



Operation  
& Safety  
manual

Cut 50 AirStart

# Cut 50 AirStart

CE 50Amps DC - Single Phase - 240V

*Inverter  
plasma cutter*





Congratulations on the purchase of your new PlasmaPart product

We are delighted you have chosen us to provide you with high quality plasma cutting equipment and we will strive to provide you with the best aftermarket service in the industry. Your product is backed up by our comprehensive guarantee please take a moment to fill in your warranty details below which will help you if you have to contact us in the future.

Machine Type .....

Invoice Number .....

This manual has been written to instruct you in the correct and safe use of your PlasmaPart product please read and fully understand it before use.

Your understanding of the product is key to your safety, plasma cutting is hazardous, by taking the correct precautions you can minimise the inherent hazards associated with plasma cutting.

You have made the right choice in choosing a PlasmaPart product.

PlasmaPart are the plasma cutting brand of choice for a huge range of users and supply a diverse range of industries and private individuals from aerospace & defence to boilermakers, our product performance, safety, backup, technical support, service and value lead the way in the plasma cutting industry we hope you enjoy using your new product.

# Important Safety Information

The following information is extremely important and must be observed, this section is in addition to specific hazard warnings that are mentioned throughout the manual where appropriate



**The operation and routine maintenance of plasma cutting equipment can be extremely dangerous and hazardous to your health and wellbeing.**

The plasma cutting process produces strong electric and magnetic emissions which may cause improper or non-function of cardiac pacemakers, and other electrical health equipment & devices. Consult your doctor if you are in any doubt before using or being in close proximity of a working plasma cutter.



## **Electric Shock**



Electric shock can injure or kill you, the plasma arc process requires high voltages at high currents to create the high temperature plasma beam. This high voltage and high current can cause serious injury or death to you or others in the workplace.

- Never touch any components or parts that are electrically live or hot
- Never change consumables or parts of the torch when the machine is turned on
- Always ensure parts and consumables are replaced when they are worn or damaged
- Do not operate the machine in damp or wet conditions
- Ensure the machine is used in conjunction with an appropriate RCD
- Insulate yourself from the work piece and any other parts of the circuit using appropriate safety equipment such as gloves
- Read and follow all instructions in the operation manual, if you are unsure about any of them please contact us
- The work piece should be earthed either direct to ground or to the earth terminal on the rear of the machine



## **Fire and Explosion**

When plasma cutting there is a risk that sparks, slag, plasma arc, conducted heat or a combination of these could cause flammable or potentially explosive materials to ignite or detonate.

- Ensure that all combustible materials are removed from the affected area
- Protect yourself and flammable materials that cannot be moved
- Never cut a container or vessel that has held flammable or volatile substances



### **Hazardous gases & fumes**

Gases produced during the plasma cutting process can be dangerous and may affect your health. Please take precautions to avoid inhaling them

- Ensure your work area is well ventilated, or that you are wearing sufficient protective equipment to avoid inhaling the fumes
- Keep your head out of the direct fume plume
- All fumes produced during plasma cutting can be hazardous to health and should not be inhaled. Certain materials produce more toxic fumes and great care should be taken when cutting any material made from or containing any of the following:

Antimony

Arsenic

Beryllium

Cadmium

Chromium

Cobalt

Lead

Manganese

Mercury

Nickel

Selenium

Silver

Titanium

Vanadium

Zinc

Any coated, painted, dipped, galvanised or plated material

Residue from chlorinated solvents

**If in doubt, consult the MSDS sheet for any material you are cutting or substance previously applied to it.**



### **Noise**

Very high frequency and intensity sound is produced when plasma cutting. Exposure to high levels of noise can cause hearing damage and potentially permanent hearing loss.

- Protect your hearing with appropriate ear defenders or plugs while plasma cutting particularly at high power levels and in confined spaces
- If you are in doubt it is best to measure the level to ensure it is below recommended levels of exposure



### **Plasma Arc Ultraviolet Radiation**

Plasma arc radiation can burn your eyes and skin, without adequate protection your eyes and skin are at risk, if exposed your eyesight can be permanently damaged please ensure you are wearing adequate PPE.

**The following should be treated as a guide as to the minimum shade numbers to use for eye protection while plasma cutting.**

#### **Process: Plasma Cutting**

<b>Current used</b>	<b>Minimum shade number</b>
< 20amps	4
20-40amps	5
40-60amps	6
60-80amps	8
80-250amps	8
250-350amps	9
350-800amps	11

# Declaration of Conformity

*PlasmaPart CUT 50 AirStart*

Manufacturer:

ZHEJIANG ZHONGJIAN (ZOJAN) WELDING EQUIPMENT CO.,LTD

Address: South Of Jiulong Rd., Industrial City, Wenling, Zhejiang, China

Tel.:86-576-81667866



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The equipment described in this manual conforms to all applicable aspects and regulations of the Low Voltage Directive and to the national legislation for the enforcement of this directive.

The equipment described in this manual conforms to all applicable aspects and regulations of the EMC directive and to the national legislation for the enforcement of this directive.

PlasmaPart machines are the result of extensive and continuous product development. Our manufacturing process is two-part and once the base units arrive at our facilities they are completed to our specification in the UK. Each machine is individually tested and verified before completion, ensuring the product is safe for use when used in accordance with these instructions.

PlasmaPart are committed to continual development and improvement of our products, if you have any comments, concerns, or suggestions please do not hesitate to contact us.

## **Statement of warranty:**

PlasmaPart Limited hereby warrants to the original purchaser that new PlasmaPart machines sold are free from material defects and defective workmanship, should any failure arise within a period of two (2) years from the invoice date and the machine has been treated in accordance with the guidelines stated in this manual, PlasmaPart Limited will collect the machine, return it to working condition or replace it at our discretion and re-deliver it to you as quickly as possible – typically within 48 hours.

This warranty is in lieu of any warranty of merchantability or fitness for a particular purpose.

**Warranty period:**     **2 years** parts and labour on power source

**1 year** parts and labour on torch

This warranty is conditional on you retaining the original packaging or being able to pack the machine so it can be transported safely by our delivery partner. If the machine is damaged in transit from you to us in the event of a warranty claim, you may be charged some of the repair costs if the machine has not been packaged adequately.

The warranty explicitly excludes:

- Consumables, electrodes, nozzles, swirl rings, o-rings, fuses and filters
- Equipment that has been modified, improperly used or installed, misused or improperly operated according to the guidelines in this manual

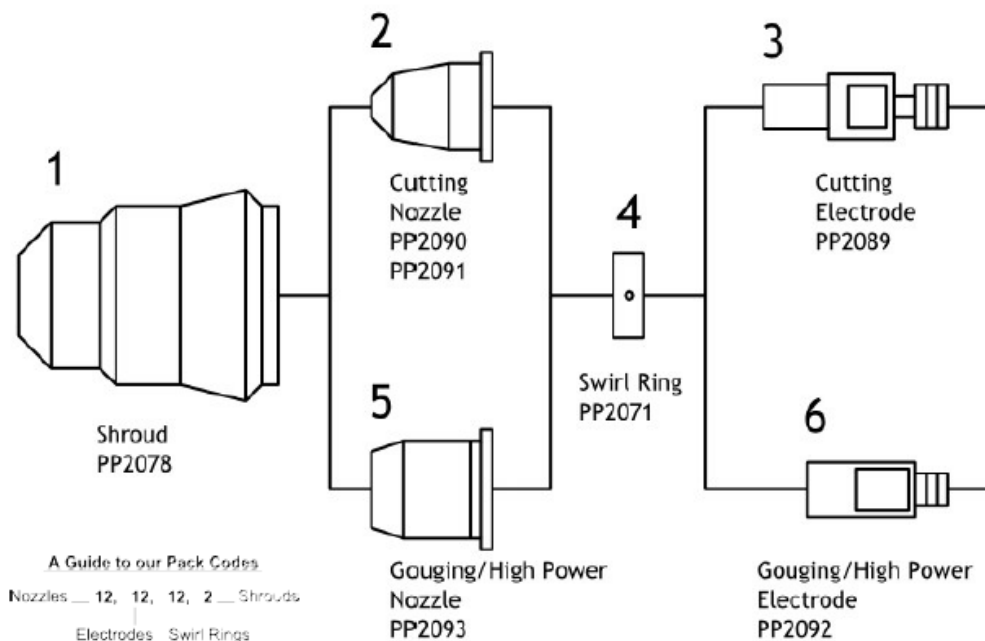
## **Limitation of liability:**

We shall not be liable or responsible for any injury, illness, accident, misfortune, loss of profit, loss of earnings, loss of life however caused as a result of buying and/or using or misusing the product(s). In no event shall PlasmaPart be liable or responsible to you or any third party for any personal, mental, physical injury or illness, consequential, direct, indirect, special or contingent damages arising from the use, misuse or failure of the product(s) sold or advice given. Our cumulative liability on account of a claimed defect in any product supplied by PlasmaPart or any damages of whatsoever type caused by the use or misuse of the products(s) shall in no event exceed the purchase price paid by you.

## Power Source Specifications CUT 50 AirStart

Supply Voltage	1-ph AC 220±15% V
Supply Frequency	50~60 Hz
Power requirement (at 50A)	6.0 KVA (Max)
Rated input current (at 50A)	30 A (Max)
No-load voltage	230 V
Output current range	20-50 A
Output voltage range	88-96 V
Duty cycle @ 50 Amps	60%
Output Efficiency	85%
Cut Width	1.0 mm
Arc striking model	Pneumatic Contact
Cos φ (η)	0.93
Air pressure	60 psi

## Torch Specification (Standard S45 Trafimet / Parker Ergo)



Pos.	Part no.	Description
1	PP2078	Shroud
4	PP2071	Swirl Ring
3	PP2089	<b>Cutting</b> Electrode
3	PP2084	Pack of 5 <b>Cutting</b> Electrodes
3	PP2083	Pack of 10 <b>Cutting</b> Electrodes
2	PP2090	<b>Cutting</b> Nozzle 0.6mm
2	PP2091	<b>Cutting</b> Nozzle 0.8mm
2	PP2085	Pack of 5 <b>Cutting</b> Nozzles
2	PP2086	Pack of 10 <b>Cutting</b> Nozzles
Not shown	PP11006	Trafimet Circle Cutting Kit <b>S45</b>



## S45 Torch Requirements

**Air:**                    **Warning – Always turn off the machine before changing tips**



- 60 PSI / 4 BAR whilst air is flowing through the torch
- The air must be clean and dry and free from oil and other contaminants
- Genuine consumables must be used to ensure reliable starting and maximum life of the torch and tips, as well as the best possible cut

### **The principle behind plasma**

The plasma beam is essentially a very high energy ionised gas stream. This is created by passing air at high velocity whilst spinning through a carefully formed arc, the arc is formed between the hafnium tip of the electrode and the inner surface of the copper nozzle. The swirl ring that is located between the nozzle and the electrode is primarily present to create a stable high velocity spinning vortex of air, this stable spinning vortex of ionised gas forms the plasma beam as it exits the nozzle orifice.

The ionised plasma beam can reach temperatures in excess of 25,000 degrees centigrade, which allows the plasma cutting system to cut so quickly and effortlessly.

## Setup, Operation & Connections

Once unpacked please take a moment to identify the various inputs, outputs and controls on your new PlasmaPart system – key to its operation are:

- **Mains Input**

In this case a 32A 240V plug is pre-wired to your machine, under certain circumstances you may use your PlasmaPart system whilst connected to a 13amp 240V supply, you must however not use the system with a cutting amperage of over 30amps whilst connected to a 13amp standard 3 pin plug, any higher than this and the unit will draw more than 13amps input current and the 13amp fuse will fail. Furthermore if you connect your machine to an extension lead ensure that the conductor size is adequate for the length of lead and current draw of the machine, in this case at least 6mm<sup>2</sup> should be used. If you are in any doubt please consult a qualified electrician. Always protect yourself and others by using your machine with an appropriately sized RCD or residual current device.

- **Compressed air supply**

Your new PlasmaPart system is equipped with a PCL type quick air connection. Once you have attached your regulator to the rear of the machine and tightened the air supply pipe clamp, plug the connection into your airline. **The regulator should be set to 60PSI / 4 Bar when the air is flowing through the torch with the trigger pressed (only depress the trigger briefly to check and do so pointing away from you).**

The air supply should be dry (compressor tank blown down regularly) and free from oil and contamination such as dirt particles. You may use compressed air bottles instead of an airline and compressor, these should be fitted with appropriate high pressure regulators to drop the output pressure to no higher than 116PSI before connecting to the input of your PlasmaPart system's regulator.

All air supply lines should be at least 6mm (1/4") inside diameter and of suitable material to safely operate at your airlines pressure – we can supply airlines if required, please contact us.

- **On / Off switch** - this turns the machine on and off
- **O.C light** – this is a general fault light, it will illuminate if the input voltage to the machine falls below the required level, the machine develops an electronic fault, the machine overheats, or if the torch parts are incorrectly assembled, please check the torch with the machine off and ensure the torch is correctly assembled, the swirl ring is present, and the electrode can move smoothly in and out. If the torch is correctly assembled and this light still illuminates, check your power connection, and failing this, call us and we will help you.
- **Regulator control** – this adjusts the output pressure of the compressed air supply to the PlasmaPart system. In order to adjust this, lift the knob slightly and you should hear a slight click as the knob engages, you can now turn the knob to adjust the pressure. Clockwise to increase and anti-clockwise to decrease, when you have adjusted it correctly push the knob back down and it will click into the locked position.
- **Euro torch connection** – this is the large connection into which the torch connects, it carries the signal from the trigger, the pilot line conductors, the compressed air and the main torch power feed.

This is a simple connection, it orientates only one way with a lug inside and then threads into position giving a safe, quick and positive connection for the torch.

It is important that the large copper conductor in the centre is not marked or damaged as this will cause the connection to bind or leak or both, if this is damaged, usually by dropping on the floor or marked it is possible to gently file the copper around the site of the damage to enable it to engage properly, however great care should be taken if this is carried out. If in doubt please contact us.

- **Output current control** – this is an infinitely variable rotational knob, which adjusts from minimum (fully anti-clockwise) to maximum (fully clockwise) it is linear in function and with the knob set halfway between the two extremes the output will be set at the machines mid-point output and so on.
- **Work piece clamp connection** - this is an industry standard Dinze connector and is used to connect the work piece clamp to.

## Using the PlasmaPart cutting system

The following is a typical sequence of operation – for details of each step please see the previous pages.

- Put on appropriate safety equipment, and check surroundings for suitability and fire hazards
- ensure where you are working is clean and dry and free from other hazards
- Connect torch
- Connect compressed air supply & check operating pressure is correct
- Connect work piece clamp lead & attach clamp to your work
- Set current to full (fully clockwise on knob) for your first cut while you get a feel for the machine
- Start cutting

The torch fitted to the CUT 50 AirStart should be used in contact with the work piece, and can be used with a variety of tips including extended type. Always use genuine consumables and if you are in any doubt contact us for advice before proceeding as mis-fitting of tips and incorrect assembly can rapidly cause very expensive damage to the torch, in some cases incorrect assembly can be dangerous and may also affect your warranty.

Full torch assembly information can be found in your torch manual and online at [www.plasmapart.com](http://www.plasmapart.com) in the manuals section under 'Trafimet S45'.

Whilst cutting it should be noted that no pressure should be applied to the torch into the material, you are aiming for an effortless glide across the material, some find using both hands gives a steadier cut as can a guide for example made from a steel strip or more complex template.

When cutting, each material will exhibit its own particular traits. As a rough guide cut quality is defined by a combination of speed & power, you should set the output current to give a comfortable speed of cut through the material, when the magic speed and power combination have been found the underside of the cutting plume should almost "flare" the sparks will be projecting as a fine volumous spray at roughly 30 degrees from vertical behind the cut and very little or anything should project back up.



**Turn the machine off before changing tips or adjusting the torch. Wear appropriate safety equipment at all times. Do not allow contact from the operator with the work piece whilst a cut is made – use suitable gloves.**

## **Cut quality**

Cut quality depends quite heavily on a number of different parameters including torch standoff or contact, torch alignment relative to the work piece, cutting speed, material being cut, and of course operator ability and experience.

The following pointers should be noted, however a lot is to be gained from practice and experience. Training and general information days as well as formal welding coding is available at our facilities or on site with you, please contact us for details.

- Try to keep the torch tip perpendicular and vertical to the work piece when cutting – this gives you the best chance of a straight cut.
- Do not raise the torch tip either from contact with the material or the guide from the material if using one when cutting as the cut quality will decrease as the gap increases above the material.
- Try to ensure the material being cut is as clean as possible before cutting, this will improve the cut quality and means there is less chance of the contaminants on the material becoming airborne fumes when they are cut.
- Ensure there is a good clean connection between the work clamp and work piece.
- Try to plan direction of cut when the edges are critical, due to the rotation of the plasma gas stream one side of a cut will be perpendicular, the other may have a slight angle offset, which side this happens on will reverse with direction of travel. You can reverse the swirl ring to swap which side this affects – this effect is present in all plasma arc cutting systems and ranges from imperceptible in thinner materials to more pronounced at higher cut speeds in thicker materials.

For example – to ensure the cut is ‘square’ to the plate when cutting the inside edge of the circumference of a circle the torch should move counter clockwise. To keep a ‘square’ cut on the outside edge of the circumference of a circle the torch should travel in a clockwise direction.

## Fault Finding

If you are having problems with any aspect of your machine please contact us, but first please take a moment to see if your fault is described here:

- **Arc goes out mid-way through a cut**

Check air pressure is correct.

Check condition of electrode and nozzle.

Check the mains plug is securely connected and not loose or under strain.

Check work piece clamp is securely attached to clean metal of the work piece.

Check torch euro connection is fully home.

Check the compressor and moisture trap on the rear of the machine is not full of water and that the air supply is free from moisture, oil or other contamination or debris.

Check to ensure the inlet of the compressor is not breathing in exhaust fumes as this can stop the arc igniting properly.

- **Arc will not initiate**

Check machine is switched on and has correct air supply.

Check work piece connection.

Disassemble torch consumables and check for worn electrode, loose electrode (this needs to be nipped up but not overtightened), missing or damaged swirl ring, and correct matching consumables have been fitted.

Check torch euro connection is fully home

- **Cut is not clean**

Check work piece clamp is securely connected to a clean part of the work piece.

Check condition of consumables and that the swirl ring is not damaged or missing.

Check air pressure is correct.

Check there is no other material on the underside of the material being cut such as a label or some paint as this can spoil the back side of the cut.

- **Cut does not fully penetrate material**

Check to ensure the work piece clamp is attached to a clean metal part of the work piece.

Check the air pressure is correct.

Check to ensure the current output is set high enough for the material you are cutting

Check that the material thickness is within the operating parameters of your machine.

**Thank you again for your purchase and  
we hope your PlasmaPart cutting system gives you  
many trouble free years of operation**

If you need to get in touch for advice, to purchase spares, for warranty support,  
service or for any other reason you can contact us here

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