OPERATORS' MANUAL

FIVE-YEAR WARRANTY 5 FIVE-YEAR WARRANTY

Stealth

DIGI-ARC DC INVERTER

Part No. **9021H DIGI-ARC 175LT**

Part No. **9023H DIGI-ARC 205LT**

IMPORTANT

Please read these instructions carefully before attempting to use this equipment.
Retain this manual and keep it to hand for quick reference. Pay particular attention to the safety instructions.
Contact your distributor if you do not fully understand this manual.

Thank you for choosing a **STEALTH DIGI-ARC DC INVERTER**

In this manual you will find instructions on how to set up your welder along with general welding information safety information and helpful tips. We encourage you to go online to our website for more tips and troubleshooting as well as many welding resources.

The **STEALTH DIGI-ARC DC INVERTER** are the latest in IGBT MMA Stick Electrode Welder technology, this very lightweight welding machine, is easy to use, generating a very smooth and stable output, ideal for welding jobs around the home, farm, workshop or on site.

We truly hope you enjoy using your welder!

Please ensure you read and understand the instructions before installation and operation of this machinery.

S STICK

- Easiest process to learn
- Best choice for quick repairs
- Slower than MIG welding
- Forgiving in dirty/rusty environments
- Not recommended for thin sheet metal welding

METAL TYPES
Mild steel, stainless steel and cast iron

T TIG-LIFT

- Gives a better weld finish
- Accurate heat control
- Considered the most challenging process to learn
- Good way to weld thin material
- Argon gas is required

METAL TYPES
Mild steel, stainless steel and aluminium

CONTENTS

1. SAFETY

WARNING

Before use, read and understand the instructional manual, follow all labels, employer's safety practices and Safety Data Sheets.

Safety precautions

Users of SWP equipment are responsible for ensuring that anyone who works with, on, or is near the equipment, observes all the relevant safety precautions relevant to that equipment. The following recommendations should be observed in conjunction with the Health and Safety regulations that apply to the workplace where the equipment is in use.

All work must be carried out by trained personnel, as incorrect operation of the equipment may lead to hazardous situations which can result in injury to the operator or those around them, and damage to the equipment.

Anyone who uses the equipment must be familar with:
- Relevant safety precautions
- Its function
- Welding, cutting or other applicable operation of the equipment
- The location of **ALL** emergency stops

The operator must ensure that:
- The equipment is connected to suitable supplies
- No unauthorised person is positioned in the work area when the equipment is started or operated
- All in the work area are adequately protected at all time

The workplace must:
- Be suitable for the purpose for which it is to be used
- Be dry and ventilated
- Have appropriate fire extinguishing equipment, which must be clearly make and close at hand

Personal safety equipment:
- Loose fitting closing and jewellery that could become trapped, or cause other hazards must not be worn
- Suitable Personal Protective Equipment (PPE), including safety glasses, flame-proof clothing, safety gloves, correct welding shield etc must always be worn

General precautions:
- Ensure the return cable is always connected securely
- Work on high voltage equipment **must only be carried out by a qualified Electrician**
- Lubrication and maintenance must **not** be carried out on the equipment during operation

WARNING

ARC Welding and cutting can be injurious to yourself and others. Take precations when performing welding, cutting and associated processes.

ELECTRIC SHOCK - Can kill

- Install and ground the unit in accordance with instruction manual.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing.
- Insulate yourself from work and ground.
- Ensure your working position is safe.

ELECTRIC AND MAGNETIC FIELDS - Can be dangerous to health

- Welders with pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
- Exposure to EMF may have other health effects, which are unknown.
- To minimise exposure to EMF welders should:
    - Route the electrode and work cables together on the same side of your body. Secure them with tape when possible. Do not place your body between the torch and work cables. Never coil the torch or work cable around your body. Keep the welding power source and cables as far away from your body as possible.
    - Connect the work cable as close as possible to the weld position.

FUMES AND GASES - Can be dangerous to health

- Use ventilation, extraction at the arc, or both, to take fumes and gases away from your breathing zone and the general area.
- Keep your head away from the fume area.

ARC RAYS - Can injure eyes and burn skin

- Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

NOISE - Excessive noise can damage hearing

- Protect your ears. Use hearing protection.

MOVING PARTS - Can cause injuries

- Keep all panels, covers closed, and securely in place. Only qualified people should remove covers for maintenance. Reinstall all panels and covers correctly, when service is completed, and before starting the equipment.

- Ensure the equipment is switched off before installing or connecting to services.

FIRE HAZARD

- Remove all combustable materials from the work area. If this is not possible, cover them with heat resistant blankets, or another suitable material.

- Do not weld enclosed tanks or containers.

- Have fire extinguishers available.

HOT SURFACE - Parts can burn

- Wear suitable protection when handling welded components, and use the correct tools.

CAUTION

Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electromagnetic compatibility of class A equipment in those locations, due to conducted and radiated disturbances.

CAUTION!

This product is soley intended for the purpose of arc welding.

NOTE!

In accordance with European Directive 2012/19/EC concerning Waste Electrical and Electronic Equipment and its implemention, electrical and/or electronic equipment that has reached the end of its life must be disposed of at a recycling facility.
As the person resposible for the equipment, it is your responsibility to dispose of equipment accordingly.

For further information, contact Specialised Welding Products Ltd.

2. SUMMARY

The Stealth DIGI-ARC is a MMA Arc welding machine featuring the Insulated Gate Bipolar Transistor (IGBT) power module. Its medium frequency transformer makes it portable, compact, lightweight and with low consumption and noise.

The Stealth DIGI-ARC offers excellent performance. Constant current output makes the welding arc more stable, and a fast dynamic response speed reduces the impact from the arc length current fluctuation.

Other automatic functions protect from under voltage, over current, overheat, etc. An alarm on the front panel lights, at the same time the output current cuts off. This can prolong production use and greatly improve the reliability of the machine.

The machine can be easily ignited with little splash and good weld bead.

The Stealth DIGI-ARC has a high duty cycle – even at 40ºC – for continuous operation. The machine is very stable and keeps working under high temperature and corrosive environments.

3. BOX CONTENTS

- Stealth DIGI-ARC DC Inverter
- 3m Earth Return Lead
- 3m Electrode Lead
- Manual

4. OPERATION CONTROL AND CONNECTORS

1 Positive output 35-50 Dinse.

2 Negative output 35-50 Dinse.

3 Welding current adjustment knob: turn to adjust the output current size.

4 Power indicator: power-on light.

5 Alarm light: indicator light comes if voltage or overheating occurs inside the machine.

6 Current digital display.

7 Power switch: power on and power off.

8 Fan: assists cooling.

9 Power access client: access to cable.

10 Conversion switch: choose LIFT TIG; choose MMA.

5. INSTALLATION & ADJUSTMENT

Note: Please follow steps in strict accordance with installation instructions!
Electrical connection must be disconnected after power is switched off!
Equipment protection level is IP23. Do not use in the rain!

5.1 Installation

Each machine is fitted with a power cable based on the input voltage connected to the appropriate selection. Do not select the wrong voltage.

With the corresponding input power supply terminal or socket, ensure good contact and prevent oxidation.

A multi meter measures the input voltage is within the fluctuation range.

Clamp the front panel connector into the jack at the bottom of the cathode and tighten clockwise.

Clamp the cable plug into the front panel below the negative welding socket and tighten clockwise.

Ensure a good earth.

See above for DC reverse operation.

Select DCSP operation when using base metals and welding rods.

In general, the basic electrode reverse method is recommended (ie, connected to a positive electrode).
When using acid electrodes take extra care.

5.2 Operation

Use the above method for correct installation. Turn the power switch to 'ON' and the power indicator light and fan come on – the device is working correctly.

Note the polarity of wiring. Generally DC welding wires are connected in two ways – positive and reverse polarity.
Positive Connection: Welding clamp then negative, then positive, then positive work piece; reverse law contrary.
Select according to technical requirements.
An incorrect selection can result in arc instability and spatter etc.

If the work piece distance from the welding machine to the second line (electrode holder and ground) is longer, choose the appropriate conductor.
A cross-sectional area should be larger to reduce cable voltage drop.

According to the standard pre-set welding electrode current, the electrode clip will be sufficient and you can use short-circuit arc welding. For welding parameters refer to 6.3.

5.3 Welding Table

Note: The following table applies to low-carbon steel. For other materials, please refer to related information.

Electrode Diameter (mm)	Recommended Welding Current (A)	Recommended Welding Voltage (V)
1.0	20~60	20.8~22.4
1.6	44~84	21.76~23.36
2.0	60~100	22.4~24
2.5	80~120	23.2~24.8
3.2	108~148	23.32~24.92
4.0	160~200	26.4~28
5.0	180~260	27.2~30.4

6. OPERATION NOTICES

6.1 Installation

Welding environmental temperature should be between –10ºC to 40ºC.
Welding should be completed in relatively dry environments with air humidity of not more than 90%.
Avoid environments containing dust or corrosive gases.
Avoid sunlight or rain. Do not allow water or rain water to infiltrated the welding machine.

6.2 Safety

This welding machine has been installed with a over-voltage, over-current and over-temperature protection circuit. When the grid voltage, output current and internal temperatures exceed the set temperature, the welding machine will automatically cease working. Excessive use will result in welding damage, so please note:

Ensure good ventilation
The Stealth DIGI-ARC is equipped with cooling fans. Before use, please check the vents are clear and the distance surrounding welding is not be less than 0.3 metres.

Prevent overload
The welder should ensure that the duty cycle current is kept within the standard range (see technical data table). Any current overload will shorten the life of the machine welding machine and may even ignite.

Prevent over-voltage
The welding voltage within the circuit will automatically compensate to ensure the welding current is in the permitted range. If the voltage exceeds the allowable value it can damage the machine. The welder should be fully aware of this and take appropriate preventive measures.

7. MAINTENANCE

The following operations require the welder has sufficient electrical expertise and can demonstrate a comprehensive knowledge of working safely with valid qualifications and documents. Check to make sure the welding power input cable is not broken.

Periodically inspect the internal circuit connections are intact and reliable (especially the joints or components). If any rust and debris is found, sand off, clean, reconnect and tighten.

Do not allow hands, hair and tools near live components or fans inside the machine.

Regularly clean machine with dry compressed air. Compressed air pressure should be at a reasonable level in order to avoid damage to the welding of small internal components. Dust the machine regularly.

Avoid water or water vapour getting inside the welding machine inside. In the event of accidental ingress, the machine should be thoroughly dried. Only when you are sure that any moisture or water has been thoroughly dried from inside may you use the machine. Suitable tools for checking the moisture content within are advised.

Regularly inspect the cable insulation for damage. In the event of any damage wrap or replace the cable.

When not using the machine, place back in the case and keep in a dry environment.

8. MACHINE SET UP - STICK/MMA

Note: The below image shows setup for DCEP/Negative Polarity (Most Common application)

1. Plug the machine power lead into the wall socket, ensuring that the power switch on the machine is in the **OFF** position.

3. Connect the earth clamp firmly to work-piece ensuring that the clamp makes good contact with bare metal.

2. Assemble Arc and Earth leads into the welding terminals depending on requirements of electrodes. Twist the connections to lock in and ensure a good connection. Refer to your electrode packet for polarity and current requirements.

SCEP/Negative Polarity (most common application)
- Earth clamp connector into the **negative** terminal.
- Electrode Holder connector into the **positive** terminal.

DCEN/Straight Polarity (most common application)
- Earth clamp connector into the **positive** terminal.
- Electrode Holder connector into the **negative** terminal.

4. Take electrode holder and press handle to open the tong. Insert bare metal rod end of electrode and release handle to clamp electrode.

Note: Pictures may vary from your machine model.

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5. Ensure the electrode/electrode holder is not near the work-piece or it can earth out.
Turn the machine on using the mains power switch. The front dispays will light up and the colling fan will start.

6. Select your required current by turning the Welding Parameter Adjustment Knob.

TIPS

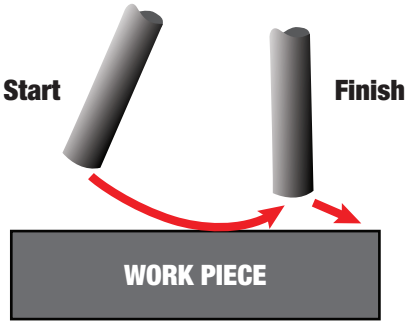
- Keep the welding current as low as possible for the job at hand to maintain the best duty cycle from your welding machine, prevent the flux from burning and make removal slag easier.
- To break the circuit withdraw the electrode from the work piece. Be careful with the end of the electrode, as it will be HOT. Provided the current setting is correct, the surface of the work piece will also melt by the intensity of the electric arc. A degree of “penetration” is thereby obtained, and a complete “fusion” of the work piece and the deposited electrode is met.
- If the transformer overheats, the overload cut-out protector will activate and cut off. The light will illuminate to show that the cut out has operated.
- After cooling, the protector will reconnect the supply circuit and the welder will be ready for further use.

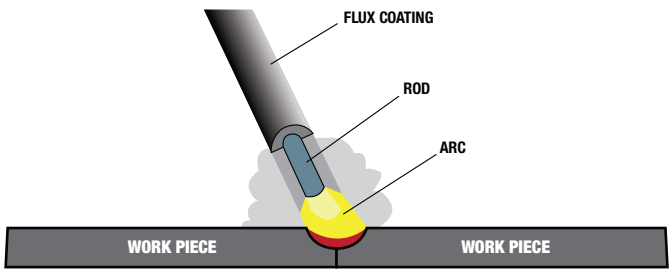
Note: If the duty cycle of the machine is exceeded, the thermostatic protection will activate and the machine will cut out, to cool down.

STARTING THE ARC

The welding arc is obtained when the welding current is forced across a gap between the electrode tip and the workpiece. A welder must be able to strike and establish the correct arc easily and quickly.

The scratching method is easier for beginners. The electrode is moved across the plate inclined at an angle, as you would strike a match. As the electrode scratches the plate an arc is struck. When the arc has formed, withdraw the electrode momentarily to form an excessively long arc, then return to optimal arc length.
The optimal arc length, or distance between electrode and puddle, is the same as the diameter of the electrode (the actual metal part within the flux covering). Holding the electrode too closely to the joint decreases welding voltage, which creates an erratic arc that may extinguish itself.





ELECTRODE SIZE SELECTION

Electrode size selection will be determined by the thickness of the section being welded. A thicker section will need a larger diameter electrode. The table below shows the maximum size of electrodes for average thicknesses of section (based on General Purpose 6013 Electrode).

Average Metal Thickness	Electrode Size
1.0 - 2.0mm	2.0mm
2.0 - 5.0mm	2.6mm
5.0 - 8.0mm	3.2mm
8.0mm +	4.0mm

WELDING CURRENT

Welding current level is determined by the size of electrode - the normal operating range and current are recommended by manufacturers. Typical operating ranges for a selection of electrode sizes are illustrated in the table. As a rule of thumb when selecting a suitable current level, an electrode will require about 40 Amps per millimeter (diameter). Therefore, the preferred current level for a 4mm diameter electrode would be 160 Amps, but the acceptable operating range is 140 to 180 Amps. It is important to match the machine to the job.

Amperage Selection Guide	
Rod Size/Gauge	**Welding Current**
1.6mm	40-50 Amps
2.0mm	50-75 Amps
2.5mm	75-105 Amps
3.2mm	105-140 Amps
4.0mm	140-160 Amps

MANUAL METAL ARC PROCESS (MMA WELDING)

When an arc is struck between the metal rod (electrode) and the workpiece, both the rod and workpiece surface melt to form a weld pool. Simultaneous melting of the flux coating on the rod will form gas and slag which protects the weld pool from the surrounding atmosphere. The slag will solidify and cool and must be chipped off the weld bead once the weld run is complete (or before the next weld pass is deposited).
The process allows only short lengths of weld to be produced before a new electrode needs to be inserted in the

TYPES OF ELECTRODES

Arc stability, depth of penetration, metal deposition rate and positional capability are greatly influenced by the chemical composition of the flux coating on the electrode. There are many types of Electrodes, and these are generally matched to the base metal. For example if welding Mild Steel then select a Mild Steel (General Purpose Electrode). Electrodes are identified by a universal numbering system (AWS Type code).

Base Metal	Electrode Type	Type
Mild Steel	Mild Steel General Purpose	6013
Stainless Steel	Stainless Steel 316L	316L
Dissimilar Metals	Dissimilar 680	312
Cast Iron	Nickel Arc 98	Ni99
High Strength Steel	Low Hydrogen	7018

Electrodes are often packed in sealed packaging to keep moisture out. However, if a pack has been opened or damaged, it is essential that the electrodes are redried according to the manufacturer's instructions.

ARC FORCE

Also called Dig and Arc Control. Gives a power source variable additional amperage during low voltage (short arc length) conditions while welding. Helps avoid "sticking" stick electrodes when a short arc length is used.

POWER SOURCE

Electrodes can be operated with AC and DC power supplies. Not all DC electrodes can be operated on AC power sources; however AC electrodes may be used on either AC or DC

NOTE: TIG TORCH OPTION AND REGULATOR SHOWN ARE NOT SUPPLIED WITH THE MACHINE

17 Series Complete Air Cooled TIG Torch

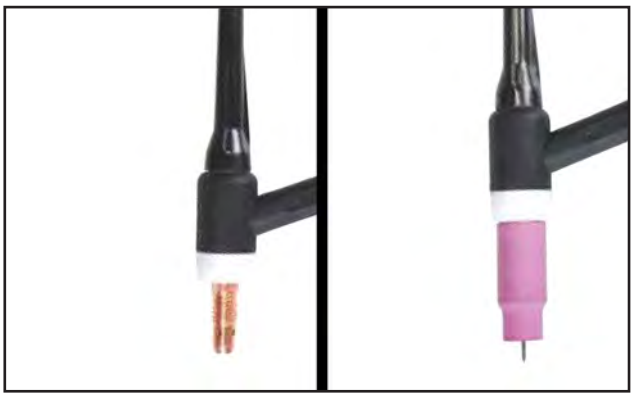
Argon Dual Stage Regulator with Flowmeter

9. MACHINE SET UP - TIG

4. Connect the Argon Gas Regulator to the Gas bottle and connect the Gas Hose from the torch to the Input socket on the Regulator. Ensure the Gas regulator is in the off position.

1. Plug the machine power lead into the wall socket, ensuring that the power switch on the machine is in the **OFF** position.

2. Install the TIG Torch to the machine by connecting the Dinse Connector to the Negative Output Connection Socket, the Gas hose to the Gas Output and the TIG Torch Control Socket and screw the nut up firmly.



3. Set up the TIG torch. Place the Tungsten Electrode into the torch head and ensure back cap and collet body are screwed in firmly.

6. Turn the machine on using the mains power switch. The front displays will light up and the cooling fan will start.

4. Connect the Argon Gas Regulator supplied to the Gas bottle and connect the Gas Hose to the Gas Input socket on the rear of machine and the Regulator. Ensure the Gas regulator is in the off position.

7. Select your required current by turning the Welding Parameter Adjustment Knob.

5. Connect earth clamp firmly to work-piece ensuring that the clamp makes good contact with bare metal.

Setup continues on the next page.

8. Turn on regulator and set gas flow to between 10-15 L/min depending on your welding environment.

Note: It is advisable to run a few test welds using scrap or offcut materials, in order to tune the machine to the correct settings prior to welding the job.

9. Turn the valve on the torch head to start the flow of gas, Remember to turn it off when finished welding.

IMPORTANT! - We strongly recommend that you check for gas leakage prior to operation of your machine.
We recommend that you close the cylinder valve when the machine is not in use. SWP authorised representatives or agents of SWP will not be liable or responsible for the loss of any gas.

SCRATCH START ARC

1. Lay the outside edge of the Gas Cup on the work piece

2. With a small movement strike the tungsten electrode along the work piece.

3. The tungsten electrode will create the arc from itself to the work piece.

Note: Pictures may vary from your machine model.

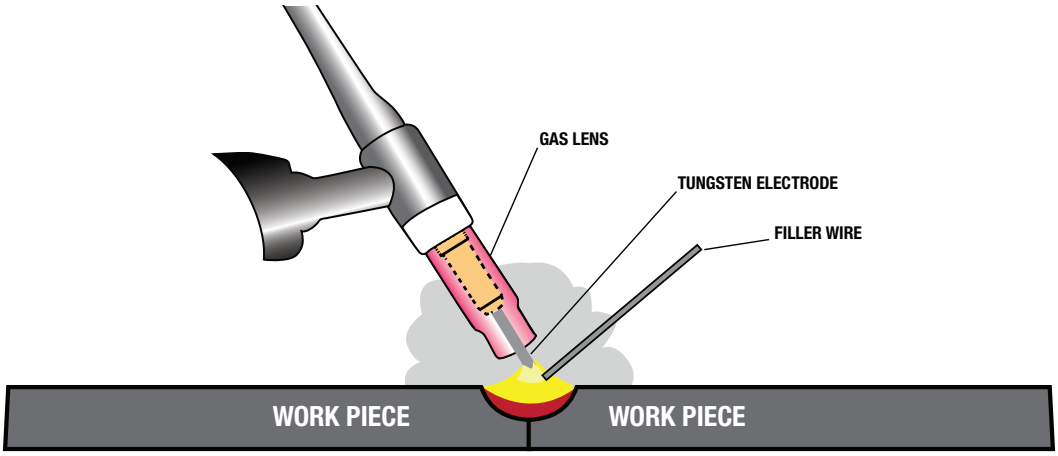
This risk can be minimised using the 'lift arc' technique where the short-circuit is formed at a very low current level. The most common way of starting the TIG arc is to use HF (High Frequency). HF consists of high voltage sparks of several thousand volts which last for a few microseconds. The HF sparks will cause the electrode - workpiece gap to break down or ionise. Once an electron/ion cloud is formed, current can flow from the power source.
Note: As HF generates abnormally high electromagnetic emission (EM), welders should be aware that its use can cause interference especially in electronic equipment. As EM emission can be airborne, like radio waves, or transmitted along power cables, care must be taken to avoid interference with control systems and instruments in the vicinity of welding.
HF is also important in stabilising the AC arc; in AC, electrode polarity is reversed at a frequency of about 50 times per second, causing the arc to be extinguished at each polarity change. To ensure that the arc is reignited at each reversal of polarity, HF sparks are generated across the electrode/workpiece gap to coincide with the beginning of each half-cycle.

WELDING GAS SELECTION CHART GUIDE	
T TIG	ARGON
MILD STEEL	√
STAINLESS STEEL	√
LOW ALLOY STEEL	√
ALUMINIUM	√

APPLICATIONS

TIG is applied in all industrial sectors but is especially suitable for high quality welding. In manual welding, the relatively small arc is ideal for thin sheet material or controlled penetration (in the root run of pipe welds). Because deposition rate can be quite low (using a separate filler rod) MMA or MIG may be preferable for thicker material and for fill passes in thick-wall pipe welds.

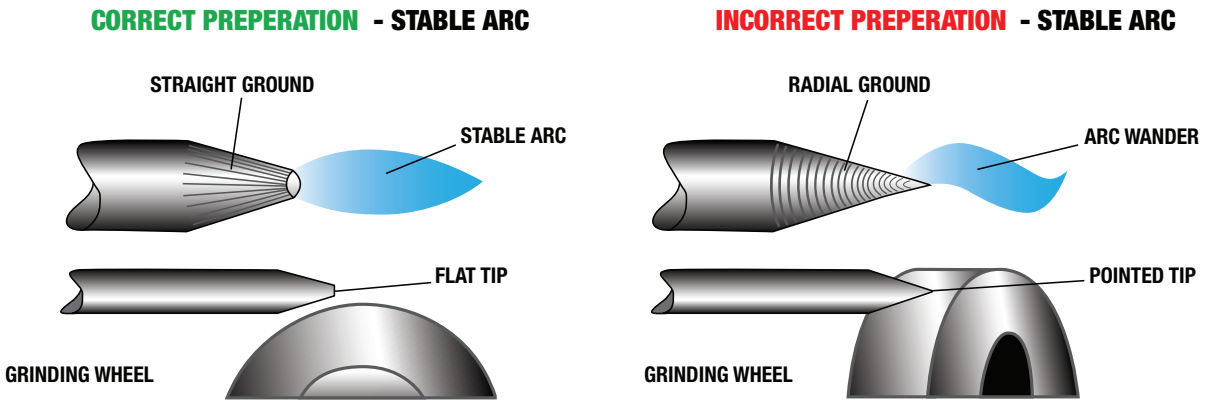
TIG is also widely applied in mechanised systems either autogenously or with filler wire. However, several 'off the shelf' systems are available for orbital welding of pipes, used in the manufacture of chemical plant or boilers. The systems require no manipulative skill, but the operator must be well trained. Because the welder has less control over arc and weldpool behaviour, careful attention must be paid to edge preparation (machined rather than hand-prepared), joint fit-up and control of welding parameters.



TUNGSTEN SELECTION / PREPARATION & GRINDING

ELECTRODES

Electrodes for DC welding are normally pure tungsten with 1 to 4% thoria to improve arc ignition. Alternative additives are lanthanum oxide and cerium oxide which are claimed to give superior performance (arc starting and lower electrode consumption). It is important to select the correct electrode diameter and tip angle for the level of welding current. As a rule, the lower the current the smaller the electrode diameter and tip angle.
In AC welding, as the electrode will be operating at a much higher temperature, tungsten with a zirconia addition is used to reduce electrode erosion. It should be noted that because of the large amount of heat generated at the electrode, it is difficult to maintain a pointed tip and the end of the electrode assumes a spherical or 'ball' profile. Grinding creates the greatest hazard as the exposed tungsten/thoria area is greatly increased and fine particles of potentially radioactive dust are released into the atmosphere. It is recommended that a dedicated grindstone with local dust extraction is used, and a simple filter mask is worn. If the grinding wheel is not fitted with a protective viewing screen, eye protection must be worn.



Note: Do not use wheel for other jobs or tungsten can become contaminated and cause lower weld quality

TIG WELDING

Tungsten inert gas (TIG) welding became an overnight success in the 1940s for joining magnesium and aluminium. Using an inert gas shield instead of a slag to protect the weldpool, the process was a highly attractive replacement for gas and manual metal arc welding. TIG has played a major role in the acceptance of aluminium for high quality welding and structural applications.

PROCESS CHARACTERISTICS

In the TIG process the arc is formed between a pointed tungsten electrode and the workpiece in an inert atmosphere of argon or helium. The small intense arc provided by the pointed electrode is ideal for high quality and precision welding. Because the electrode is not consumed during welding, the welder does not have to balance the heat input from the arc as the metal is deposited from the melting electrode. When filler metal is required, it must be added separately to the weldpool.

POWER SOURCE

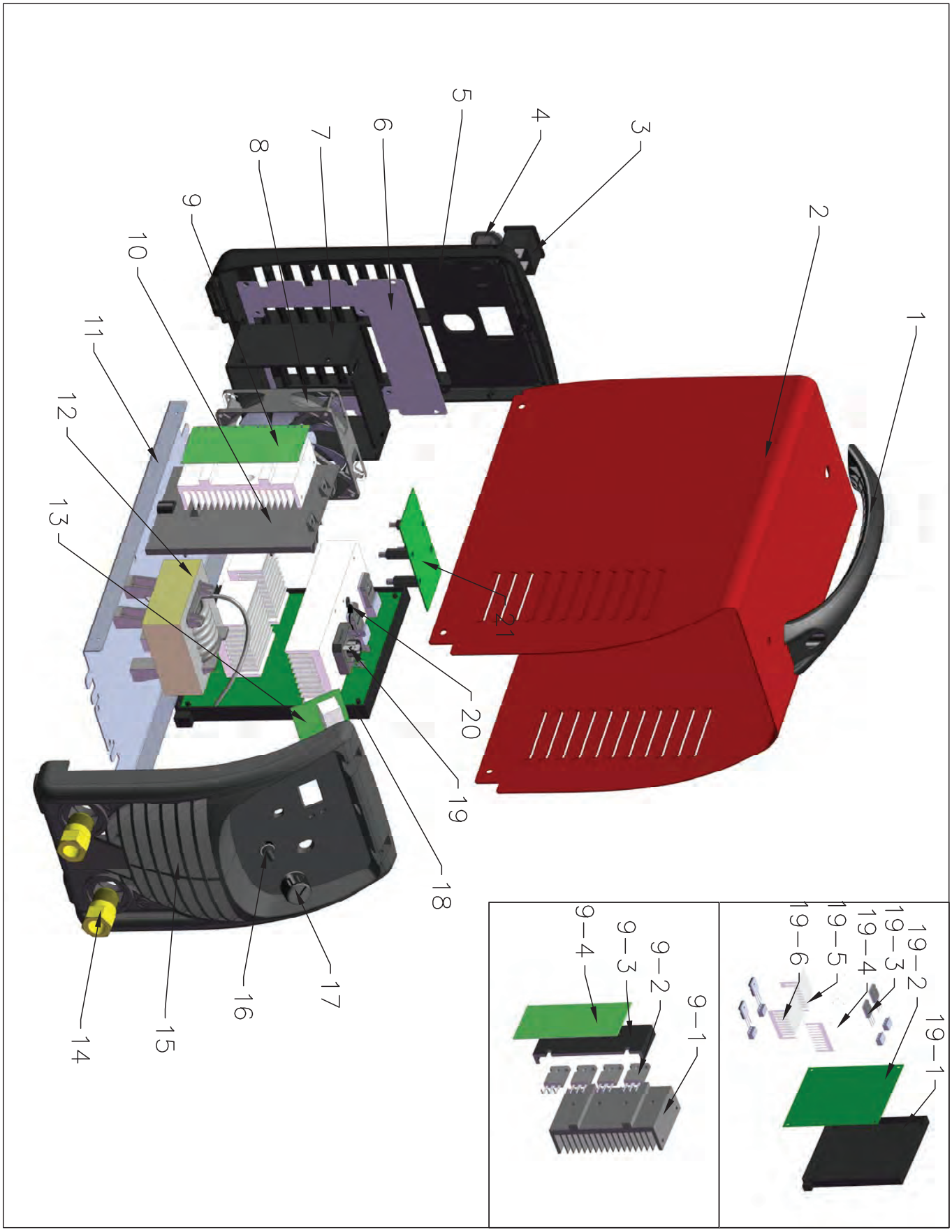
TIG must be operated with a constant current power source - either DC or AC. A constant current power source is essential to avoid excessively high currents being drawn when the electrode is short-circuited onto the workpiece surface. This could happen either deliberately during arc starting or inadvertently during welding. If, as in MIG welding, a flat characteristic power source is used, any contact with the workpiece surface would damage the electrode tip or fuse the electrode to the workpiece surface. In DC, because arc heat is distributed approximately one- third at the cathode (negative) and two-thirds at the anode (positive), the electrode is always negative polarity to prevent overheating and melting. However, the alternative power source connection of DC electrode positive polarity has the advantage in that when the cathode is on the workpiece, the surface is cleaned of oxide contamination. For this reason, AC is used when welding materials with a tenacious surface oxide film, such as aluminium.

ARC STARTING

The welding arc can be started by scratching the surface, forming a short-circuit. It is only when the short-circuit is broken that the main welding current will flow. However, there is a risk that the electrode may stick to the surface and cause a tungsten inclusion in the weld.

11. TROUBLESHOOTING & SERVICE

Symptom	Solution
Power indicator does not light, fan does not turn, no welding output	- Make sure the power switch is turned on. - Confirm that the power input cable is connected to electricity.
Fan switch not working Fluctuation in current High / Low	- Assess any damage and replace where necessary. - Check for poor connections (eg plug-ins).
Power indicator light shows fan rotating normally but no welding output	- Check all connectors inside the machine. - Check circuit output connections. - If the alarm indicator light is on check: That the machine is not overheating. If so maintain power, so that the fan continues and the temperature drops. When the light goes out continue working. - Check if the thermal switch is damaged and replace if necessary.
Hot welding clamp	- Welding clamp current is too small. Replace with larger clamp.
Welding arc flares	- Check +/– polarity is correct for welding process.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