Plasma Cutter Instruction Manual

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PAC50 INVERTER PLASMA CUTTER

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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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.

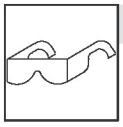
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- 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.

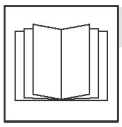
- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

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.

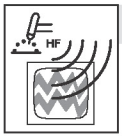
MOVING PARTS can injure.

- 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.

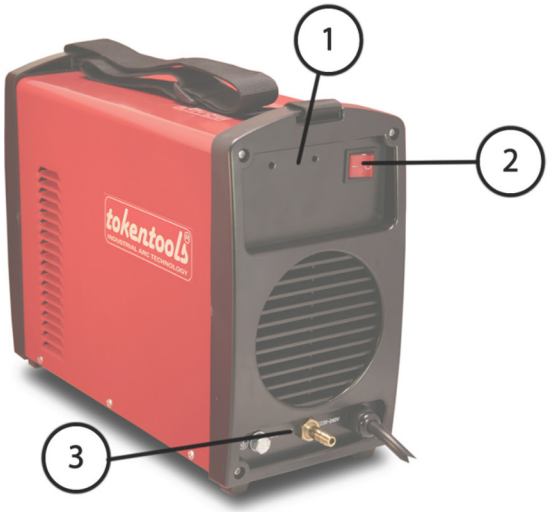
NOTE! *Always move the welding machine by the handle, never pull it by the power cord or welding torch cables. Disconnect welding & gas leads when transporting.*

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.

Plasma Cutter Front

1. Control Panel
2. Torch Cable Connections



Plasma Cutter Rear

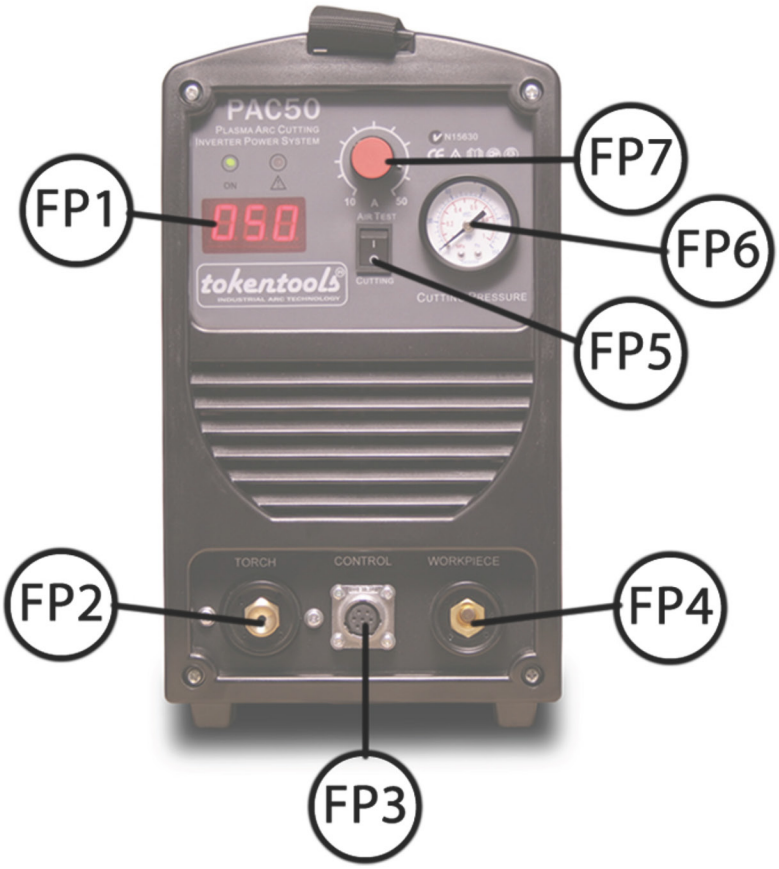
1. Regulator Mount
2. On/Off Isolator
3. Gas Inlet

Torch and Job Cable

A Plasma Torch and job clamp is included in the package.

Front Panel

The front panel allows the plasma cutting operator to make easy adjustments and cable connections to the machine.



NOTE! Plasma cutting air pressure indicator 6 is indicates cutting air pressure.

Control Panel Features

The control panel on the PAC50 allows the operator to select cutting amperage and cutting mode or test gas mode.

(FP1) - Display 1 shows preset amperage for cutting.

(FP2) – Plasma cutting tiorch connection.

(FP3) – Plasma cutting torch control connection.

(FP4) – Job clamp connection.

(FP5) – Cutting mode / Test gas switch. When testing cutting gas pressure flick this switch to the Test gas mode. Whilst adjusting the rear mounted pressure regulator air will flow through the plasma cutting torch.

(FP6) – Cutting gas pressure indicator. Compressed air is used as it is relatively inexpensive to create with an air compressor. Shielding gasses may also be used. This dial will indicate the pressure of the cutting gas.

(FP7) – Amperage control. Use this knob to increase and decrease cutting amps.

Rear Panel

Rear Panel Layout

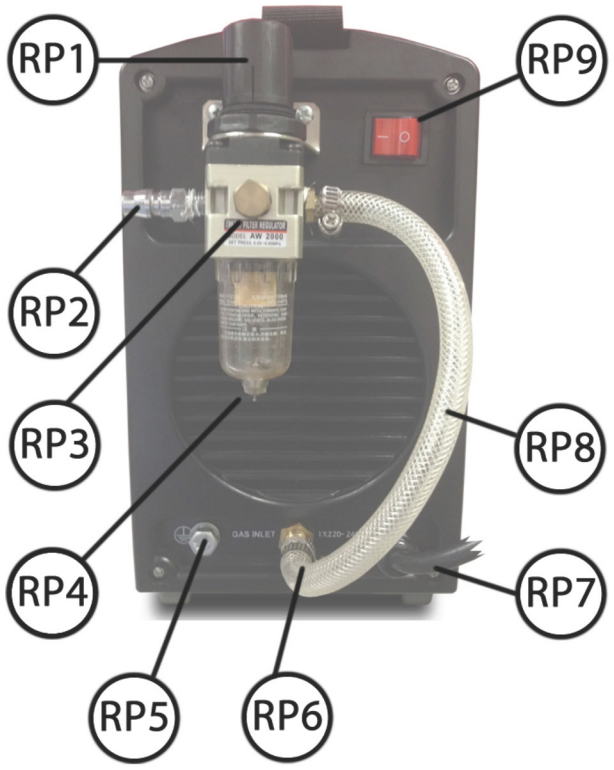
The rear panel contains the main power switch, 240V mains powered input supply cord, shielding gas input barb, cooling fan intake vent and supplementary grounding bolt and filter – drier pressure regulator assembly.

(RP1) Turning RP1 in a clockwise direction increases pressure for the plasma cutter function. Turning RP1 in an anti-clockwise direction reduces pressure.

(RP2) A brass barb is supplied for the input air connection to the filter-drier. Most air tool fittings will also fit enabling use of your existing air compressor hoses and fittings.

(RP3) A Pressure dial is installed on the front of the machine instead of the filter-drier so a plug is fitted in lieu.

(RP4) 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.



(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.

(RP6) Compressed air is supplied to the machine from the regulator via the input gas barb.

(RP7) The 240V mains electrical cord is fitted with a 15A plug.

(RP8) A reinforced pressure hose is supplied for connection of filter-drier & inlet barb.

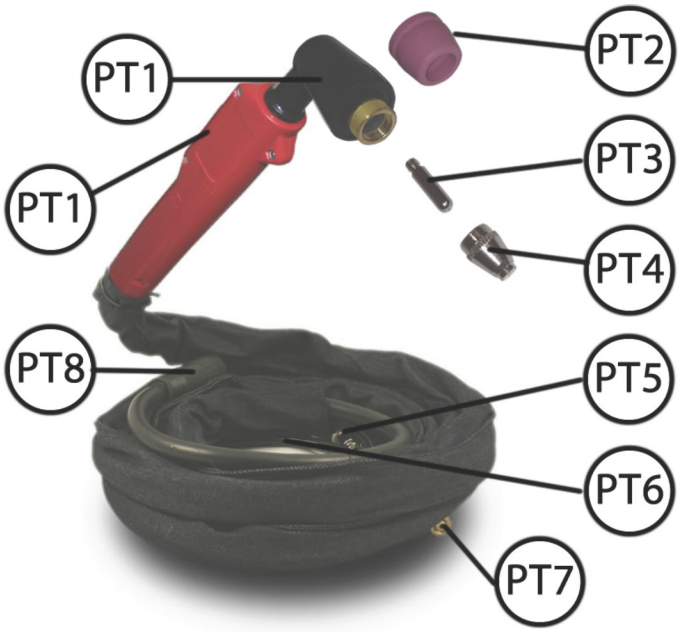
(RP9) The main on / off switch is a double pole isolator. Flicking the switch such that (-) symbol is depressed will activate the machine input power.

NOTE!. Avoid the ingress of debris by keeping the machine off the floor.

Plasma Torch

60 Series Plasma Cutting Torch

The supplied plasma torch is 4M in length and is compatible with accessories and parts designed to fit the 60 series 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 – Not Used PAC50
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). Plug the control connector (PT5) into (FP4). Screw air line connector (PT7) onto (FP4). Install the job cable dinse plug into (FP5).

Striking a Plasma Arc

The PAC50 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. If starting an arc away from the edge it is best to tilt the torch 45 degrees to the left or right and ignite the arc. As the plasma arc blows away molten metal the torch must be gently rotated again to the vertical position.

Cutting – Getting Started

The information contained within this manual is of a general nature and may be referenced when selecting a cutting parameter to be used on the PAC50.

Torch Polarity Based On Process

Process	Torch	Work Piece
PLASMA CUT	-	+

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

NOTE! The plasma cutter can be used for cutting all conductive metals. For Aluminium and stainless steel subtract max cutting thickness by 1/3rd.

For example – 8mm Aluminium requires 40 Amps and 55 psi.

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.

Plasma Cutter Setup

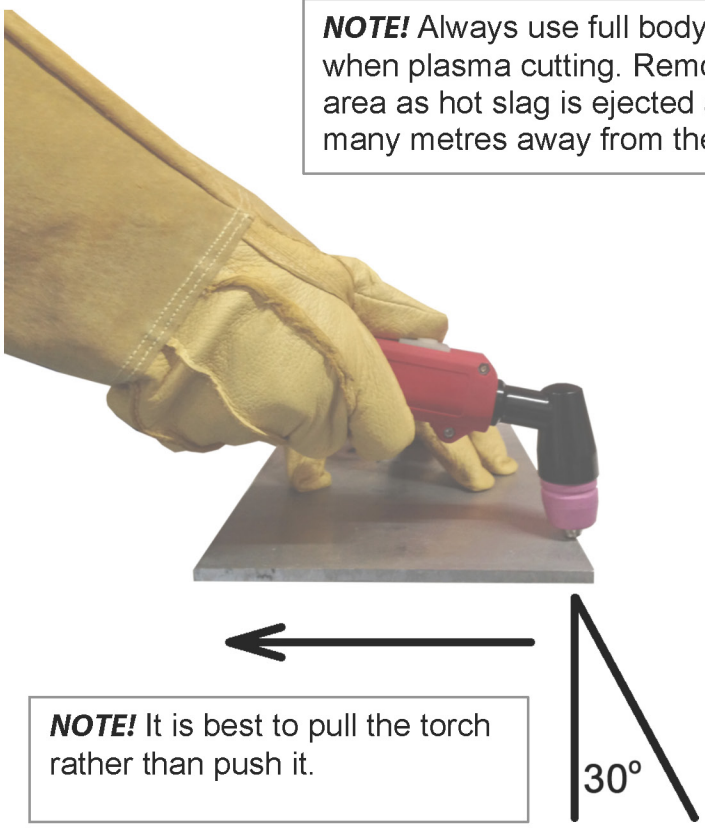
Connect the plasma cutter to a suitable mains supply. Extension cords not exceeding 20 metres with conductors containing a minimum cross sectional area of 2.5mm^2 or larger are suitable. An air compressor capable of delivering 7CFM may be used with maximum air pressure set to 55psi.Connect the job clamp 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 workpiece. 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.

Welding Machine Specification

Brand:

- ☑ Tokentools
- ☑ Registered Australian Trademark – YES

Warranty:

- ☑ 5 Years Parts & Labour

Power Requirement:

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

Welding Process:

- ☑ Plasma Cutting

At A Glance :

- ☑ Cuts all metals
- ☑ Post Flow Shielding Gas Timer
- ☑ Preset Amps Control / Display

Inverter Type:

- ☑ MOSFET - Toshiba Power Transistors

Dimensions and weight:

- ☑ L37cm x W16cm x H28cm
- ☑ Weight - 9 Kilograms

Plasma Cutting Features

Plasma Cutting Capability:

- ☑ HF arc ignition
- ☑ Cuts all metals
- ☑ Clean cut to 16mm in mild steel
- ☑ Severance cut to 20mm in mild steel
- ☑ Requires 60PSI compressed air
- ☑ Requires 7CFM of compressed air

- ☑ Includes filter / dryer (water trap)
- ☑ Front Panel Mounted Air Pressure Gauge

Duty Cycles

Plasma Cutter Duty Cycles:

- ☑ 24 Amps @ 100% Duty
- ☑ 31 Amps @ 80% Duty
- ☑ 50 Amps @ 60% Duty

What is in the box?

All items listed are included in the standard package:

- ☑ 1 x PAC50 Inverter Plasma Cutting Power Supply
- ☑ 1 x 4 Metre 60 Series Ergonomic Plasma Cutting Torch
- ☑ 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 Instruction Manual