Welding Machine Instruction Manual

MINIARC 200STL IGBT INVERTER WELDER
MMA – MMA VRD - LIFT ARC TIG WELDER

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.

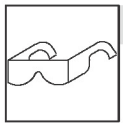
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- 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.

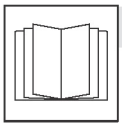
- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

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.

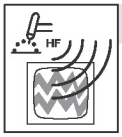
MOVING PARTS can injure.

- 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.

Table of Contents

Preface

Congratulations on your choice of a Metalmaster welding machine. Reliable and durable, Metalmaster 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.

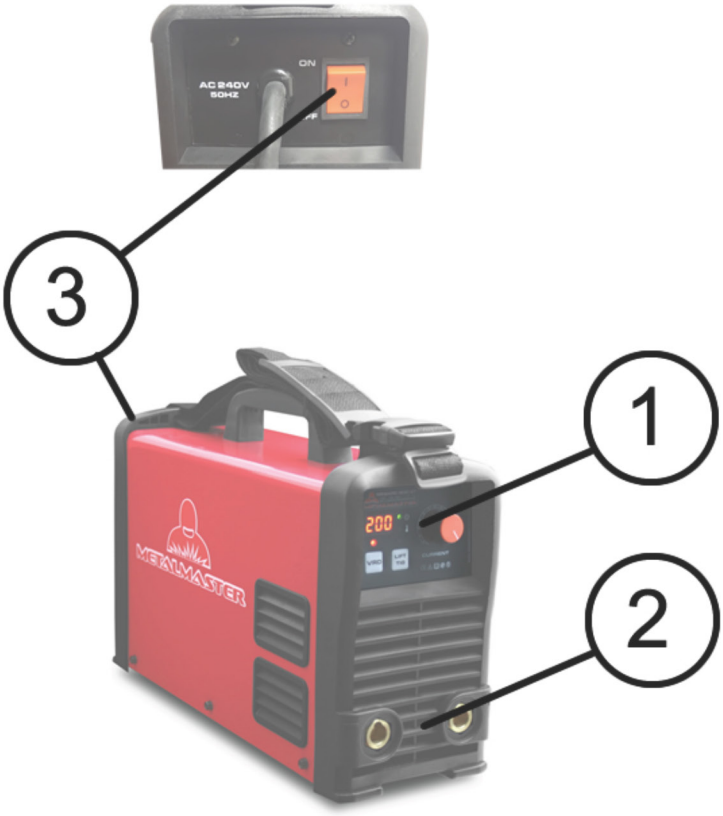
Transportation

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. Main Power Switch

3 Metre 25mm^2 Orange PVC insulated welding job clamp.

3 Metre 25mm^2 Orange PVC insulated 300A Twist Lock electrode holder.

Control Panel

The control panel allows the welding operator to easily set up for welding operations.

Selecting A Welding Mode

This welding machine is capable of 3 welding modes

1. MMA VRD (Manual Metal Arc with Voltage Reduction Device)
2. MMA (Manual Metal Arc) welding also known as Stick welding
3. LIFT ARC TIG Welding via an optional gas valve TIG torch.

Pressing the membrane switch selects MMA VRD mode. The open circuit voltage of the arc welder is 15 volts and helps reduce the risk of electrocution when welding in hazardous situations where the operator may be likely to come into contact with the work piece. In VRD mode, when the machine senses that the electrode has touched the work piece, the full power of the arc is applied and the output voltage increases. Once the arc is broken the VRD reactivates and drops the open circuit voltage to a safe level of 15 volts.

Pressing the membrane switch a second time deactivates the VRD device and leaves the machine operational in MMA mode only. The open circuit voltage is approximately 70 Volts DC and is ideal for striking low hydrogen electrodes.

Pressing the LIFT ARC membrane switch activates the TIG function. An optional gas valve TIG torch must be used for this function. LIFT ARC TIG mode reduces the start current to several amps so that when the tungsten electrode is touched to the work piece, it will not stick as it is lifted away in order to strike the arc. Upon the tungsten electrode being lifted the full welding arc is established.

Amperage Control

The amount of welding power is regulated by the red knob labelled current. Turning the current knob clockwise will increase the welding amperage whilst turning it anti-clockwise will reduce the welding current. The amount of current to be applied is shown in the digital multi function display.

Multi-Function Display

A multi function display shows the amperage selected as well as power mode and overheat mode. In normal operation a green LED will illuminate to the left of the power symbol. When exceeding the duty cycle of the welder a red LED will illuminate to the left of the thermometer symbol. Allow the machine to remain plugged in so that the cooling fan may cool of the inverter.

On/Off Switch

A red double pole toggle switch is mounted on the rear of the machine. To activate the welder simply switch the toggle over until the machine power activates.

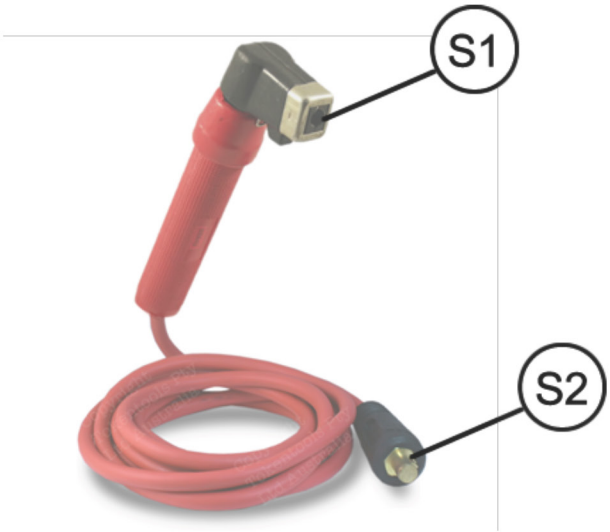
Rear Panel

The rear panel contains a fan for cooling, do not obstruct the fan or block air from entering the inverter.

Welding Torches

MMA Welding Torch

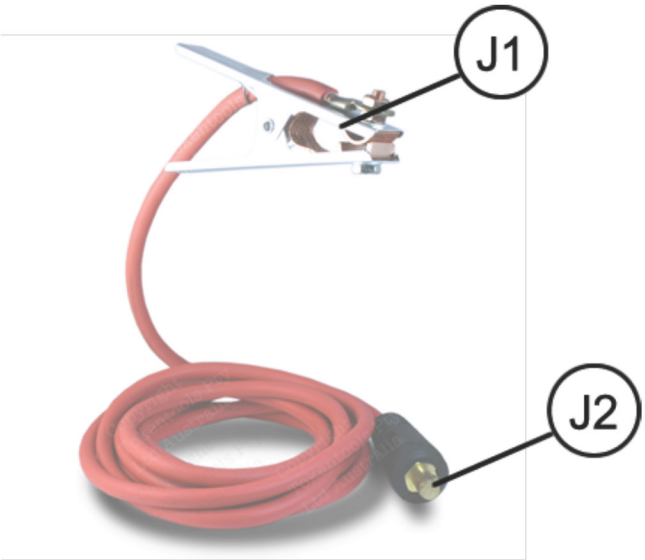
The MMA welding torch is used for performing stick welding operations. The Twist Lock stick welding torch is easy to use and durable.



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 the (+)ve on the front panel so that it may be positively charged.



Job Clamp Connection

Connect the work clamp (J1) to the work piece that will be welded. Connect the dinse plug (J2) to the negative (-)ve socket on the welding machine.

Machine Connections

Torch Connections

The negative socket is on the left of the machine, then positive socket is on the right of the machine.

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

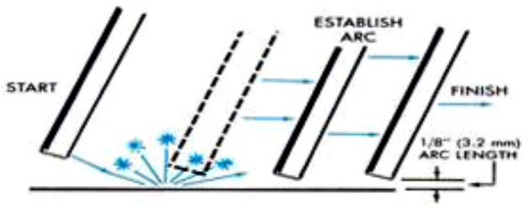
Welding Process	Torch	Work Piece
STICK (SMAW)	+	-

DC MMA Welding Data

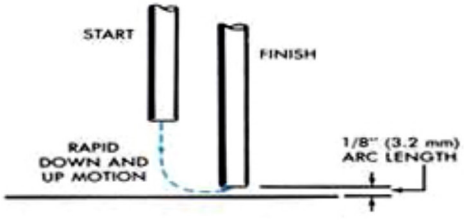
MMA Rod	Amperage	Material Thickness
1.5 mm	20 – 50A	1.00 mm – 3.00 mm
2.0 mm	40 – 90A	2.50 mm – 4.00 mm
3.2 mm	75 – 125A	3.00 mm – 6.00 mm
4.0 mm	125 – 160A	4.50 mm – 7.00 mm
5.8 mm	140 – 210A	6.50 mm – 8.00 mm

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

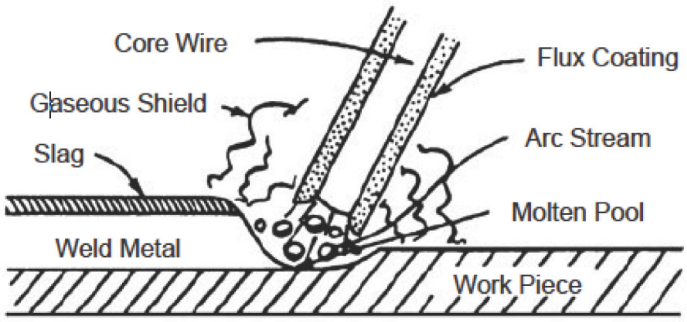
Arc blow is peculiar to DC MMA welding. The welding arc, instead of playing steadily on one spot, is deflected away from the point of welding due to the influence of surrounding

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 140 - 160 Amps.

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

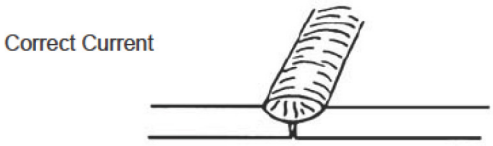


Fig. 3

Fig. 4

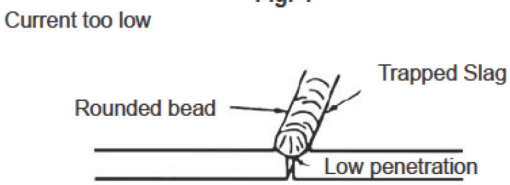


Fig. 5

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.

TIG Welding

Overview

TIG welding on the Miniarc 200STL is available as a standard built in feature however the TIG torch is available separately as an optional accessory. Any TIG torch with a gas valve head in the range of WP9 – WP17 – WP26 is suitable. The torch head choice depends on amperage range to be used.

WP9 is suitable from 10 Amps to 120 Amps
WP17 is suitable from 10 Amps to 160 Amps
WP26 is suitable from 10 Amps to 200 Amps

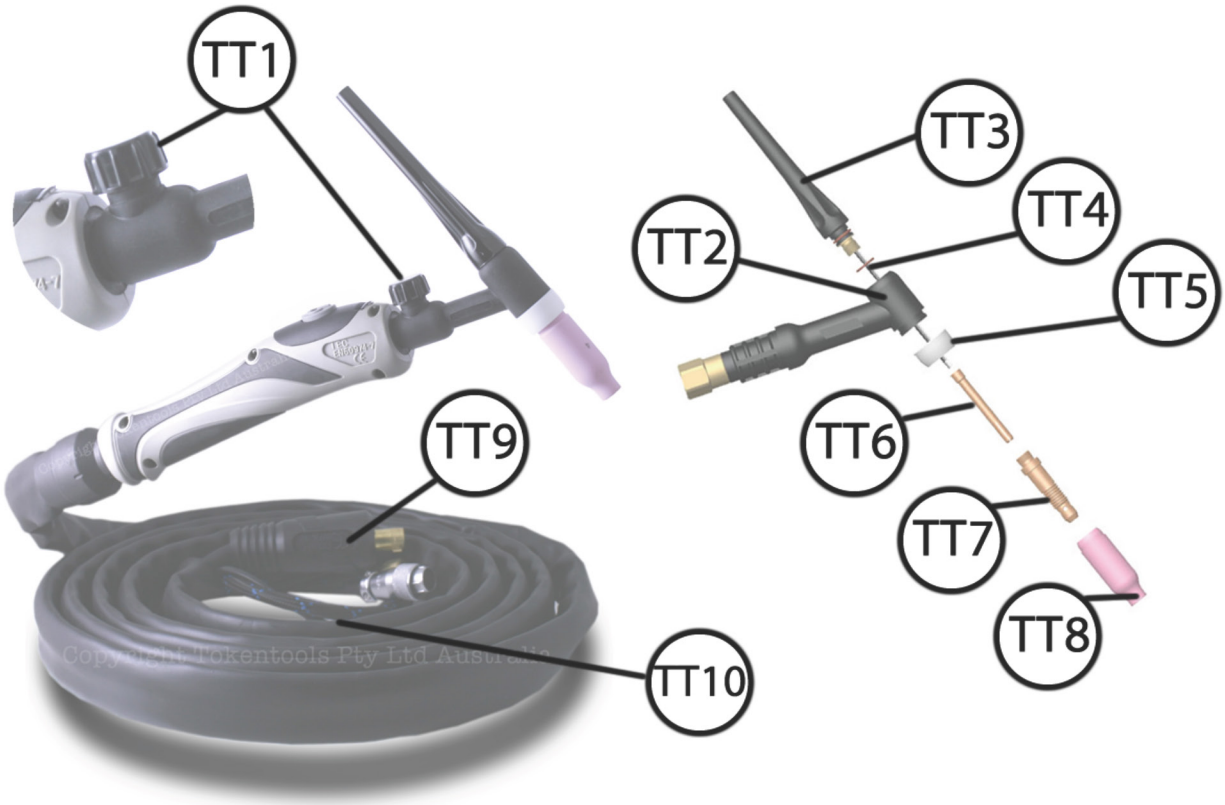
Example TIG Torch Types

WP9

WP17 / 26

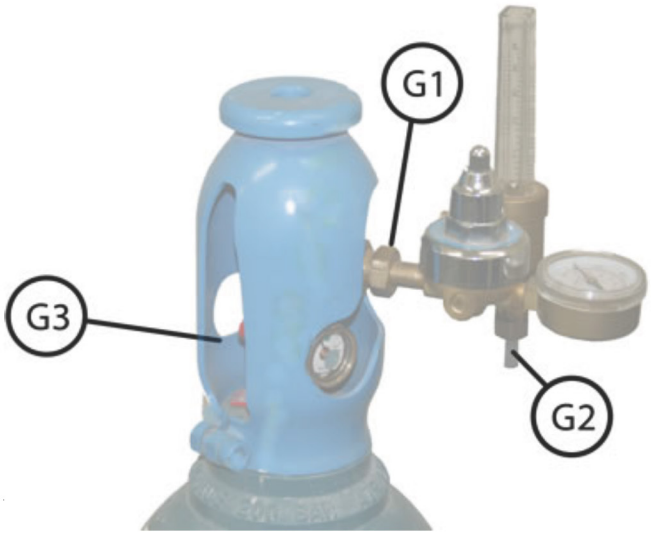
Assembly Of The TIG Torch

Supplied with the **OPTIONAL** TIG torch is a TIG torch accessories. Inside the kit you will receive a back cap (TT3), several collets (TT6), a collet body (TT7) and several ceramic nozzles (TT8), you will need to purchase tungsten electrodes to suit your application / material. 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.



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)

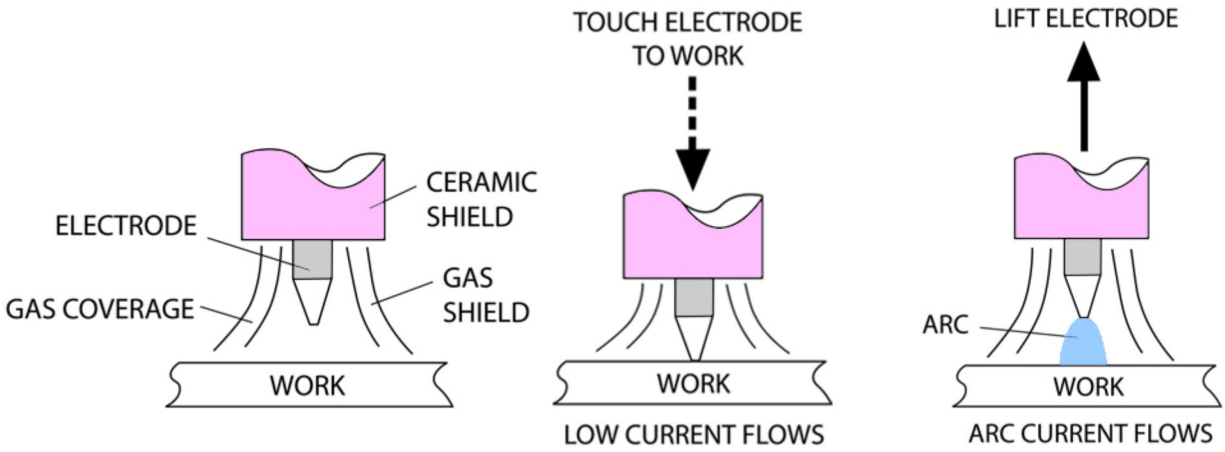
When ready to weld, activate the shielding gas cylinder by opening the main gas valve at (G3) and adjust your flow rate at required.

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 and the welding job clamp must be plugged into the positive socket. The brass gas connector on the TIG torch (TT10) is plugged into the female gas coupling supplied with the optional TIG Torch & Regulator Kit.

Striking A TIG Arc

In order to strike a TIG welding arc, once set up in LIFT TIG welding mode, the operator will need to open the gas valve on the TIG Torch neck and strike an arc using the lift arc starting procedure detailed below. To break the arc simply flick the torch to the left or right momentarily by twisting the handle 90 degrees. After gas has cooled the tungsten for a few seconds turn of the gas valve until you are ready to strike the next arc.



Specifications

Manufacturer:
- Metalmaster

Warranty:
- 5 Years Parts & Labour

Power Requirement:
- 1 x 240 Volt 15 Amp Supply - Single Phase

Welding Process:
- DC Tig Welding
- DC MMA Welding

At A Glance :
- Welds Stainless Steel
- Welds Other Metals Excluding Aluminium
- VRD (Voltage Reduction Device)
- Digital Readout

Inverter Type:
- IGBT - Siemens / Infineon Power Transistors

Dimensions and weight:
- L39cm x W13cm x H24cm
- Weight - 6.4 Kilograms

Tig Welding Features

Arc Ignition:
- Touch Lift Arc Start

Gas Control:
- Manual valve on torch neck

Tig Welding Amps Range:
- DC Amps 10 to 200

Tig Welding Waveform:
- DC

Remote Amps Control Capable:
- No

Slope Control:
- No

MMA Welding Features

MMA Welding Amps Range:
- 10 to 200 Amps

MMA Current Waveform Control:

- DC
- MMA with VRD Activated
- MMA with VRD Deactivated

Duty Cycles

Tig Welding Duty Cycles:

- 110 Amps @ 100% Duty
- 142 Amps @ 60% Duty
- 200 Amps @ 30% Duty

MMA Welding Duty Cycles:

- 110 Amps @ 100% Duty
- 142 Amps @ 60% Duty
- 200 Amps @ 30% Duty

What is in the box

All items listed are included in the standard package:

- 1 x Black Plastic Carry Case
- 1 x Miniarc200 STL Inverter Welding Power Supply
- 1 x 3 Meter MMA Twist Lock Torch and Cable
- 1 x 3 Meter Job Clamp and Cable
- 1 x Instruction Manual