Welding Machine Instruction Manual

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ALUSYNC 200 ACDC IGBT GTAW PAC INVERTER WELDER CUTTER

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

som 2011–10

Protect yourself and others from injury — read, follow, and save these important safety precautions and operating instructions.

1-1. Symbol Usage

DANGER! – Indicates a hazardous situation which, if not avoided, will result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury. The possible hazards are shown in the adjoining symbols or explained in the text.

NOTICE *– Indicates statements not related to personal injury.*

☞ *Indicates special instructions.*

This group of symbols means Warning! Watch Out! ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.

Only qualified persons should install, operate, maintain, and repair this unit.

During operation, keep everybody, especially children, away.

ELECTRIC SHOCK 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 machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install, ground, and operate this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal. Disconnect cable for process not in use.

SIGNIFICANT DC VOLTAGE exists in inverter welding power sources AFTER removal of input power.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.

HOT PARTS can burn.

- Do not touch hot parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.

FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding 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 in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

ARC RAYS can burn eyes and skin.

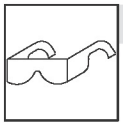
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes from arc rays and sparks when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.

WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, 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.

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on containers that have held combustibles, or on closed containers such as tanks, drums, or pipes unless they are properly prepared according to AWS F4.1 and AWS A6.0 (see Safety Standards).
- Do not weld where the atmosphere may contain flammable dust, gas, or liquid vapors (such as gasoline).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- After completion of work, inspect area to ensure it is free of sparks, glowing embers, and flames.
- Use only correct fuses or circuit breakers. Do not oversize or by-pass them.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



FLYING METAL or DIRT can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

BUILDUP OF GAS can injure or kill.

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

ELECTRIC AND MAGNETIC FIELDS (EMF) 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 arc welding, spot welding, gouging, plasma arc cutting, or induction heating operations.

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

CYLINDERS can explode if damaged.

Compressed gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct compressed gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.

1-3. Additional Symbols For Installation, Operation, And Maintenance

FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.

FALLING EQUIPMENT can injure.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Keep equipment (cables and cords) away from moving vehicles when working from an aerial location.
- Follow the guidelines in the Applications Manual for the Revised NIOSH Lifting Equation (Publication No. 94–110) when manually lifting heavy parts or equipment.

OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.

FLYING SPARKS can injure.

- Wear a face shield to protect eyes and face.
- Shape tungsten electrode only on grinder with proper guards in a safe location wearing proper face, hand, and body protection.
- Sparks can cause fires — keep flammables away.

STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

MOVING PARTS can injure.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

WELDING WIRE can injure.

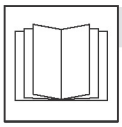
- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

BATTERY EXPLOSION can injure.

- Do not use welder to charge batteries or jump start vehicles unless it has a battery charging feature designed for this purpose.

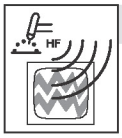
MOVING PARTS can injure.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance and troubleshooting as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before reconnecting input power.



READ INSTRUCTIONS.

- Read and follow all labels and the Owner's Manual carefully before installing, operating, or servicing unit. Read the safety information at the beginning of the manual and in each section.
- Use only genuine replacement parts from the manufacturer.
- Perform maintenance and service according to the Owner's Manuals, industry standards, and national, state, and local codes.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.

ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

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Preface

Congratulations on your choice of a Tokentools welding machine. Reliable and durable, Tokentools welding products are affordable to own, easy to maintain, and may help to increase your work productivity.

This user manual contains important information on the use, maintenance, and safety of your Tokentools product. The technical specifications of the device can be found at the end of the manual. Please read this manual carefully before using the equipment for the first time. For your safety and that of your working environment, pay particular attention to the safety instructions in the manual.

This manual is a living document and subject to change without prior notice therefore it is recommended to visit www.tokentools.com.au for updates when they occur.

Important notes

Items in the manual that require particular attention in order to minimise damage and personal harm are indicated with the ***'NOTE!'*** notation. Please read these sections carefully and follow their instructions.

Before First Use

Tokentools products are packed into durable packages especially designed for them. Always make sure before use that the products have not been damaged during transportation. Check also, that you have received the products ordered and read this manual completely. Product packing material is recyclable however it may be prudent to keep it for long-term storage of your product when not in use.

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Transportation

The machine should only be transported in an upright position.

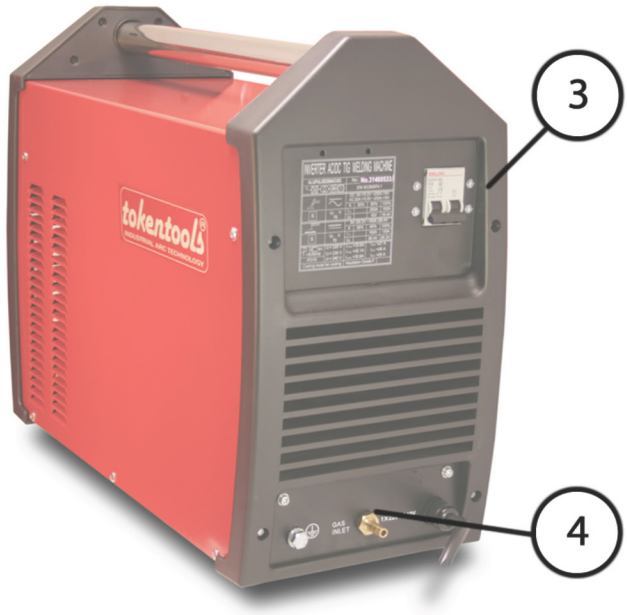
NOTE! *Always move the welding machine by the handle, never pull it by the power cord or welding torch cables. Disconnect welding & gas leads when transporting.*

Know Your Machine

Take a moment to familiarise yourself with the major components of your welding machine, these will be referred to in greater detail within the manual.

Welding Machine Parts

1. Control Panel
2. Welding Cable Connections
3. Power Switch
4. Rear Panel



Job Clamp

TIG Welding Torch

MMA / Stick Welding Torch

Plasma Cutting Torch

Control Panel

The control panel allows the welding operator easy selection of parameters to accomplish the many welding tasks this product offers.

> ***NOTE!*** The digital display shows preset amperage whilst not welding however once weld current flows the actual measured amps are shown

Intuitive colour grouping makes the Alusync 200 digital welder easy to understand and use. Functions are colour coded to enable the operator to quickly understand which features are grouped together by identifying the colour group.

For example the Pulse Tig Welding mode is yellow whilst the AC welding controls are green.

Digital Displays

The main digital numeric display is used to display the set value for welding current. When turning the amps knob up or down in non pulse mode, the digital display will reflect the preset amperage. If using the pulse weld setting the display will show base amps and then peak amps in an alternating cycle. If the pulse frequency is set sufficiently high the display will stop flashing and show the average calculated current instead.

The machine's operating status is indicated by the green and amber LEDs to the left of the central display. A green LED will be illuminated when the welding machine's power is activated. A yellow LED will illuminate adjacent to the warning triangle if there is a problem within the welding machine.

Selecting A Welding or Cutting Mode

This welding machine is capable of Tig welding, Pulse Tig welding, Plasma Cutting and MMA welding (Stick). Pressing the selector switch up selects MMA (Stick) welding, setting it evenly in the middle selects plasma cutting and pressing it down selects TIG welding. Pulse welding is automatically enabled whenever the pulse amps exceed the base amps (Main Amps Knob)

Waveform Selection

For Tig welding processes this switch selects AC welding current or DC welding current. AC welding is used for aluminium or it's alloys, DC welding is used for all other metals. For plasma cutting and MMA stick welding the machine is automatically placed into DC current.

Trigger

The trigger selector switch will enable either 2T or 4T trigger modes. Each "T" represents a change in state of the welding torch trigger. When you push the Tig torch button a change of state occurs. For example, pushing and releasing the torch button will result in 2 changes of state or 2T. Pushing / releasing then pushing / releasing will result in 4 changes of state or 4T. Using trigger settings allows the welding operator to include additional welding parameters that will activate when the operator requires them by changing the trigger state during the welding process. Examples include up and down slope, start and finish crater current modes or using a remote amps (amptrol) torch available as an option.

2T Mode

In 2T mode pressing the torch trigger will initiate the pre flow gas timer, start the arc at start crater value, up slope and then provide the pre-set welding current. Releasing the torch button will activate down slope until final crater current value is reached, extinguish the arc and then activate the gas post flow timer.

4T Mode

In 4T mode pressing the torch trigger will initiate the pre gas flow and start the arc at start crater value. The welding arc will then maintain the start crater current value. Releasing the torch trigger will activate up slope and provide the set welding current. At this point you will note the operator does not need to hold the torch trigger to continue welding as it has been released. Pressing the tig torch trigger again will activate down slope until the final crater current value is reached and the current will remain at this value. Releasing the tig torch trigger will then extinguish the arc and activate the gas post flow timer.

As you can see, the "T" represents a change in trigger value so a push and release as in the first example is two changes hence the term 2T. In the second example the welding torch trigger was pushed, released, pushed, and released again. This was four trigger change of states hence the term 4T.

Remote Amps Torch

Using a variable amps remote control torch must be done in 4T only. You simply press and release the trigger to latch the welding current to the “on” state leaving your finger free to control and vary the welding amperage of the machine whilst welding. To stop the welding process simply press and release the tig torch trigger again.

Welding Parameters

Start Current - The amount of amperage that is provided upon initial arc strike. In 2T mode the machine will first strike this amperage before moving on to the next parameter. In 4T mode the machine will strike an arc at this setting and remain until the torch trigger is released. This value is factory preset (~ 6A DC or ~ 20A ACDC) and cannot be operator adjusted.

Up Slope - This setting increases the amount of welding current from the start current setting to the welding amps setting over the time set. For example, if welding in DC amps, the start current is ~6 amps and welding current is set to 170 amps with 5 seconds up slope time you would experience the welding arc as follows. Upon pressing the Tig torch trigger in 2T mode the current would start at ~6 amps then immediately grow steadily for 5 seconds until it reaches 170 amps. In 4T mode upon pressing the trigger the current will start at ~6 amps, when the trigger is released the current would steadily increase for 5 seconds until it reaches 170 amps.

Down Slope – This setting allows the welding current to decrease over the set time until it reaches the factory preset value for crater current. Down slope operates similarly to up slope except it reduces the welding amperage.

Welding Amps - This is the welding current control used for Tig welding in AC and DC modes or MMA mode.
Non Pulse – If the pulse amps knob is set to a lower value than the welding amps knob, this control sets the amount of welding current.
Pulse – If the pulse amps knob is set to a higher value than the main welding amps knob then this control will set the base current.

AC Balance - This setting is critical for aluminium welding. AC balance sets the amount of time electrons flow from the job to the tungsten (cleaning) as opposed to their flow from tungsten to job (penetration). AC balance is expressed as a percentage of total AC cycle. For example if set to 40%, the electrons will spend 40% of the AC welding cycle flowing from the job to the tungsten electrode and the remaining proportion of 60% flowing from the tungsten to the job. Having the ability to manipulate AC balance gives an additional penetration gain over machines without balance control. The torch must always be plugged into the negative (-ve) polarity socket for both AC and DC applications.

AC Frequency - This setting changes the amount of AC cycles that occur each second. More alternating cycles has the effect of narrowing the arc which in turn increases penetration. Lowering the AC frequency broadens the arc so is ideal for situations where a wide / fatter bead is required.

Pulse Amps – If the amperage setting of this knob is set to a value greater than the main welding amps knob, pulse welding mode is automatically enabled. During the pulse welding process this setting controls the amount of pulse current, also known as peak amps. The pulse current is doing the work, it is providing the heat that melts the material whilst the base current provides a lower amperage that allows the material to cool whilst still under an electrical

arc. Unlike the non pulse welding current that is provided to the workpiece at a constant rate, the pulse current is provided in bursts that can be variable in duration and intensity. Pulsing the work piece can provide excellent penetration and reduce overall heat input when compared to non pulse methods.

Base Amps – During the pulse welding process this setting controls the base current. The base amps control sets the amount of amperage that is provided between pulses and this amount must be set sufficiently low that it allows the material to cool. As it is not practical to extinguish the welding arc in between pulses, the base current effectively keeps the arc active but does so at a value that will not affect the weld pool (cause melting).

Pulse Ratio - The proportion of time the welding arc will be the higher value (pulse current) as opposed to the lower value (base current). If set at 50% the pulse and base current is applied in equal proportions. If set to 20% the pulse current will be applied for 20% of the cycle and the base current will be applied for 80% of the cycle.

An example of what is occurring may be calculated as follows. If welding 2mm sheet aluminium the operator may set the pulse current at 80 amps and base current at 20 amps with pulse ratio of 30%. In normal non pulse operation an 80 amp welding current would blow a hole right through the 2mm sheet however in pulse welding mode 80 amps welding current is provided 30% of the time and base current of 20 amps is provided 70% of the time. The resulting heat input may be calculated as follows, (80 x 0.3 = 24) + (20 x 0.7 = 14) = 38 Amps. It would be difficult to Tig weld the material at 38 amps however using the pulse welding technique it is easy to achieve excellent penetration and do so at a reduced AVERAGE welding current.

Pulse Frequency - This adjusts how fast the pulses repeat each second. Increasing pulse frequency can again narrow the arc slightly thus increasing penetration as the welding arc energy is concentrated into a smaller zone.

Final Crater Amps – This setting determines the final amount of current supplied to the workpiece and is used to avoid the creation of craters at the end of the weld. A crater can occur due to the force of the arc and rapid contraction of the molten material as it cools. By reducing the current and allowing the heat time to move away from the weld cratering is reduced.

Gas Post Flow – This setting allows shielding gas to continue flowing after the welding arc has extinguished. Both the weld bead and tungsten electrode are extremely hot and if subjected to the atmosphere will start to oxidise and burn. By allowing the shielding gas to continue after the arc has ceased, both the tungsten electrode and weld bead will cool within a protective barrier until their heat load is not sufficient to react with the atmosphere.

Arc Force – Changing the arc length of the MMA electrode can alter the penetration of the weld however when the arc length is too small the rod may stick to the work piece. Arc force allows the welding amperage to increase when this occurs which will prevent the rod sticking.

Welding & Cutting Cable Connections

TIG Welding AC & DC Modes

(FP1) used for the connection of the job clamp to the work piece.

(FP4) used for connection of the Tig Torch.

(FP3) used for connection of the TIG Torch trigger control cable.

(FP2) Quick Disconnect female coupler used for rapid connection of the TIG torch shielding gas connector.

MMA Welding

(FP1) used for connection of the MMA / Stick welding torch.

(FP4) used for connection of the job clamp to the work piece.

Plasma Cutting Mode

(FP1) used for the connection of the job clamp to the work piece.

(FP4) used for connection of the Plasma Torch

(FP3) used for connection of the Plasma Torch trigger control cable.

(FP2) Quick Disconnect female coupler used for rapid connection of the Plasma Torch air line.

Rear Panel

Rear Panel Layout

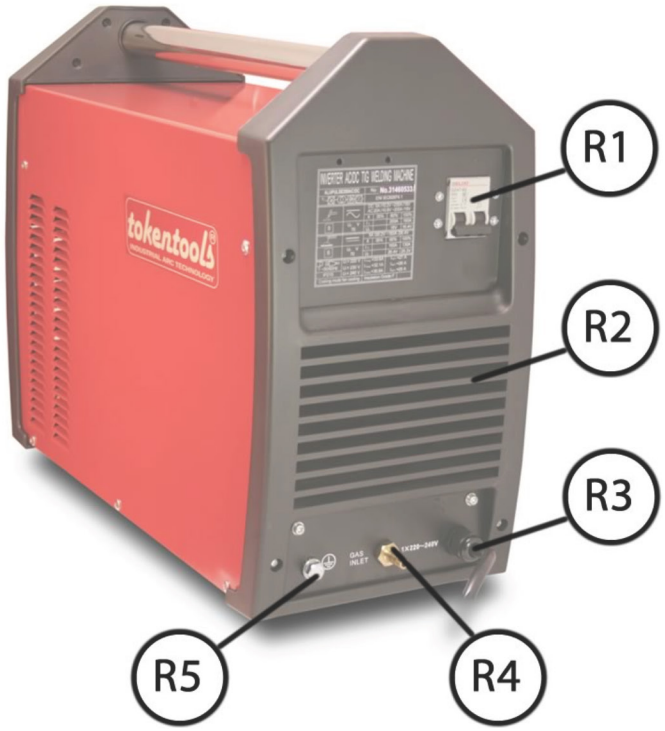
The rear panel contains the main power switch, 240V mains powered input supply cord, shielding gas input barb, cooling fan intake vent and supplementary grounding bolt.

(R1) The main on / off switch is a double pole isolator and circuit breaker. Flicking the lever in the upward position activates the welding power source.

(R2) Cooling air is drawn into the rear vent and is exhausted via the front and side vents. Keep vents at least 250mm clear of obstruction whilst the machine is in use.

(R3) The 240V mains electrical cord is fitted with a 15A plug.

(R4) Quick Connect Female Connector – In Tig mode shielding gas is supplied to the machine from the regulator. In plasma mode the outlet of the water separator / pressure regulator supplies compressed air to the machine via this connector.

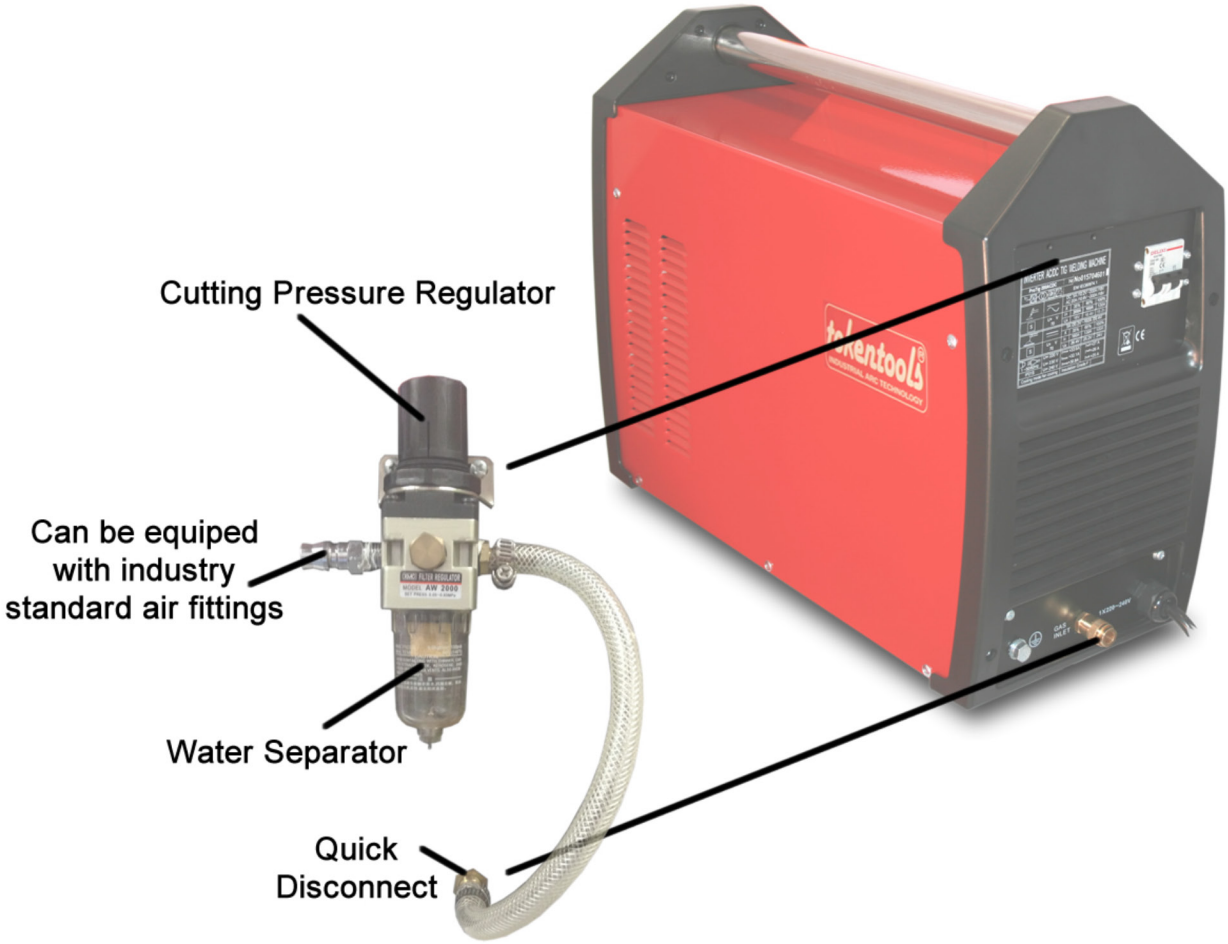


(R5) An external ground connection bolt is provided to allow for supplementary shielding cables / faraday shielding to be easily bonded to the mains. The welding power source is already grounded via the 3 pin plug to the mains ground, for normal operation (R5) is not required.

NOTE! Ensure the cooling fan intake vent is clear to allow adequate air flow to keep the welding machine cool. Avoid the ingress of debris by keeping the machine off the floor.

Installing the Cutting Regulator & Separator

The Alusync 200 is provided with a dual use water separator and cutting air pressure regulator. This unit is easily fitted to the rear of the welding machine using the supplied hardware and bracket. Quick disconnect fittings are supplied for connection to the welding machine. It is recommended to install a male air fitting that suits the air line being used so that the air supply can be easily connected and disconnected.



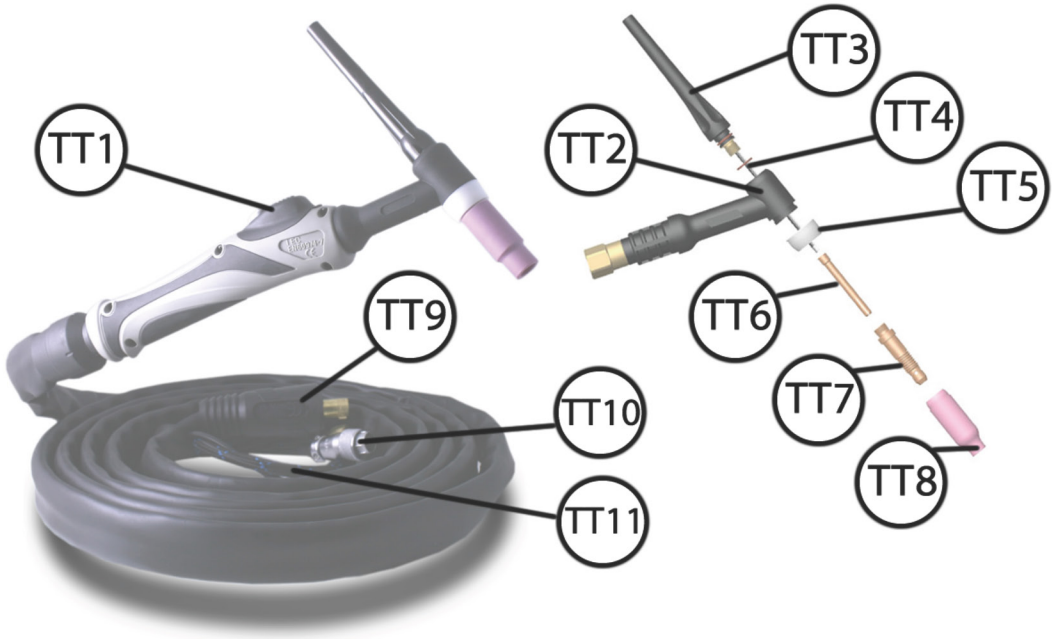
Striking a Plasma Arc

The Alusync 200 uses a high energy oscillating circuit to start the plasma arc at the push of a button. The safest way to start the arc is to position the torch on the edge of the work-piece and press the plasma torch trigger. Once the arc ignites the operator must pull the torch inward and maintain a steady cutting action.

Welding Torches

TIG Welding Torch

The supplied TIG welding torch is 4M in length and is compatible with accessories and parts designed to fit the Binzel 26 torches.



NOTE! Always install the collet so that the split end points to the welding tip of the tungsten

Assembly Of The TIG Torch

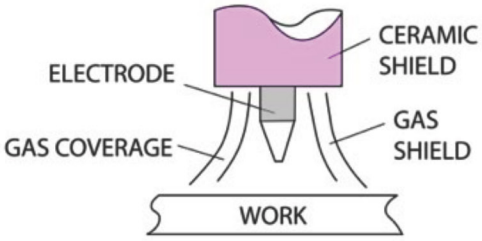
Supplied with the TIG torch is a TIG torch accessories kit. Inside you will receive a back cap (TT3), several collets (TT6), a collet body (TT7) and several ceramic nozzles (TT8). Before TIG welding may be undertaken the TIG torch will require assembly. Install the collet body into the TIG torch (TT2) head by screwing it in firmly. Install the desired ceramic nozzle onto the collet holder ensuring it presses firmly against the cup gasket insulator (TT5). Install your collet (TT6) onto the tungsten electrode (TT4) and insert both into the rear of the torch head. Install the back cap (TT3) over the tungsten and tighten gently. Allow the tungsten to slip past the ceramic nozzle approximately 3-6mm and firm up the back cap so that the pressure on the collet locks the tungsten into place.

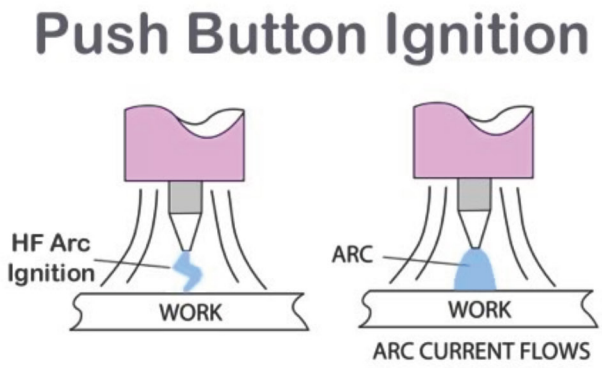
Connecting The TIG Torch

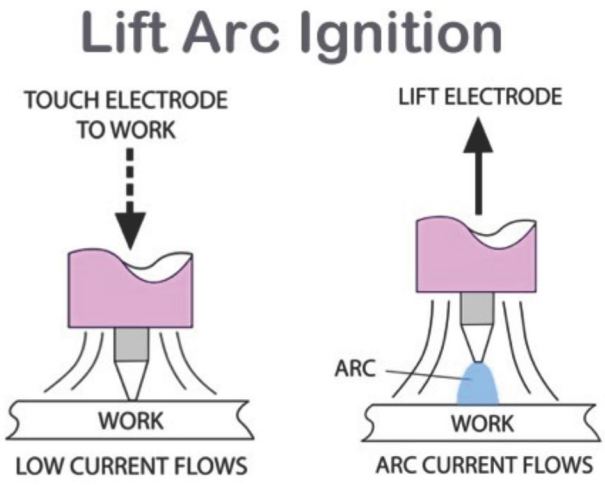
TIG welding operations are undertaken with a negatively charged tungsten electrode, therefore the TIG torch dinse connector (TT9) must be plugged into the front panel negative socket (FP1) and the welding job clamp must be plugged into (FP3). The brass gas connector on the TIG torch (TT11) is plugged into the female gas coupling on the front panel (FP6). The TIG torch push button control connector (TT10) is connected to the 7 pin female socket on the front panel (FP2).

Striking A TIG Arc

In order to strike a TIG welding arc, once set up in TIG welding mode, the operator will need to press the TIG torch push button (TT1) and strike an arc using the lift arc starting procedure detailed below.

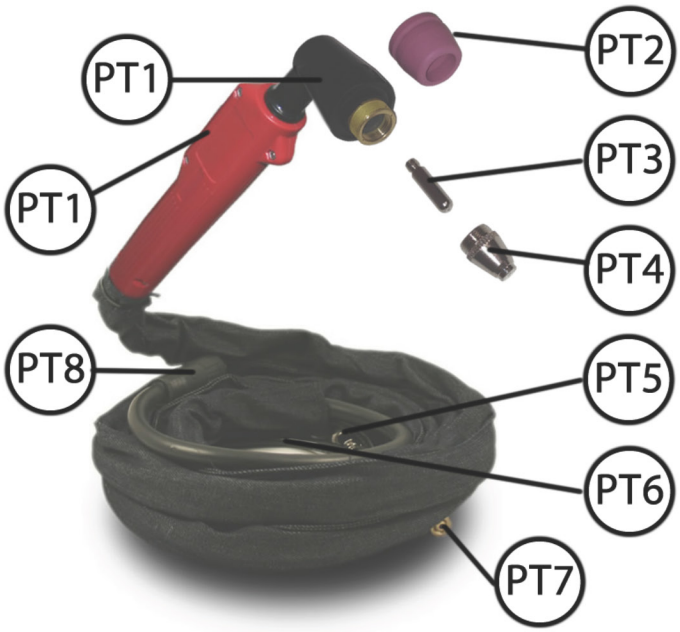






Plasma Cutting Torch

The supplied PAC torch is 4M in length and is compatible with accessories and parts designed to fit the 60 series pilot arc torches available from Tokentools Pty Ltd.



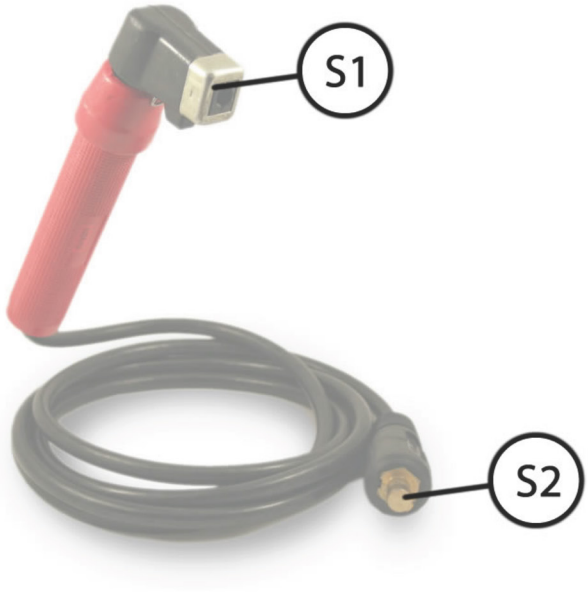
Plasma Torch Parts

PT1 – 60 Series Torch Head
PT2 – 60 Series Ceramic Nozzle
PT3 – 60 Series Electrode
PT4 – 60 Series Tip
PT5 – Torch Control Connector
PT6 – Pilot Arc Cable Lug
PT7 – Air Line Connection
PT8 – Dinse Plug

NOTE! Never run the torch without air supply active. Never change torch parts whilst the machine is switched on.

Assembly Of The Plasma Torch

Install the electrode (PT3) into the plasma torch head (PT1) and firmly tighten. Install the torch tip (PT4) onto the torch head and firmly tighten. Install the ceramic nozzle (PT2) onto the torch head and gently tighten. Insert and twist clockwise dinse plug (PT8) into (FP1). Install the pilot arc cable lug (PT6) onto FP2. Plug the control connector (PT5) into (FP4). Screw air line connector (PT7) onto (FP4). Install the job cable dinse plug into (FP5).



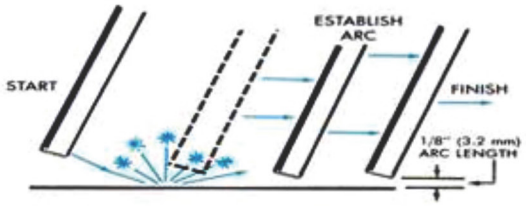
Stick Torch Connection

Insert an MMA electrode by twisting torch head (S1) anti-clockwise until the tongue lifts. Insert the electrode and lock it into place by turning the head clockwise.

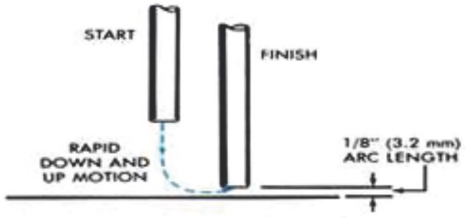
The MMA torch dinse plug (S2) must be plugged into (F3) on the front panel so that it may be positively charged.

Arc Starting Method

There are two ways to start an arc welding arc. The first way is to scratch the MMA electrode across the work piece. The second way is to tap the electrode against the work piece. Inverter welders provide excellent arc start capability due to their high open circuit voltage and DC welding current output.



Scratch



Tap

Using Shielding Gas

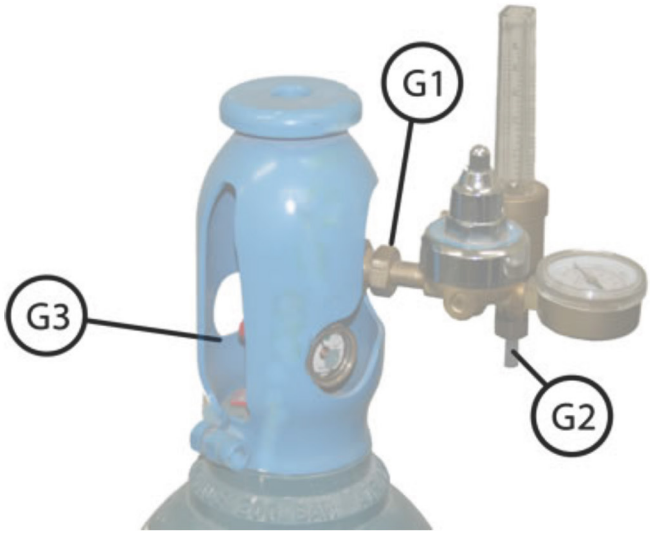
Selection Shielding Gas

Welding process	Appropriate Gas
ACDC TIG (GTAW) ALUMINUM	100% Argon
DC TIG (GTAW)	100% Argon

Flow rates will depend on the type of material being welded and the type of shielding gas being used. Please reference the "Welding – Getting Started" section in this manual.

The Shielding Gas Regulator

If you have separately purchased a gas regulator you will find it enclosed within your welding machine package.



Install the shielding gas regulator to the gas bottle at (G1), use a shifter to tighten it.

Connect the shielding gas hose to the outlet barb on the gas regulator at (G2)

When ready to weld, activate the shielding gas cylinder by opening the main gas valve at (G3) and adjust your flow rate at required.

NOTE! The solenoid built into the welder will activate and deactivate shielding gas as required during TIG and MIG welding operations. At the conclusion of welding it is ***STRONGLY*** recommended to deactivate the gas supply at the main gas bottle valve (G3). Failure to do so may result in minute leakage from the solenoid which over a prolonged period of time will empty the shielding gas cylinder.

Welding – Getting Started

The welding processes and information contained within this manual are of a general nature and may be referenced when selecting a welding process to be used on this welding machine. Welding is a broad topic and welding operators are encouraged to undertake tertiary education to achieve a deeper level of technical skill & knowledge.

Torch Polarity Based On Welding Process

Welding Process	Torch	Work Piece
TIG (GTAW)	-	+
STICK (SMAW)	+	-
PLASMA (PAC)	-	+

DC TIG Welding Data

Tungsten	Amperage	Material Thickness	Gas Flow Rate
1.6 mm	5 – 120A	0.20 mm – 4.50 mm	7-12 Litres / Per Minute
2.4 mm	120 – 200A	4.50 mm – 8.00 mm	12-20 Litres / Per Minute

AC TIG Welding Data (Balance 40%)

Tungsten	Amperage	Material Thickness	Gas Flow Rate
1.6 mm	5 – 90A	0.20 mm – 4.50 mm	7-12 Litres / Per Minute
2.4 mm	90A – 200A	4.50 mm – 8.00 mm	12-20 Litres / Per Minute

Plasma Cutting Data

Material	Amperage	Material Thickness	Air pressure
Mild Steel	30A	1.0 mm – 3mm	45Psi
Mild Steel	40A	3.1 mm – 8.0 mm	52Psi
Mild Steel	50A	8.1 mm – 16.0 mm	65Psi

DC MMA Welding Data

MMA Rod	Amperage	Material Thickness
1.5 mm	20 – 50A	1.00 mm – 3.00 mm
2.0 mm	40 – 90A	2.50 mm – 4.00 mm
3.2 mm	75 – 125A	3.00 mm – 6.00 mm
4.0 mm	125 – 160A	4.50 mm – 7.00 mm
5.8 mm	140 – 210A	6.50 mm – 8.00 mm

TIG Welding

Overview

TIG welding is a process that uses a constant current (CC) power source, a shielding gas and a TIG torch fitted with a tungsten electrode. An electric arc is formed between the tungsten electrode and the work piece. The tungsten and the welding zone is protected from the surrounding air by a gas shield comprised of inert gas. The electric arc can produce temperatures in excess of 8000 Degrees celcius and this heat can be very focused and localized to a very small weld pool area. The weld pool can be used to join the base metal with or without additional filler material.

Selecting A Gas Nozzle

The diameter of a TIG welding alumina cup exit port (diameter closest to the arc where the shielding gas exits) is available in a variety of sizes. The exit port diameter for any alumina cup is specified with a number that represents the diameter in 1.6 mm increments or 1/16ths of an inch. A number 5 cup is therefore 5/16ths of an inch or 8 mm in diameter. A number 6 cup is 6/16ths of an inch or 9.6 mm in diameter and so on.

TIG welding alumina cups are also available in various lengths from short nozzles to extra-long nozzles and widths to accommodate collet bodies or gas lenses.

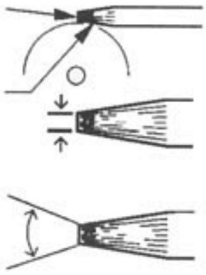
Alumina cups are the most commonly used gas nozzles in TIG Welding. Alumina cups are made from alumina oxide which has a very high melting point. The diameter for any nozzle must be large enough to allow the entire weld area to be covered by the shielding gas. The exit diameter can be neither too large nor too small, or poor shield gas coverage will result.

Using The Right Tungsten

The output current within this TIG welder is selectable as either AC (Alternating Current) or DC (Direct Current). Suitable tungsten electrodes include, pure tungsten, or alloyed tungstens such as thoriated 2%, ceriated 2% , lanthanated 2% or zirconiated 2%. Suitable tungsten diameters for this machine are 1.6mm and 2.4mm in either 175mm or 150mm lengths.

Sharpening The Tungsten

Tungsten must be sharpened along it’s long axis so that any scratches left on the surface will run toward the tip.



Shape by grinding longitudinally (never radially). Remove the sharp point to leave a truncated point with a flat spot. Diameter of flat spot determines amperage capacity.

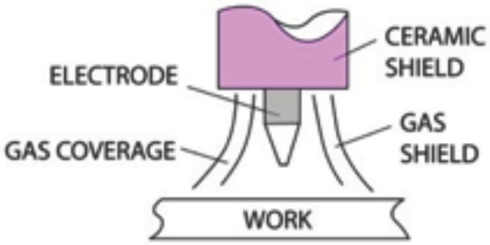
The included angle determines weld bead shape and size. Generally, as the included angle increases, penetration increases and bead width decreases.

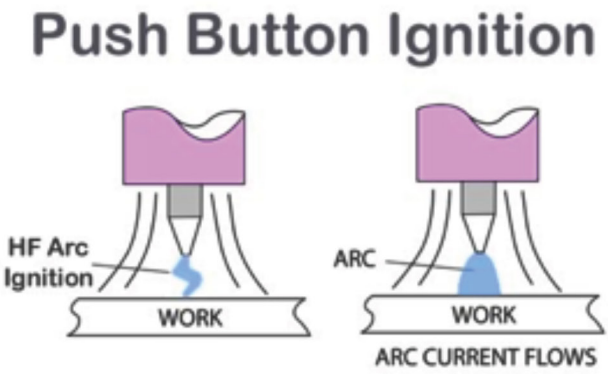
Use a medium (60 grit or finer) aluminium oxide wheel.

Striking A TIG Arc

HF Arc Ignition

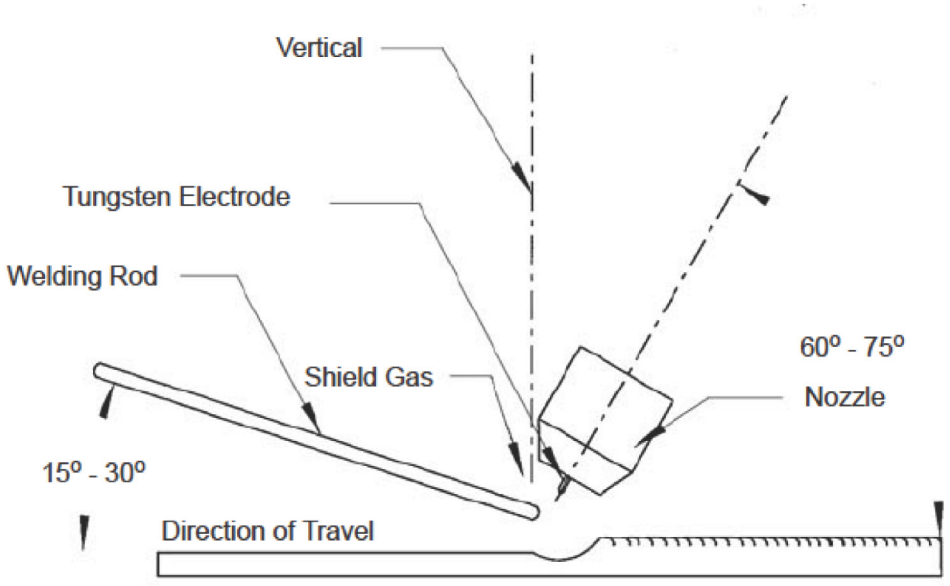
In order to strike a TIG welding arc using the HF start circuit, once set up in TIG welding mode with 2T or 4T selected, the operator will need to press the TIG torch push button (TT1) and strike the arc whilst keeping the tungsten electrode a few millimeters from the work piece.





Correct TIG Torch & Filler Rod Position

The suggested electrode and welding rod angles for welding a bead on plate are indicated in the image below. The same angles are used when making a butt weld. The torch is held 60o -75o from the material surface. This is the same as holding the torch 15o - 30o from the vertical. Take special note that the rod is in the shielding gas during the welding process.



Plasma Cutting

Overview

Plasma Arc Cutting (PAC) is a simple process that is used to cut or gouge electrically conductive materials of different thicknesses with a special torch that creates helps create a plasma arc stream. In this process compressed air is blown at high speed out of a nozzle whilst simultaneously an electrical arc is formed through that gas from the nozzle to the surface being cut, turning some of that gas to a plasma. The plasma is sufficiently hot to melt the material being cut and moves sufficiently fast to blow the molten material away from the cut.

NOTE! For CNC enquiries please contact Tokentools Pty Ltd directly on 1300 881 991 for options.

Plasma Cutter Setup

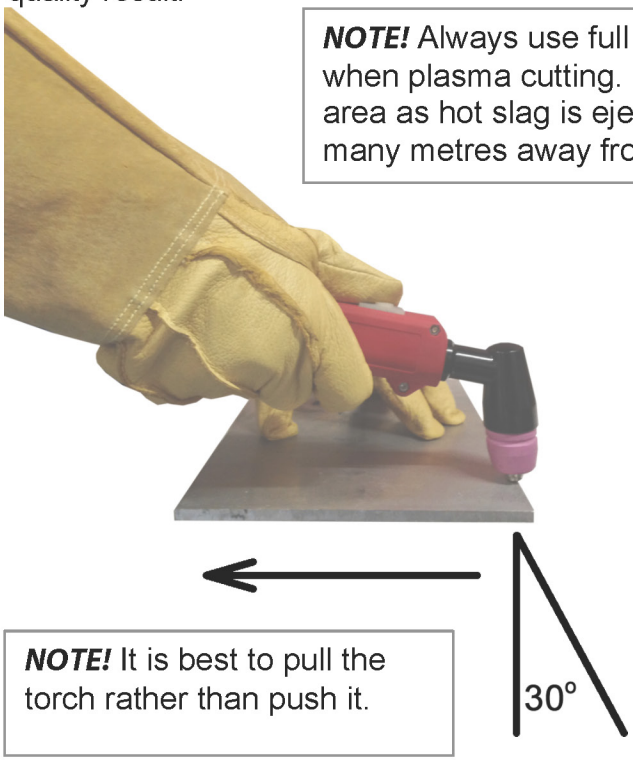
Connect the plasma cutter to a suitable mains supply. Extension cords not exceeding 20 metres with conductors containing a minimum cross sectional area of 2.5mm^2 or larger are suitable. An air compressor capable of delivering 7CFM may be used with maximum air pressure set to 55psi.Connect the job clamp and plasma torch as detailed in this manual. Test air pressure is available by quickly pressing and releasing the torch trigger whilst pointing the plasma torch away from objects and people. Air should flow easily.

NOTE! Where possible run the plasma cutter and air compressor on separate electrical circuits.

Plasma Torch Position

The plasma torch should be kept perpendicular to the work piece being cut. If starting from the edge of the work piece ignite the plasma arc on the edge and then start to pull the torch away from the edge. The plasma stream will quickly melt the material and blow the slag through the bottom of the work piece. It is important to keep the slag within the 30 degree are of the zone indicated below. If the slag is being ejected at less than 10 degrees off the vertical axis the operator must increase torch travelling speed. If the angle exceeds 30 degrees off the vertical axis the operator must slow the torch travelling speed. A few minutes of practice is required to experience the correct co-ordination required to achieve a high quality result.

NOTE! Always use full body protection and a full face shield when plasma cutting. Remove all flammable material from the area as hot slag is ejected at high speed and may be deposited many metres away from the cutting zone.



NOTE! Keep the slag stream within 30 degrees of the vertical axis by maintaining a smooth torch travelling speed.

Plasma cutters are hungry for material to consume therefore the operator must maintain a steady federate.

NOTE! It is best to pull the torch rather than push it.

MMA (Stick) Welding

Overview

Manual Metal Arc (MMA) is commonly known as Stick Welding and is really a melting and casting process in miniature. The various components of the welding process (base metal, weld metal slag, etc.) form the crucible and contents of a tiny electric furnace.

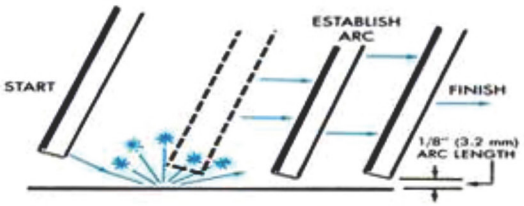
The electric arc, with a temperature of at least 6,000 Degrees Celsius is a concentrated and efficient source of heat. This heat is utilised in the metal arc welding process by employing a flux-coated electrode to provide filler metal.

The electrode and parent metal act as poles of the arc, the core wire of the electrode melting and being transferred across the arc to coalesce with the molten parent metal and form a bond which in most cases, is stronger than the parent metal. The flux covering melts more slowly than the core wire and a cup is formed at the electrode tip which assists in directing the molten droplets to the required spot.
The weld metal itself, as deposited, has a cast structure, its composition is determined by the core wire and coating of the electrode, and by the amount of pick-up of parent metal during welding. For example, a deposit of alloy steel, say, stainless steel on mild steel, no longer has just the properties expected of that alloy, due to dilution with the parent metal. This effect, in many cases, is not important, but, if desired, it may be eliminated by using multi-layer welds.

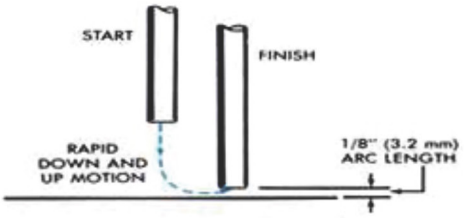
Welding on materials that have been strengthened by heat-treatment or cold-working generally creates a zone of lower strength along the weld boundary. This may not affect the serviceability of the welded joint, but sometimes it is necessary to restore this strength by further heat-treatment or cold-work.

Arc Starting Method

There are two ways to start an arc welding arc. The first way is to scratch the MMA electrode across the work piece. The second way is to tap the electrode against the work piece. Inverter welders provide excellent arc start capability due to their high open circuit voltage and DC welding current output.



Scratch



Tap

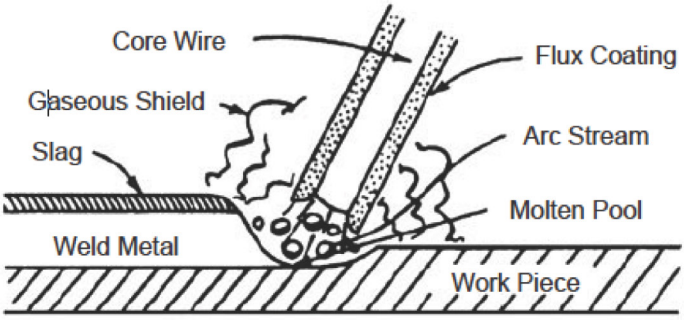
ARC Blow

Arc blow is peculiar to DC MMA welding. The welding arc, instead of playing steadily on one spot, is deflected away from the point of welding due to the influence of surrounding magnetic fields created by welding currents flowing in the work. To overcome such a situation try repositioning the welding job clamp to another part of the work piece.

Running Beads

If you have not yet done any welding, the simplest way to commence is to run beads on a piece of scrap plate. Use mild steel plate about 12 mm thick and a 4.0 mm electrode. Clean any paint, loose scale or grease off the plate and set it firmly on the work bench so that welding can be carried out in the down hand position. Make sure that the earth clamp is making good electrical contact with the work, either directly or through the work table. For light gauge material, always clamp the earth lead directly to the job, otherwise a poor circuit will probably result.

It is important to understand how the MMA process works and practice on scrap material so that you may quickly gain the skills required to produce strong penetrating welds with excellent bead appearance.



MMA Welding Current

Suitable amperages for the various sizes of electrodes are usually printed on the packets. These amperages may be varied to suit conditions — welds on thin plate require low amperages to prevent burn-through, while high welding rates or deep penetration of the weld metal require higher amperages. For 4.0 mm rods set the machine at about 160 Amps.

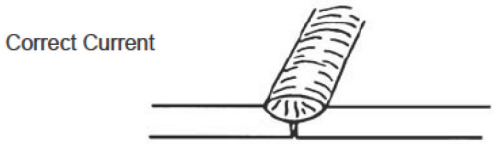


Fig. 3

Fig. 4

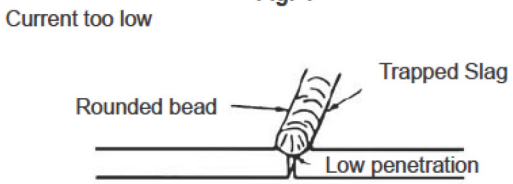


Fig. 5

There are several effects produced by incorrect amperage setting. If it is too high, spatter becomes excessive, and the weld pool becomes very hot, producing a flattened bead with elongated ripple marks, and the electrode overheats.

If the current is too low, it is difficult to maintain the arc and prevent the electrode from sticking, the bead is high and rounded, with poor edge fusion, and penetration is slight. Figures 3, 4 and 5 show the effects of different amperages.

Welding Machine Specification

Brand: Tokentools

Warranty:

- ☑ 5 Years Parts & Labour

Power Requirement:

- ☑ 1 x 240 Volt 15 Amp Supply - Single Phase

Welding Process:

- ☑ AC Tig Welding
- ☑ DC Tig Welding
- ☑ DC MMA Welding
- ☑ Plasma Cutting

At A Glance :

- ☑ 2T / 4T Trigger Latching
- ☑ Welds Aluminium
- ☑ Welds Stainless Steel
- ☑ Welds Other Metals
- ☑ Cuts all metals
- ☑ Adjustable AC Welding Frequency
- ☑ Adjustable AC Balance / Cleaning Action
- ☑ Pulse Welding Mode
- ☑ Adjustable Pulse Width / Duty
- ☑ Adjustable Pulse Welding Frequency
- ☑ Arc Force
- ☑ Post Flow Shielding Gas Timer
- ☑ Up Slope
- ☑ Down Slope
- ☑ Push Button Start HF Ignition
- ☑ Preset Amps Control / Display

Inverter Type:

- ☑ IGBT - Siemens / Infineon Power Transistors

Dimensions and weight:

- ☑ L50cm x W23cm x H44cm
- ☑ Weight - 25 Kilograms

Plasma Cutting Features

Plasma Cutting Capability:

- ☑ HF arc ignition
- ☑ Cuts all metals
- ☑ Clean cut to 12mm in mild steel
- ☑ Severance cut to 16mm in mild steel
- ☑ Requires 60PSI compressed air
- ☑ Requires 7CFM of compressed air
- ☑ Includes filter / dryer (water trap)

Tig Welding Features

Arc Ignition:

- ☑ Push Button Start (HF)

Gas Control:

- ☑ Electric Solenoid activates when torch trigger is pressed
- ☑ Postflow - 0 to 25 seconds
- ☑ Preflow - 1 to 25 seconds (Available by pressing torch trigger briefly and activating post flow cycle)

Waveform Control:

- ☑ AC Balance - 20% to 80%
- ☑ AC Square Wave Frequency - 10Hz to 300Hz
- ☑ AC & DC Pulse Width
- ☑ AC & DC Pulse Frequency

Tig Welding Amps Range:

- ☑ DC Amps 5 to 200
- ☑ AC Amps 20 to 200

Tig Welding Waveform:

- ☑ AC Square Wave
- ☑ DC

Pulse Welding Features:

- ☑ Pulse Duty - 10% to 90%
- ☑ Pulse Amps AC - 20 to 200
- ☑ Pulse Amps DC - 10 to 200
- ☑ Pulse Frequency - 0.5Hz to 25Hz

Remote Amps Control Capable:

- ☑ Yes
- ☑ Foot Pedal Compatible
- ☑ Variable Amps Torch Compatible

Slope Control:

- ☑ Yes
- ☑ Up Slope - 1 to 5 seconds
- ☑ Down slope - 1 to 5 seconds

Crater Current:

- ☑ Available by selecting 4T mode
- ☑ Start Crater - Fixed @ 20 Amps AC and 10 Amps DC
- ☑ Finish Crater - Fixed @ 20 Amps AC and 10 Amps DC

MMA Welding Features

MMA Welding Amps Range:

- ☑ 10 to 160 Amps

MMA Current Waveform Control:

- ☑ DC

Duty Cycles

Tig Welding Duty Cycles:

- ☑ 160 Amps @ 100% Duty
- ☑ 200 Amps @ 60% Duty

MMA Welding Duty Cycles:

- ☑ 100 Amps @ 100% Duty
- ☑ 130 Amps @ 60% Duty
- ☑ 160 Amps @ 35% Duty

Plasma Cutter Duty Cycles:

- ☑ 30 Amps @ 100% Duty
- ☑ 40 Amps @ 60% Duty

What is in the box?

All items listed are included in the standard package:

- ☑ 1 x Alusync 200 Inverter Welding Cutting Power Supply
- ☑ 1 x 4 Metre 60 Series Ergonomic Plasma Cutting Torch
- ☑ 1 x 4 Metre Binzel Compatible 26 Series Ergonomic Tig Torch
- ☑ 1 x 3 Meter MMA Twist Lock Torch and Cable
- ☑ 1 x 3 Meter Job Clamp and Cable
- ☑ 1 x Reinforced gas Line
- ☑ 1 x Filter Dryer (Water Trap)
- ☑ 1 x Plasma Torch Accessory Kit (5 tips, 5 electrodes, 3 ceramic shields)
- ☑ 1 x Tig Torch Accessory Kit
- ☑ 1 x Instruction Manual