and often do not tell you which they are referring to when AC Balance is displayed. You may need to check your operating manual or test the AC Balance control of your machine to confirm if the machine is displaying the measure of Electrode Positive or Electrode Negative

IMPORTANT: Xcel-Arc, Razorweld and Viper AC TIG welding machines with Electronic AC Balance Control display the AC Balance by % of time spent in the Electrode Negative phase of the AC cycle

Synergic AC Balance - The level of welding amperage selected affects where the ideal AC Balance point is to produce a stable arc that provides good cleaning action and good penetration. In conventional machines, as you increase or decrease the Amperage, you will need to adjust the AC Balance to maintain a good arc characteristic. With the use of software, our MCU digital control interface provides a simple, yet highly effective Synergic solution to setting the ideal AC Balance. As you set the Amperage to suit your job conditions, the machine automatically adjusts the AC Balance to suit. This default point is shown as “0” on the AC Balance display and the machine also provides a window of adjustment either side of this default “0” position. You can adjust for more Electrode Negative for a more penetrating, narrower arc or adjust more to the Electrode Positive side for a more cleansing arc.

Setting the AC Balance on Front Control Panel

Set the AC Balance by pressing the encoder to cycle through to illuminate the AC Balance icon. The synergic software will always provide an ideal setting at “0” no matter what Amperage you have set. Adjust the AC Balance by turning the encoder knob, as you adjust further into negative figures the machine will provide more penetration and a narrower arc. Adjusting into positive figures will increase the cleaning action and result in a wider arc. You can adjust the AC Balance away from the default “0” position down to -10 for maximum Electrode Negative and up to +10 for maximum Electrode Positive setting.

The below table shows the % of time the Electrode is in Negative Polarity.

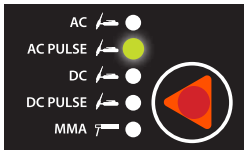
XA-TIG200CRZ ACDC

Amperage Range	% of Electrode Negative (EN) at Default 0	AC Balance Range (EN) -10 ~ 10+
5 ~ 80A	60%	70% ~ 50%
80 ~ 150A	65%	75% ~ 55%
150 ~200A	70%	80% ~ 60%

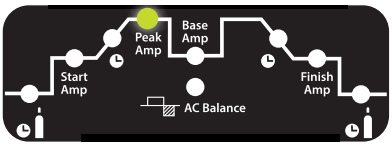
AC Pulse Welding Set Up Procedure

The Razorweld 200ACDC machine has digital Pulse Frequency Control. All the parameters for AC Pulse Tig welding - Peak Amp, Base Amp, Pulse Frequency and Pulse Width are easy to set via the digital control panel.

EXAMPLE OF PULSE AC TIG WELDING - SETUP PARAMETERS:
Material = Aluminium x 3.0mm / Tungsten Electrode = 2.4mm Zirconiated / Gas = Argon
The following steps are a guide as a starting point for you to set the machine up in Pulse mode to give an example of welding in Pulse mode function. You can experiment by changing any of the variables to see what effect it has over the welding and what the end result can be, but it is suggested to change only one variable at a time and then check the welding to see what the result is, in this way you acquire a better understanding of how each variable affects the welding current.

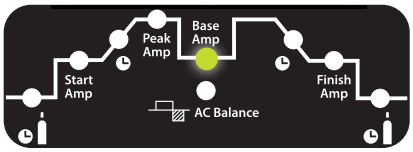


1. Select AC Pulse by pushing selector button to cycle through to illuminate AC Pulse icon.

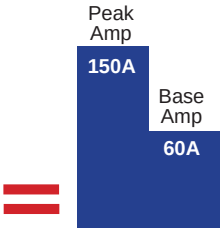


2. Select Peak Amp by pressing the encoder knob to cycle through to illuminate the Peak Amp Icon

3. Rotate the Encoder Knob to set the Peak Amp at 150A, it will show in the digital display. (Range is 10-200 Amps)

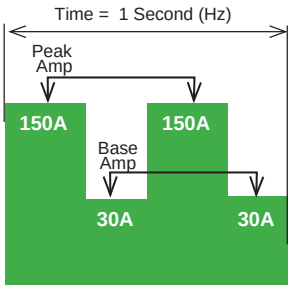


4. Select the Base Amp by pushing the encoder knob to cycle through to illuminate the Base Amp Icon



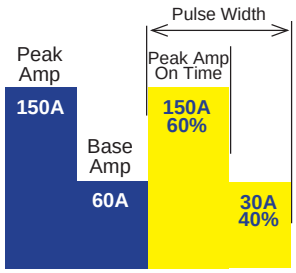
5. Rotate the Encoder Knob to set the Base Amp at 60A - (Range is 5-200 Amps)

6. Select the Pulse Frequency by pushing the encoder knob to cycle through to illuminate the Pulse Hz Icon



7. Rotate the Adjustment Encoder Knob to set the Pulse Frequency to 2 Hz - (0.5 - 200Hz)

8. Select the Pulse Width (on time of the Peak Amp) by pushing the selector button to cycle through to illuminate the % Pulse Icon



9. Rotate the Adjustment Encoder Knob to set the Pulse Width at 60% - (Range is 10 - 90%).

GAS FLOW REGULATORS

The job of the gas flow regulator is to reduce the bottle pressure gas down to a lower pressure and deliver it at a constant flow. This constant flow of gas is usually fed through the welding machine where it is controlled by a solenoid valve, operated when the torch trigger is pulled. Once the gas has passed the solenoid valve it flows down the torch cable exiting at the gas nozzle to protect the weld pool and surrounding area. There are two main types of flow regulators commonly used for MIG and TIG welding applications. Both regulator types perform the same function, but have a different way of setting and measuring the gas flow. A flow-gauge regulator (Fig.1) has a dial-type pressure gauge to measure the cylinder contents and a second gauge to measure and deliver the flow rate required.The flow-meter regulator (Fig.2) has a pressure gauge to measure the cylinder contents and a flow tube assembly to measure and deliver the flow rate required. Some flowmeter regulators will have two flow tube assemblies (Fig.3) typically one is used for supplying gas to the welding machine and the other is used used for purging the welding area with gas prior to welding, during welding and post welding and at a separate rate of flow from that being supplied to the welding machine. The amount of gas flow needed to do the job will depend on the welding gas and the job being done, but a common setting to start with is 10 L/min.

Fig.1

Fig.2

Fig.3

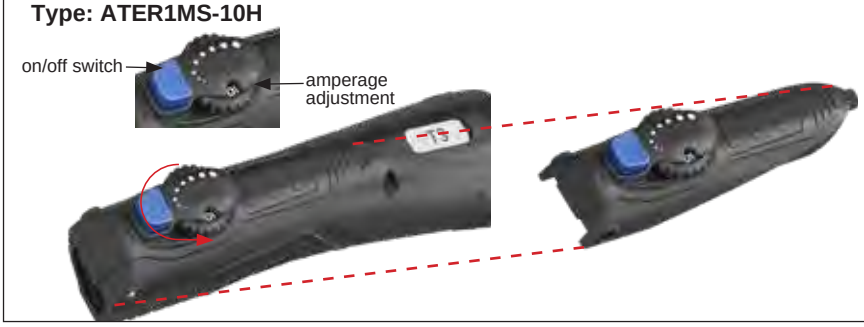
SHIELDING GASES

Shielding gases are almost always necessary for MIG and TIG welding processes to protect the weld zone from gases that are contained in the surrounding atmosphere, particularly nitrogen and oxygen. If allowed into the weld zone these gases will contaminate the weld pool resulting in fusion defects also porosity and embrittlement of the weld metal. Selecting the right type of shielding gas depends on the welding process being used and type of material being welded. The MIG process is typically a mixture of Argon and Co2 (AR90% Co2 10%) or pure Co2 for steel welding applications, other specialised mixtures of Argon, Co2, and Oxygen are available for stainless steel welding but with welding aluminium pure Argon is almost always used The TIG welding process almost always requires 100% Argon for welding of all materials, however in some specialised applications Helium, or a Helium mix are sometimes used. Today with the multitude of gas mixes available through a number of different suppliers, it is difficult to list and recommend which gas mix is better for which job. If you are unsure about what gas or gas mix to use we recommend you discuss with your application local gas suppliers or your Esseti technical representative.

REMOTE AMPERAGE CONTROL OPERATION - T3

Remote amperage controls allow remote welding current adjustment from the welding machine during welding.

Type: ATER1MS-10H



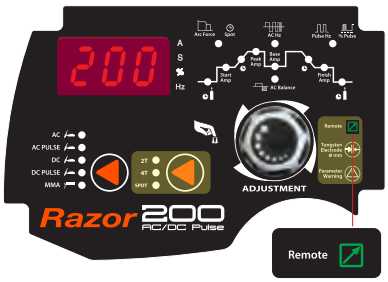
Type: XA-RFC-2

Connection and operation of the remote hand control

1. Connect the remote control 7 pin plug from the Tig Torch switch lead to the 7 pin remote receptacle on the front panel of the machine.

2. Select **4T** trigger function by pushing the button to cycle through until the **4T** icon illuminates as the chosen option.

3. Activate the remote control. Press and hold the torch switch for 5 second until the machine beeps to indicate the remote function has activated. Repeat the procedure to de-activate the remote control.



(4) The thermal **LED** will illuminate **Green** to indicate the machine is in remote control mode. **Note:** The machine will default to non-remote mode when switched off.

5. Rotate the Remote Control Knob to adjust the amperage output of the machine. The remote can be used static or during welding to adjust the amps up or down.

6. The amps set by the remote control will show in the Digital Display of the machine.

Connection and operation of the remote foot control

1. Connect the remote control 7 pin plug from the Tig Torch switch lead to the 7 pin remote receptacle on the front panel of the machine.

2. Select **2T** trigger function by pushing the button to cycle through until the **2T** icon illuminates

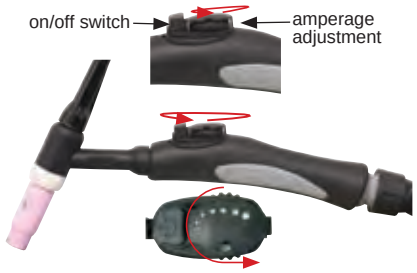
3. Activate by holding down the foot pedal for 5 seconds, the remote icon will illuminate. Up & down travel of the foot pedal will adjust the welding amperage during welding. The side potentiometer knob will allow manual set and adjustment.

REMOTE AMPERAGE CONTROL OPERATION - XA26 (OPTIONAL)

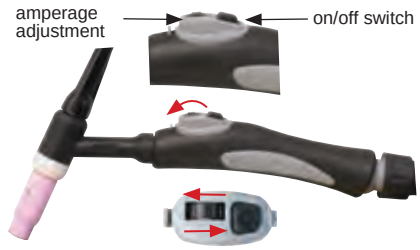
RazorWeld

Remote amperage controls allow remote welding current adjustment from the welding machine during welding.

Type: ER1MS-10H



Type: ER1MS-10



Type: XA-RFC-2

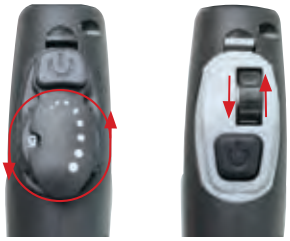
Connection and operation of the remote hand control

1. Connect the remote control 7 pin plug from the Tig Torch switch lead to the 7 pin remote receptacle on the front panel of the machine.

2. Select **4T** trigger function by pushing the button to cycle through until the **4T** icon illuminates as the chosen option.

3. Activate the remote control. Press and hold the torch switch for 5 second until the machine beeps to indicate the remote function has activated. Repeat the procedure to de-activate the remote control.

(4) The thermal **LED** will illuminate **Green** to indicate the machine is in remote control mode. **Note:** The machine will default to non-remote mode when switched off.



5. Rotate the Remote Control Knobto adjust the amperage output of the machine. The remote can be used static or during welding to adjust the amps up or down.

6. The amps set by the remote control will show in the Digital Display of the machine.

Connection and operation of the remote foot control

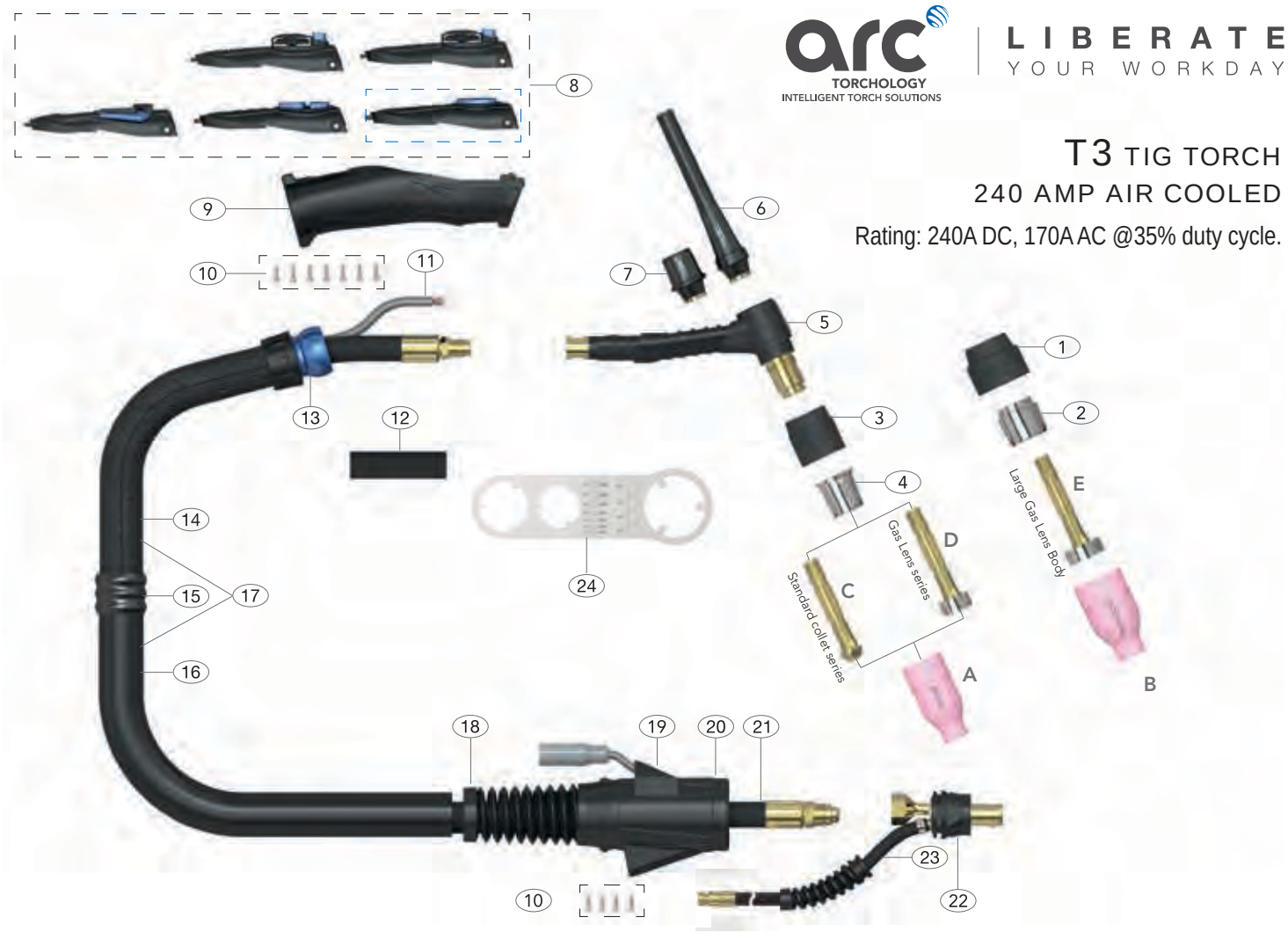
1. Connect the remote control 7 pin plug from the Tig Torch switch lead to the 7 pin remote receptacle on the front panel of the machine.

2. Select **2T** trigger function by pushing the button to cycle through until the **2T** icon illuminates

3. Activate by holding down the foot pedal for 5 seconds, the remote icon will illuminate. Up & down travel of the foot pedal will adjust the welding amperage during welding. The side potentiometer knob will allow manual set and adjustment.

ARC T3 TIG TORCH & SPARES

Supplied as standard with TIG200CRZ



Torch Model		
Description	**Part Number 4m**	**8m**
ARC T3Tig Torch 35-50 Twistlok End, QF Gas	ARC-T3-4M	ARC-T3-8M
ARC T3FX **Flexi** Tig Torch 35-50 Twistlok End, QF Gas	ARC-T3FX-4M	ARC-T3FX-8M

Spare Parts

	Part Number	Description
3	T3GS	Head Gasket
4	T3SN	Heat Zone Isolator
5	AT2601	T3 Torch Body Air-Cooled
	AT2601F	T3 Flexi Torch Body Air-Cooled
6	T3LBC	Long Back Cap
7	T3SBC	Short Back Cap
8*	ATER1MS	Momentary Switch Kit
9	ATERH200	Arc Handle Kit
10	ATERSP1	Screw Pack
11	ATERSWL4	Trigger Lead 4m
	ATERSWL8	Trigger Lead 8m
12	ATHS18MM-90	Heat Shrink Tube
13	ATERKJ200	Knuckle Joint
14	ATERLC200-08	Leather Cover x 0.8m
15	ATERJK200	Joint Repair Kit

Spare Parts

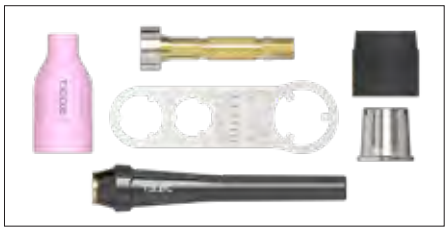
	Part Number	Description
16	ATERNCL-32	Neoprene Cover Assembly x 3.2m
	ATERNCL-72	Neoprene Cover Assembly x 7.2m
17	ATERCO200-40	Sheath x 4m Inc Leather Cover
	ATERCO200-80	Sheath x 8m Inc Leather Cover
18	ATSLH26-S	Cable Support Large
19	ATSLH26-C	SurelokTM Housing Cover
20	ATNSLH26-H	SurelokTM Housing Large
21	AT2620-4M-OB	Power Cable x 4m Surelok O/B Rubber
	AT2620-8M-OB	Power Cable x 8m Surelok O/B Rubber
22	ATNSL3550	Surelok Body & Support
23	ATNSLOB-1-GS#	Gas Supply Hose O/B
24	AT-SP	Spanner

ARC T3 TIG TORCH & SPARES

Supplied as standard with TIG200CRZ

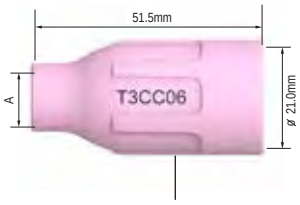
RazorWeld

Gas Lens Body Starter Kits - Medium



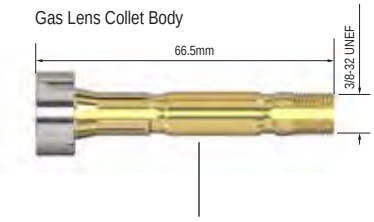
Part #	Description
MGL2	ARC Medium Gas Lens Body Starter Kit 1.6mm Ø
MGL4	ARC Medium Gas Lens Body Starter Kit 2.4mm Ø
MGL5	ARC Medium Gas Lens Body Starter Kit 3.2mm Ø

Front End Wear Parts - Medium



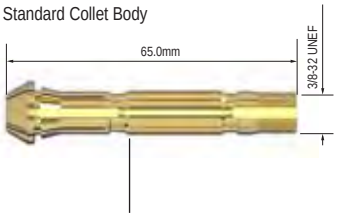
Part #	Description	Size
T3CC04	Ceramic Cup Ø6mm	4
T3CC05	Ceramic Cup Ø8mm	5
T3CC06	Ceramic Cup Ø10mm	6
T3CC07	Ceramic Cup Ø11mm	7
T3CC08	Ceramic Cup Ø12.5mm	8
T3CC10	Ceramic Cup Ø16mm	10
T3CC12	Ceramic Cup Ø19mm	12

Gas Lens Collet Body



Part #	Description
T3GL10	Gas Lens Collet Body 1.0mm
T3GL16	Gas Lens Collet Body 1.6mm
T3GL24	Gas Lens Collet Body 2.4mm
T3GL32	Gas Lens Collet Body 3.2mm

Standard Collet Body



Part #	Description
T3CB10	Collet Body 1.0mm
T3CB16	Collet Body 1.6mm
T3CB24	Collet Body 2.4mm
T3CB32	Collet Body 3.2mm

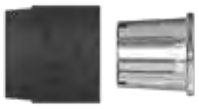
Gas Lens Body Filter Kits - Medium

Part #	Description
MGL10FS-3KIT	ARC Medium Gas Lens Body Filter Kit-1.0mm Ø (3 per Kit)
MGL16FS-3KIT	ARC Medium Gas Lens Body Filter Kit-1.6mm Ø (3 per Kit)
MGL24FS-3KIT	ARC Medium Gas Lens Body Filter Kit-2.4mm Ø (3 per Kit)
MGL32FS-3KIT	ARC Medium Gas Lens Body Filter Kit-3.2mm Ø (3 per Kit)

Back Caps

Part #	Description
T3SBC	ARC T3 Short Back Cap
T3LBC	ARC T3 Long Back Cap

Head Gasket & Isloator



Part #	Description
T3GS	ARC T3 Head Gasket
T3SN	ARC T3 Heat Zone Isolator

arc TORCHOLOGY INTELLIGENT TORCH SOLUTIONS | LIBERATE YOUR WORKDAY

XA26 TIG TORCH & SPARES

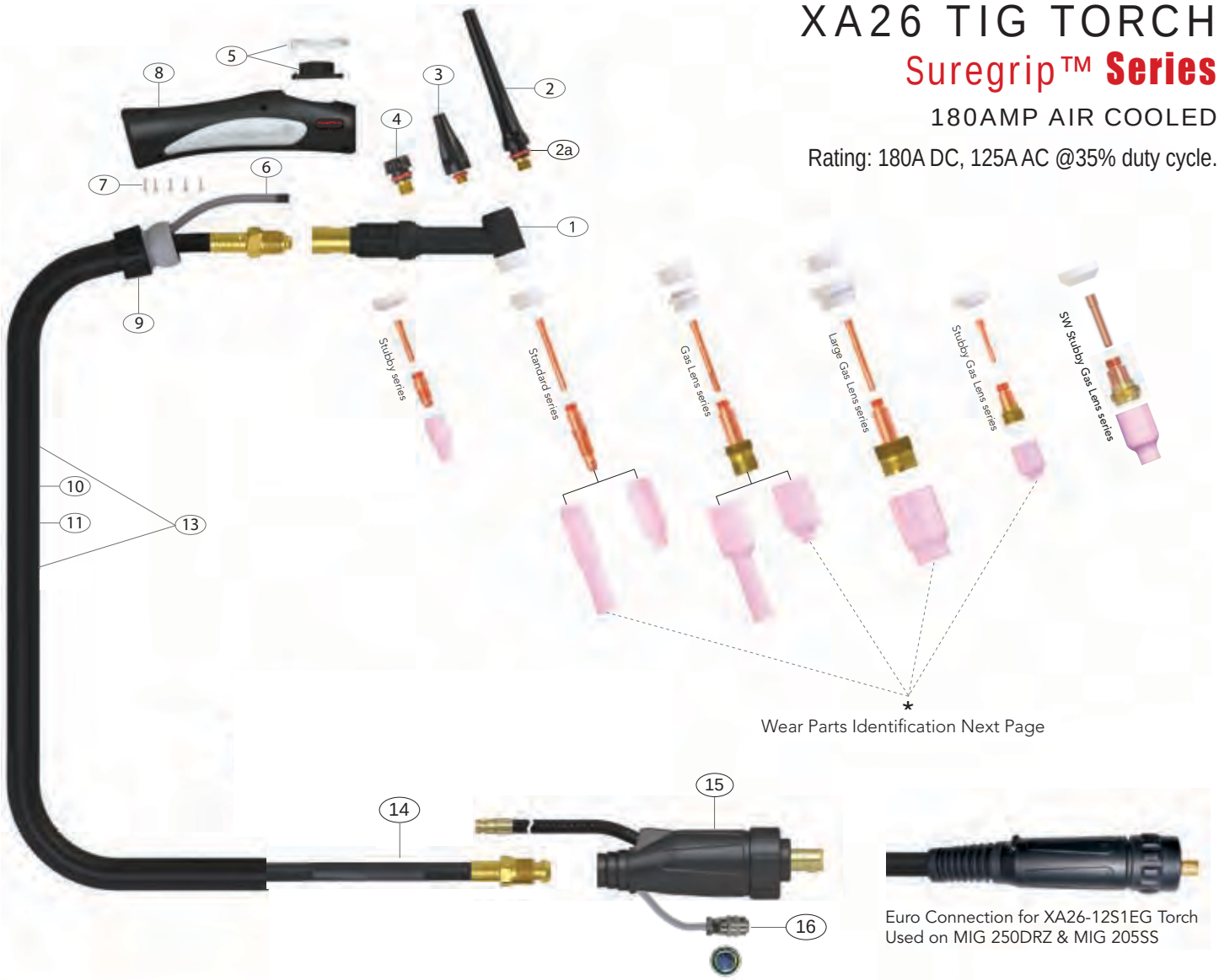
Optional with TIG200CRZ machine

XA26 TIG TORCH

Suregrip™ Series

180AMP AIR COOLED

Rating: 180A DC, 125A AC @35% duty cycle.



Euro Connection for XA26-12S1EG Torch
Used on MIG 250DRZ & MIG 205SS

Torch Model Description	Part Number 4m	Part Number 8m
XA26 Suregrip Tig Torch 4m, Surelok Connector QF Gas	XA26-S112GS4	XA26-S125GS4
XA26FX Suregrip Flexi Tig Torch, Surelok Connector, QF Gas	XA26FX-S112GS4	XA26FX-S125GS4
XA26FX Suregrip Flexi Tig Torch, Euro Connection Style	XA26-12S1EG	XA26-25S1EG

Spare Parts

	Part Number	Description
1	XA26	Torch Body Standard
	XA26FX	Torch Body Flexible
2	57Y02	Back Cap Long
2a	98W18	Back Cap O Ring
3	57Y05	Back Cap Medium
4	57Y04	Back Cap Short
5	ER1MS	Momentary Switch Kit (See page 174 for Switch options)
6	ERSWL4	Trigger Lead x 4m
	ERSWL8	Trigger Lead x 8m
7	ERSP1	Screw Pack
8	ERH200	Large Ergo Tig Handle

Spare Parts

	Part Number	Description
9	ERKJ200	Large Knuckle Joint
10	ERLC200-08	Leather Cover x 0.8m
11	ERJK200	Jointing Repair Kit
13	ERCO200-40	Sheath x 4m c/w Leather Cover
	ERCO200-80	Sheath x 8m c/w Leather Cover
14	SL46V28AOB	Power Cable x 4m Surelok OB Rubber
	SL46V30AOB	Power Cable x 8m Surelok OB Rubber
15	UD1025-38	Dinse Tig Power Cable Connector 10-25
	UD3550-38	Dinse Tig Power Cable Connector 35-50
16	C03045	7 Pin Plug

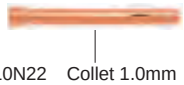
XA26 TIG TORCH & SPARES

Optional with TIG200CRZ machine

RazorWeld

Standard Front End Parts

18CG Cup Gasket



10N22	Collet 1.0mm
10N23	Collet 1.6mm
10N24	Collet 2.4mm
10N25	Collet 3.2mm

10N30	Collet Body 1.0mm
10N31	Collet Body 1.6mm
10N32	Collet Body 2.4mm
10N28	Collet Body 3.2mm

10N50	Alumina Nozzle Ø 6mm	#4
10N49	Alumina Nozzle Ø 8mm	#5
10N48	Alumina Nozzle Ø 10mm	#6
10N47	Alumina Nozzle Ø 11mm	#7
10N46	Alumina Nozzle Ø 12.5mm	#8
10N45	Alumina Nozzle Ø 16mm	#10
10N44	Alumina Nozzle Ø 19mm	#12

10N49L	Long Alumina Nozzle Ø 8mm	#5L
10N48L	Long Alumina Nozzle Ø 10mm	#6L
10N47L	Long Alumina Nozzle Ø 11mm	#7L

Stubby Front End Parts

18CG20 Stubby Cup Gasket

10N22S	Stubby Collet 1.0mm
10N23S	Stubby Collet 1.6mm
10N24S	Stubby Collet 2.4mm
10N25S	Stubby Collet 3.2mm

17CB20
Stubby Collet Body
Fits 1.0 - 3.2mm

13N08	Alumina Nozzle Ø 6mm	#4
13N09	Alumina Nozzle Ø 8mm	#5
13N10	Alumina Nozzle Ø 10mm	#6
13N11	Alumina Nozzle Ø 11mm	#7
13N12	Alumina Nozzle Ø 13mm	#8
13N13	Alumina Nozzle Ø 16mm	#10

796F70	Long Alumina Nozzle Ø 5mm	#3
796F71	Long Alumina Nozzle Ø 6mm	#4
796F72	Long Alumina Nozzle Ø 8mm	#5
796F73	Long Alumina Nozzle Ø 10mm	#6

Ultra Stubby Gas Lens Front End Parts

USTB80300236
Gas Lens Gasket

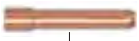
10N22S	Stubby Collet 1.0mm
10N23S	Stubby Collet 1.6mm
10N24S	Stubby Collet 2.4mm
10N25S	Stubby Collet 3.2mm

USTB45V43	Stubby Gas Lens Body 1.6mm
USTB45V44	Stubby Gas Lens Body 2.4mm
USTB45V45	Stubby Gas Lens Body 3.2mm

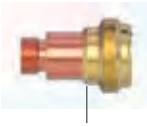
53N58	Gas Lens Nozzle Ø 6mm	#4
53N59	Gas Lens Nozzle Ø 8mm	#5
53N60	Gas Lens Nozzle Ø 10mm	#6
53N61	Gas Lens Nozzle Ø 11mm	#7
53N61S	Gas Lens Nozzle Ø 12.5mm	#8

SW Stubby Gas Lens Front End Parts

18CG20
Stubby Cup
Gasket



10N22S	Stubby Collet 1.0mm
10N23S	Stubby Collet 1.6mm
10N24S	Stubby Collet 2.4mm
10N25S	Stubby Collet 3.2mm



45V24S	SW Stubby Gas Lens Body 1.0mm
45V25S	SW Stubby Gas Lens Body 1.6mm
45V26S	SW Stubby Gas Lens Body 2.4mm
45V27S	SW Stubby Gas Lens Body 3.2mm

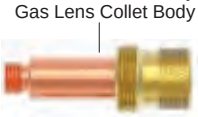
54N16SW	Gas Lens Nozzle Ø 10mm	#6
54N15SW	Gas Lens Nozzle Ø 11mm	#7
54N14SW	Gas Lens Nozzle Ø 12.5mm	#8
54N12SW	Gas Lens Nozzle Ø 16.0mm	#10

Gas Lens Front End Parts

18CG	Cup Gasket
54N01	Gas Lens Gasket

10N22	Collet 1.0mm
10N23	Collet 1.6mm
10N24	Collet 2.4mm
10N25	Collet 3.2mm

45V24	Gas Lens Collet Body 1.0mm
45V25	Gas Lens Collet Body 1.6mm
45V26	Gas Lens Collet Body 2.4mm
45V27	Gas Lens Collet Body 3.2mm



54N18	Gas Lens Nozzle Ø 6mm	#4
54N17	Gas Lens Nozzle Ø 8mm	#5
54N16	Gas Lens Nozzle Ø 10mm	#6
54N15	Gas Lens Nozzle Ø 11mm	#7
54N14	Gas Lens Nozzle Ø 12.5mm	#8
54N19	Gas Lens Nozzle Ø 17mm	#11

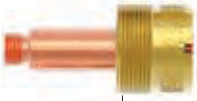
54N18L	Long Gas Lens Nozzle Ø 6mm	#4L
54N17L	Long Gas Lens Nozzle Ø 8mm	#5L
54N16L	Long Gas Lens Nozzle Ø 10mm	#6L
54N15L	Long Gas Lens Nozzle Ø 11mm	#7L
54N14L	Long Gas Lens Nozzle Ø 12.5mm	#8L

Large Gas Lens Front End Parts

18CG
Cup Gasket

54N63
Large Lens Gasket

10N22	Collet 1.0mm
10N23	Collet 1.6mm
10N24	Collet 2.4mm
10N25	Collet 3.2mm



45V0204	Large Gas Lens Body 1.0mm
45V116	Large Gas Lens Body 1.6mm
45V64	Large Gas Lens Body 2.4mm
995795	Large Gas Lens Body 3.2mm

57N75	Large Gas Lens Nozzle Ø 10mm	#6
57N74	Large Gas Lens Nozzle Ø 12.5mm	#8
53N88	Large Gas Lens Nozzle Ø 16mm	#10
53N87	Large Gas Lens Nozzle Ø 19mm	#12

MMA (STICK) WELDING TROUBLE SHOOTING

The following chart addresses some of the common problems of MMA welding. In all cases of equipment malfunction, the manufacturer's recommendations should be strictly adhered to and followed.

1: No arc	
Possible Reason	*Suggested Remedy*
Incomplete welding circuit	Check earth lead is connected. Check all cable connections.
Wrong mode selected	Check the MMA selector switch is selected
No power supply	Check that the machine is switched on and has a power supply
2: Porosity – small cavities or holes resulting from gas pockets in weld metal.	
Possible Reason	*Suggested Remedy*
Arc length too long	Shorten the arc length
Work piece dirty, contaminated or moisture	Remove moisture and materials like paint, grease, oil, and dirt, including mill scale from base metal
Damp electrodes	Use only dry electrodes
3: Excessive Spatter	
Possible Reason	*Suggested Remedy*
Amperage too high	Decrease the amperage or choose a larger electrode
Arc length too long	Shorten the arc length
4: Weld sits on top, lack of fusion	
Possible Reason	*Suggested Remedy*
Insufficient heat input	Increase the amperage or choose a larger electrode
Work piece dirty, contaminated or moisture	Remove moisture and materials like paint, grease, oil, and dirt, including mill scale from base metal
Poor welding technique	Use the correct welding technique or seek assistance for the correct technique
5: Lack of penetration	
Possible Reason	*Suggested Remedy*
Insufficient heat input	Increase the amperage or choose a larger electrode
Poor welding technique	Use the correct welding technique or seek assistance for the correct technique
Poor joint preparation	Check the joint design and fit up, make sure the material is not too thick. Seek assistance for the correct joint design and fit up
6: Excessive penetration - burn through	
Possible Reason	*Suggested Remedy*
Excessive heat input	Reduce the amperage or use a smaller electrode
Incorrect travel speed	Try increasing the weld travl speed
7: Uneven weld appearance	
Possible Reason	*Suggested Remedy*
Unsteady hand, wavering hand	Use two hands where possible to steady up, practise your technique
8: Distortion – movement of base metal during welding	
Possible Reason	*Suggested Remedy*
Excessive heat input	Reduce the amperage or use a smaller electrode
Poor welding technique	Use the correct welding technique or seek assistance for the correct technique
Poor joint preparation and or joint design	Check the joint design and fit up, make sure the material is not too thick. Seek assistance for the correct joint design and fit up
9: Electrode welds with different or unusual arc characteristic	
Possible Reason	*Suggested Remedy*
Incorrect polarity	Change the polarity, check the electrode manufacturer for correct polarity

TIG WELDING TROUBLE SHOOTING

RazorWeld

The following chart addresses some of the common problems of TIG welding. In all cases of equipment malfunction, the manufacturer's recommendations should be strictly adhered to and followed.

1: Tungsten burning away quickly	
Possible Reason	*Suggested Remedy*
Incorrect Gas	Check that pure Argon is being used
No gas	Check the gas cylinder contains gas and is connected
Inadequate gas flow	Check the gas is connected, check hoses, gas valve and torch are not restricted. Set the gas flow between 10 - 15 l/min flow rate
Back cap not fitted correctly	Make sure the torch back cap is fitted so that the o-ring is inside the torch body
Torch connected to DC +	Connect the torch to the DC- output terminal
Incorrect tungsten being used	Check and change the tungsten type if necessary
Tungsten being oxidised after weld is finished	Keep shielding gas flowing 10–15 seconds after arc stoppage. 1 second for each 10 amps of weld current.
Tungsten melting back into the nozzle on AC welding	Check that correct type of tungsten is being used. Check the balance control is not set too high on the balance - reduce to a lower setting
2: Contaminated tungsten	
Possible Reason	*Suggested Remedy*
Touching tungsten into the weld pool	Keep tungsten from contacting weld puddle. Raise the torch so that the tungsten is off of the work piece 2 - 5mm
Touching the filler wire to the tungsten	Keep the filler wire from touching the tungsten during welding, feed the filler wire into the leading edge of the weld pool in front of the tungsten
Tungsten melting into the weld pool	Check that correct type of tungsten is being used. Too much current for the tungsten size so reduce the amps or change to a larger tungsten
3: Porosity - poor weld appearance and colour	
Possible Reason	*Suggested Remedy*
Incorrect Gas	Check that pure Argon is being used
Inadequate gas flow / gas leaks	Check the gas is connected, check hoses, gas valve and torch are not restricted. Set the gas flow between 10 - 15 l/min flow rate. Check hoses and fittings for holes, leaks etc.,
Moisture on the base metal	Remove all moisture from base metal before welding
Contaminated base metal	Remove materials like paint, grease, oil, and dirt, including mill scale from base metal
Contaminated filler wire	Remove all grease, oil, or moisture from filler metal.
Incorrect filler wire	Check the filler wire and change if necessary
4: Yellowish residue / smoke on the alumina nozzle & discoloured tungsten	
Possible Reason	*Suggested Remedy*
Incorrect Gas	Use pure Argon gas
Inadequate gas flow	Set the gas flow between 10 - 15 l/min flow rate
Inadequate post flow gas	Increase the post flow gas time
Alumina gas nozzle too small for size of tungsten being used	Increase the size of the alumina gas nozzle
5: Unstable Arc during DC welding	
Possible Reason	*Suggested Remedy*
Torch connected to DC +	Connect the torch to the DC- output terminal
Contaminated base metal	Remove materials like paint, grease, oil, and dirt, including mill scale from base metal.
Tungsten is contaminated	Remove 10mm of contaminated tungsten and re grind the tungsten
Arc length too long	Lower torch so that the tungsten is off of the work piece 2 - 5mm
Unstable Arc during AC welding	
Incorrect gas or inadequate gas flow	Check that pure Argon is being used. Check the gas is connected, check hoses, gas valve and torch are not restricted. Set the gas flow between 10 - 15 l/min flow rate
Incorrect tungsten being used	Check and change the tungsten type if necessary
Tungsten is contaminated	Remove 10mm of contaminated tungsten and re grind the tungsten
Improperly prepared tungsten	Use a pointed tungsten with AC Squarewave inverter machines. The point will round off after welding.
Excessive rectification in the base metal	Increase balance control. Increase travel speed. Add filler wire during welding

6: HF present but no welding power	
Possible Reason	*Suggested Remedy*
Incomplete welding circuit	Check earth lead is connected. Check all cable connections. If using a water cooled torch check that the power cable is not separated.
No gas	Check the gas is connected and cylinder valve open, check hoses, gas valve and torch are not restricted. Set the gas flow between 10 - 15 l/min flow rate
Tungsten melting into the weld pool	Check that correct type of tungsten is being used. Too much current for the tungsten size so reduce the amps or change to a larger tungsten
7: Arc wanders during DC welding	
Possible Reason	*Suggested Remedy*
Poor gas flow	Check and set the gas flow between 10 - 15 l/min flow rate
Incorrect arc length	Lower torch so that the tungsten is off of the work piece 2 - 5mm
Tungsten incorrect or in poor condition	Check that correct type of tungsten is being used. Remove 10mm from the weld end of the tungsten and re sharpen the tungsten
Poorly prepared tungsten	Grind marks should run lengthwise with tungsten, not circular. Use proper grinding method and wheel.
Contaminated base metal	Remove contaminating materials like paint, grease, oil, and dirt, including mill scale from base metal.
Contaminated filler wire	Remove all grease, oil, or moisture from filler metal.
Incorrect filler wire	Check the filler wire and change if necessary
Arc wanders during AC welding	
Possible Reason	*Suggested Remedy*
Inadequate gas flow	Set the gas flow between 10 - 15 l/min flow rate
Incorrect arc length	Set the torch so that the tungsten is off of the work piece 2 - 5mm
Tungsten is contaminated	Remove 10mm of contaminated tungsten and re grind the tungsten. Use a pointed tungsten with AC Squarewave and inverter machines. The point will round off after welding
Incorrect tungsten size and or tungsten being used	Check and change the size and or the tungsten if required
Excessive rectification in the base metal	Increase balance control. Increase travel speed. Add filler wire during welding
Contaminated base metal	Remove contaminating materials like paint, grease, oil, and dirt, including mill scale from base metal.
8: Arc difficult to start or will not start DC welding	
Possible Reason	*Suggested Remedy*
Incorrect machine set up	Check machine set up is correct
No gas, incorrect gas flow	Check the gas is connected and cylinder valve open, check hoses, gas valve and torch are not restricted. Set the gas flow between 10 - 15 l/min flow rate
Tungsten is contaminated	Remove 10mm of contaminated tungsten and re grind the tungsten
Incorrect tungsten size and or tungsten being used	Check and change the size and or the tungsten if required
Loose connection	Check all connectors and tighten
Earth clamp not connected to work	Connect the earth clamp directly to the work piece wherever possible
Loss of high frequency	Check torch and cables for cracked insulation or bad connections. Check spark gaps and adjust if necessary
Arc difficult to start or will not start AC welding	
Incorrect machine set up	Check machine set up is correct
No gas, incorrect gas flow	Check the gas is connected and cylinder valve open, check hoses, gas valve and torch are not restricted. Set the gas flow between 10 - 15 l/min flow rate
Incorrect tungsten size and or tungsten being used	Check and change the size and or the tungsten if requir
Tungsten is contaminated	Remove 10mm of contaminated tungsten and re grind the tungsten. Use a pointed tungsten with AC Squarewave and inverter machines. The point will round off after welding
Loose connection	Check all connectors and tighten
Earth clamp not connected to work	Connect the earth clamp directly to the work piece wherever possible
Loss of high frequency	Check torch and cables for cracked insulation or bad connections. Check spark gaps and adjust if necessary

WARRANTY TERMS

ESSETI New Zealand Limited ('us', 'we') warrants that the products bearing the brand names ESSETI, XCEL-ARC, RAZORWELD, RAZORCUT, JASIC, VIPER, T&R, XCEL-GAS, Otos, Servore, TECNA & HIT-8SS supplied by us and purchased by you from an Authorised ESSETI (NZ) Ltd. Distributor are free of Material and Faulty Workmanship Defects except for those products listed under 'Warranty Exclusions' and whilst any claim is made subject to the following terms and conditions.

Your rights under the New Zealand Consumer Law may not be limited by a defined time. However, New Zealand Consumer Law does recognise that the relevant time period can vary from product to product, depending on factors such as the nature of the product and the price. Esseti NZ Ltd. adopts the same approach. As you can appreciate, the type of remedy we can offer you may also vary depending on how long it takes you to return the product to us.

WARRANTY PERIOD

We offer the following 'Warranty Periods' from 'date of purchase':

An Extended Warranty Period of 6 months total shall apply only to Machinery where offered and warranty is registered online.

We offer the following 'Warranty Periods' effective from the 'date of purchase':

XCEL-ARC, Inverter MIG/SWF/MTS, MMA/TIG, TIG ACDC, Plasma (Power Source Only*)	2 Years
RAZORWELD, Inverter MIG/SWF/MTS, MMA/TIG, TIG ACDC (Power Source Only*)	3 Years
RAZORCUT, Inverter Plasma (Power Source Only*)	3 Years
VIPER MIG185, Viper TIG180ACDC (Power Source Only*)	2 Years
VIPER ARC140, VIPER ARC160, VIPER CUT30, (Power Source Only*)	1 Year
VIPER TIG200P, VIPER SYNERGIC MIG 120 (Power Source Only*)	1 Year
JASIC, Inverter MIG/SWF/MTS, MMA/TIG, TIG ACDC, Plasma (Power Source Only*)	2 Years
XCEL-ARC & RAZORWELD, Water Coolers, PAPR Air Blower Unit	1 Year
XCEL-GAS, Gas Cutting and Welding Torches	3 Months
XCEL-GAS, Straight Line & Gas Cutting Machines (Machine Only*)	1 Year
XCEL-GAS, Regulators Argon/ Acetylene / Oxygen / LPG / Bobbin Flowmeter	1 Year
XCEL-ARC, Automatic Welding Helmet	2 Years
RAZORSHIELD Digital Welding Mask & Goggle Kit , Automatic Welding Helmets	2 Year
TECNA, Spot Welding Machines (Power Source Only*)	1 Year
ALL WELDING TORCHES – GMAW / GTAW / MMAW / PLASMA	3 Months
ALL EARTH LEADS, INTERCONNECTING CABLES, GAS HOSES	3 Months

(*) This only covers manufacturing faults on any torches, cables and other accessories, either included with a machine kitset or sold separately, for the first three months after date of purchase.

REGISTER YOUR MACHINE ONLINE TO RECEIVE AN ADDITIONAL 6 MONTHS ON YOUR WARRANTY

Visit **XcelArc.nz/warranty-registration/** to register your machine.

WARRANTY / RETURNS / EXCHANGES

Our Warranty Returns Policy recognises all and any rights you have under New Zealand Consumer Law and other relevant laws.

You shall inspect the goods on delivery and shall within seven (7) days of delivery (time being of the essence) notify the Esseti NZ Ltd. Authorised Distributor from whom you purchased the goods of any alleged defect, shortage in quantity, damage or failure to comply with the description or quote.

You shall also afford Esseti NZ Ltd. the opportunity to inspect the goods within a reasonable time following delivery if you believe the goods are defective in any way.

If you shall fail to comply with these provisions the goods shall be presumed to be free from any defect or damage. For defective goods and where permissible by law, Esseti NZ Ltd. reserves the right to repair or otherwise remedy the defect prior to issuing replacement goods or refunding the purchase price.

If the goods are being purchased for a business purpose then the purchaser acknowledges that the Consumer Guarantees Act will not apply.

The New Zealand Sales of Goods Act applies when goods are not covered by the Consumer Guarantees Act. You may be able to get a full refund or compensation if the trader doesn't have the right to sell the goods, or the goods are:

- not of 'merchantable quality' (so defective that most people wouldn't want them)
- not fit for their normal purpose
- poorer quality than a sample you were shown
- not suitable for what you told the trader you wanted the goods for
- not matching their description

If there has been a misrepresentation you may have rights under the Fair Trading Act or the Contractual Remedies Act and therefore also entitled to, at the consumer's discretion, either a refund of the purchase price of the goods, or repair of the goods, or replacement of the goods.

Returns will only be accepted provided that:

(a) You have complied with the provisions outlined above, and

(b) where the goods are unable to be repaired, the goods are returned at your cost within thirty (30) days of the delivery date, and

(c) Esseti NZ Ltd. will not be liable for goods which have not been stored or used in a proper manner, and

(d) the goods are returned in the condition in which they were delivered and with all packaging material, brochures and instructional material in as new condition as is reasonably possible in the circumstances.

Esseti NZ Ltd Accepts no responsibility for any products lost, damaged or mislaid whilst in transit. Esseti NZ Ltd. may (at their sole discretion) accept the return of goods for credit but this may incur a handling fee of up to fifteen percent (15%) of the value of the returned Goods plus any freight costs.

MAKING A CLAIM

If you wish to make a claim under this Warranty, you should:

• Return the product to the point of purchase either in person or via prepaid courier; or

• Contact us by Telephone – Esseti NZ Ltd – 06 355 1103

When returned, the product must be accompanied with the original Receipt or Tax Invoice clearly showing the purchase date and disclosing the purchase price. All costs of installation, cartage, freight, travelling expenses, hiring tools and insurance are paid by the Customer. To the extent permitted by law, our total liability for loss or damage of every kind related to the goods in any way whatsoever is limited to the amount paid to the retailer by you for the goods or the value of the goods. No responsibility will be taken for any products lost, damaged or mislaid whilst in transit.

WARRANTY EXCLUSIONS

This Warranty covers Material and Faulty Workmanship defects only.

This Warranty does not cover damage caused by:

- Normal wear and tear due to usage
- Misuse or abusive use of the machine and/or failure to correctly follow set up or operating instructions supplied with these products
- Failure to clean or improper cleaning of the product
- Failure to maintain the equipment such as regular services, etc.
- Incorrect voltage or non-authorised electrical connections
- Improper installation
- Use of non-authorised/non-standard parts
- Abnormal product performance caused by any ancillary equipment interference or other external factors
- Failure or any breakage caused by overload, dropping or abusive treatment or use by the customer
- Repair, modifications or other work carried out on the product other than by an Esseti-Authorised Service Agent

Unless it is a manufacturing fault, this Warranty does not cover the following parts:

- **All Batteries, including Button Type and Cell Type Batteries**
- **MIG Welding Torch Consumables, such as:**

Gas Nozzles, Gas Diffusers, Contact Tip Holders, Contact Tips, Swan Necks, Triggers, Handles, Liners, Euro Block, Shroud Springs, Knobs, All XCEL-ARC / Magmaweld Mig Welding Wires & Electrodes, Arc Leads, Welding Cable, Electrode Holder, Earth Clamps

- **MMA & TIG Welding Torch Consumables, such as:**

Tungsten Electrodes, Collet, Collet Body, Alumina Nozzle, Torch Head, Torch Head water Cooled, Torch Head Flexible, Back Caps, Gas Lens, Torch Handle, Cup Gasket, Torch Body Gas Valve, O-ring, All XCEL-ARC TIG Welding Rods, All XCEL-ARC / Magmaweld Electrodes, Arc Leads, Welding Cable, Electrode Holder, Earth Clamps

- **PLASMA Cutting Torches Consumables, such as:**

All Cutting Tips, All Diffuser/Swirl Ring, All Electrodes, Retaining Caps, Nozzle Springs, All Spacers, All Shield Caps, All Air and Power Cables, All Switches, All O-rings, All Springs, All Circle Guides and Cutting Kits, Torch Bodies, Air Filter Regulator, Welding Cable, Earth Clamps

- **Gas Welding & Cutting Torch and Straight Line Cutting Machine Consumables and Fittings, such as:**

All Cutting, Welding & Brazing Tips, Adaptors, Hoses, Fittings, Tracks and associated parts

- **Automatic Welding & Cutting Carriage Machine Parts, such as:**

Input Cord, Inter-connecting Power Cord, Triggering Cable

This Warranty does not cover products purchased:

- Without the provision of a suitable Receipt or Tax Invoice that clearly provides proof of purchase as outlined above
- At an auction or from a private seller
- Unless it is a manufacturing fault, this Warranty does not apply to any products sold to Hire Companies.

These conditions may only be varied with the written approval of the Directors of Esseti NZ Limited.

REMEMBER TO RETAIN YOUR ORIGINAL INVOICE FOR PROOF OF PURCHASE.

NOTES

*foot controller is optional.

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