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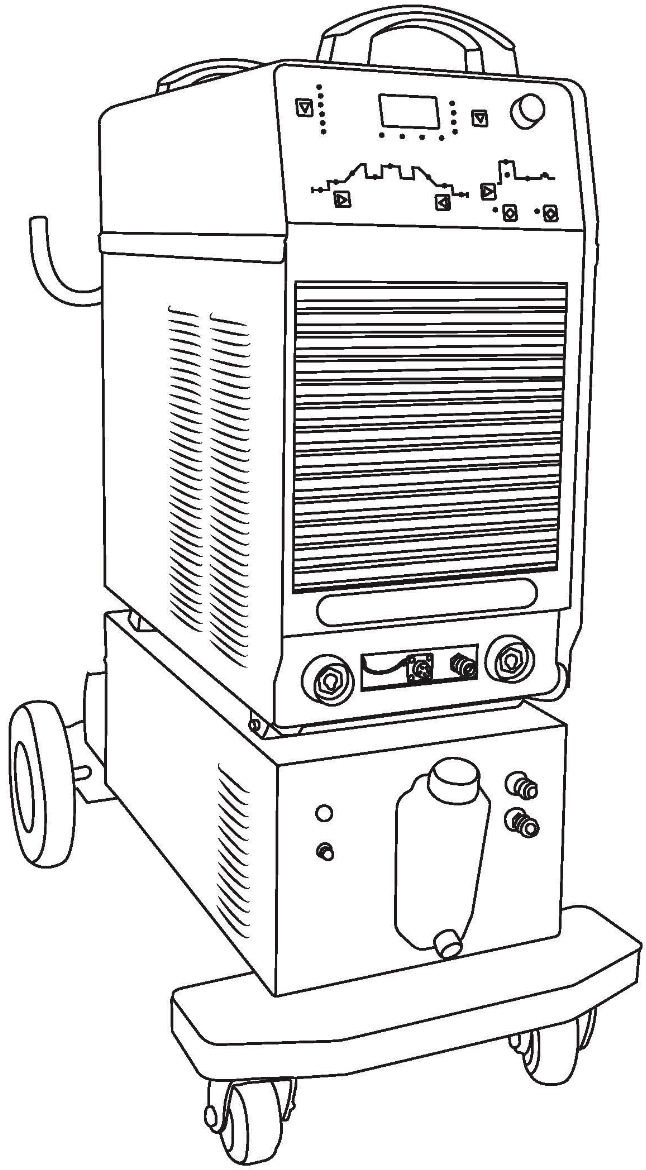
TIG Series

| TIG 500 Pulse (JT-500D) |



Operator Manual

RoHS
2002/95/EC

ISO 9001 CERTIFICATION™
Intertek

WILKINSON STAR
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Your new product

Thank you for selecting this Jasic Technology, Wilkinson Star product.

This product manual has been designed to ensure that you get the most from your new product. Please ensure that you are fully conversant with the information provided paying particular attention to the safety precautions. The information will help protect yourself and others against the potential hazards that you may come across.
Please ensure that you carry out daily and periodic maintenance checks to ensure years of reliable and trouble free operation.
Wilkinson Star Limited are a leading supplier of equipment in the UK and our products are supported by our extensive service network. Call your distributor in the unlikely event of a problem occurring. Please record below the details from your product as these will be required for warranty purposes and to ensure you get the correct information should you require assistance or spare parts.

Date purchased ____

From where ____

Serial Number ____

(The serial number will normally be located on the equipment top or underside of the machine and begin with letters i.e. AA*****)

PLEASE REGISTER YOUR PRODUCT ONLINE AT WWW.JASIC.CO.UK/REGISTER

When all entry fields are complete the system will show a short message thanking you for a successful registration.

Disclaimer
Whilst every effort has been made to ensure that the information contained within this manual is complete and accurate, no liability can be accepted for any errors or omissions. Please note products are subject to continual development and may be subject to change without notice.

CONTENTS

SAFETY

These general safety norms cover both arc welding machines and plasma cutting machines unless otherwise noted.
The equipment must only be used for the purpose it was designed for. Using it in any other way could result in damage or injury and in breach of the safety rules.
Only suitably trained and competent persons should use the equipment. Operators should respect the safety of other persons.

Prevention against electric shock

The equipment should be installed by a qualified person and in accordance with current standards in operation. It is the users responsibility to ensure that the equipment is connected to a suitable power supply. Consult with your utility supplier if required.
If earth grounding of the work piece is required, ground it directly with a separate cable.
Do not use the equipment with the covers removed.
Do not touch live electrical parts or parts which are electrically charged.
Turn off all equipment when not in use.
Cables (both primary supply and welding) should be regularly checked for damage and overheating.
Do not use worn, damaged, under sized or poorly jointed cables.
Ensure that you wear the correct protective clothing, gloves, head and eye protection.
Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work ground.
Never touch the electrode if you are in contact with the work ground or another electrode from a different machine.
Do not wrap cables over your body.
Ensure that you take additional safety precautions when you are welding in electrically hazardous conditions such as damp environments, wearing wet clothing and metal structures.
Try to avoid welding in cramped or restricted positions.
Ensure that the equipment is well maintained. Repair or replace damaged or defective parts immediately.
Carry out any regular maintenance in accordance with the manufacturer’s instructions.

Safety against fumes and welding gases

Locate the equipment in a well-ventilated position.
Keep your head out of the fumes. Do not breathe the fumes.
Ensure the welding zone is in a well-ventilated area. If this is not possible, provision should be made for suitable fume extraction.
If ventilation is poor, wear an approved respirator.
Read and understand the Material Safety Data Sheets (MSDS’s) and the manufacturer’s instructions for metals, consumable, coatings, cleaners and de-greasers.
Do not weld in locations near any de-greasing, cleaning or spraying operations. Be aware that heat and rays of the arc can react with vapours to form highly toxic and irritating gases.
Do not weld on coated metals unless the coating is removed from the weld area, the area is well ventilated and while wearing an air-supplied respirator. The coatings on many metals can give off toxic fumes if welded.

Prevention against burns and radiation

Arc rays from the welding process produce intense, visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.
Wear an approved welding helmet fitted with a proper shade of filter lens to protect your face and eyes when welding or watching.

SAFETY

Wear approved safety glasses with side shields under your helmet.
Never use broken or faulty welding helmets.
Always ensure that there are adequate protective screens or barriers to protect others from flash, glare and sparks from the welding area. Ensure that there are adequate warnings that welding or cutting is taking place.
Wear suitable protective flame resistant clothing.
The sparks and spatter from welding, hot work pieces and hot equipment can cause fires and burns.
Welding on closed containers, such as tanks, drums or pipes can cause them to explode.
Accidental contact of the electrode to metal objects can cause arcs, explosion, overheating or fire.
Check and be sure the area is safe and clear of inflammable material before carrying out any welding.

Protection against noise

Some welding and cutting operations may produce noise.
Wear safety ear protection to protect your hearing.

Protection from moving parts

When the machine is in operation keep away from moving parts such as motors and fans. Moving parts, such as the fan, may cut fingers and hands and snag garments.
Protections and coverings may be removed for maintenance only by qualified personnel, after first disconnecting the power supply cable.
Replace the coverings and protections and close all doors when the intervention is finished and before starting the equipment.
Take care to avoid getting fingers trapped when loading and feeding wire during set up and operation.
When feeding wire be careful to avoid pointing it at other people or towards your body.
Always ensure machine covers and protective devices are in operation.

Precautions against fire and explosion

Avoid causing fires due to sparks and hot waste or molten metal.
Ensure that appropriate fire safety devices are available near the cutting/welding area.
Remove all flammable and combustible materials from the cutting/welding zone and surrounding areas.
Do not cut/weld fuel and lubricant containers, even if empty.
These must be carefully cleaned before they can be cut/welded.
Always allow the cut/welded material to cool before touching it or placing it in contact with combustible or flammable material.
Do not work in atmospheres with high concentrations of combustible fumes, flammable gases and dust.
Always check the work area half an hour after cutting to make sure that no fires have begun.

Risks due to magnetic fields

The magnetic fields created by high currents may affect the operation of pacemakers or electronically controlled medical equipment.
Wearers of vital electronic equipment should consult their physician before beginning any arc welding, cutting, gouging or spot welding operations.
Do not go near welding equipment with any sensitive electronic equipment as the magnetic fields may cause damage.

SAFETY

RF Declaration

Equipment that complies with directive 2004/108/EC concerning electromagnetic compatibility (EMC) and the technical requirements of EN60974-10 is designed for use in industrial buildings and not those for domestic use where electricity is provided via the low voltage public distribution system.
Difficulties may arise in assuring class A electromagnetic compatibility for systems installed in domestic locations due to conducted and radiated emissions.
In the case of electromagnetic problems, it is the responsibility of the user to resolve the situation.
It may be necessary to shield the equipment and fit suitable filters on the mains supply.

LF Declaration

Consult the data plate on the equipment for the power supply requirements.
Due to the elevated absorbance of the primary current from the power supply network, high power systems affect the quality of power provided by the network. Consequently, connection restrictions or maximum impedance requirements permitted by the network at the public network connection point must be applied to these systems.
In this case, the installer or the user is responsible for ensuring the equipment can be connected, consulting the electricity provider if necessary.

Handling of compressed gas cylinders and regulators

All cylinders and pressure regulators used in welding operations should be handled with care.
Never allow the electrode, electrode holder or any other electrically “hot” parts to touch a cylinder.
Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
Always secure the cylinder safely.

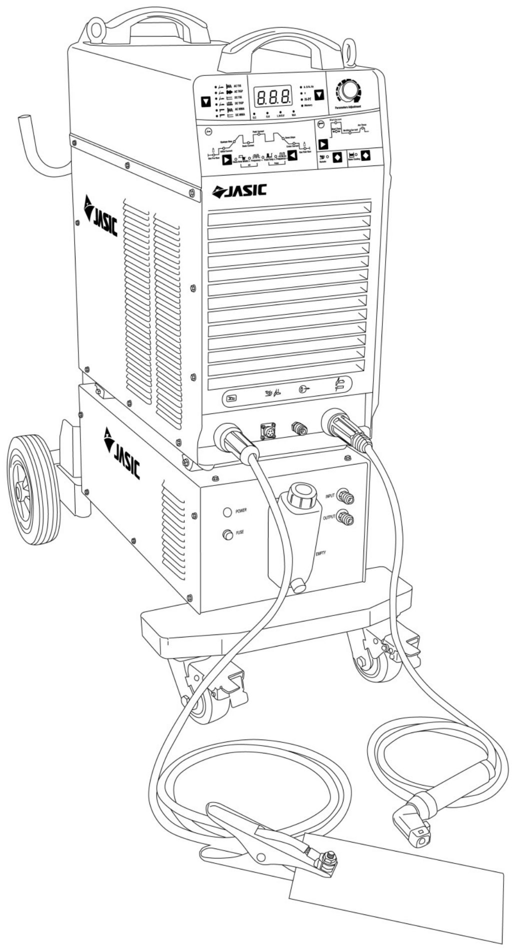
Never deface or alter any cylinder

PRODUCT OVERVIEW

The Wilkinson Star Jasic Technology TIG inverter range of welding machines have been designed as integrated and portable welding power supplies units incorporating the most advanced IGBT inverter technology in power electronics with easy operation and adjustment due to friendly user interface.

Wilkinson Star Jasic Technology TIG 500D AC/DC Product Features:

- 100Khz inverter frequency for high efficiency offering reduced weight and volume
- TIG AC square wave, DC TIG and AC/DC MMA are available
- TIG AC and DC pulse mode
- MCU intelligent digital control (Software)
- 2T/4T trigger control
- Pre and post gas flow time, full up and down slope control
- Pulse adjustment, frequency, pulse duty and arc force
- 100KHz frequency for reduced weight/volume
- Adjustable AC frequency and AC wave balance
- Hot start arc ignition function which ensures excellent arc ignition in MMA for easier and more reliable arc starting
- Built in adjustable arc force technology which maintains the optimum MMA arc conditions during welding even with long cables
- Offers excellent weld characteristics and suitable for a wide range of electrodes in MMA
- Easy arc starting, low spatter, stable current which offers good weld bead shape
- Wide input voltage range tolerance
- Remote control option available
- High quality finish to mouldings and handle
- Air cooled or water cooled options available



TECHNICAL SPECIFICATIONS

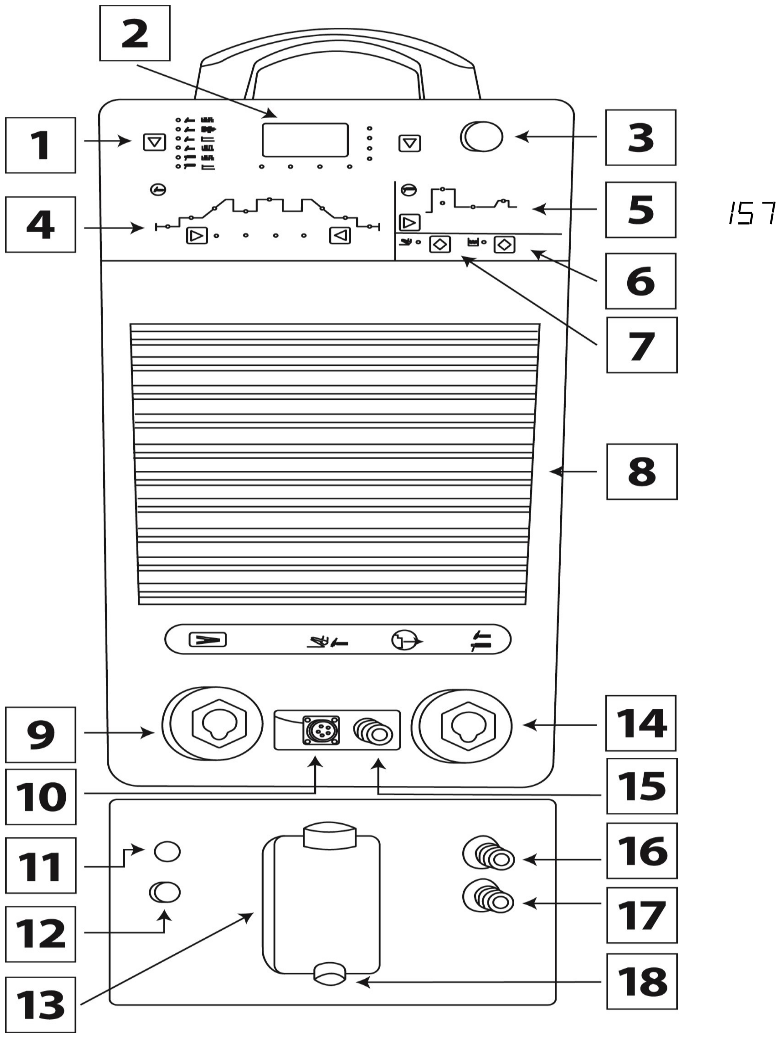
Parameter			Model
			TIG500P AC DC
Input		Rated input power supply	Three-phase AC400V 50/60Hz
		Rated input capacity (KVA)	21
		Power factor	0.85
MMA output		Rated no-load voltage (V)	68
		Rated maximum output (A/V)	400/36
		Welding current range DC (A)	10~410
		Welding current range AC (A)	20~410
		Arc force current range (A)	0~250
		Arc ignition current range (A)	10~410
		AC frequency (Hz)	50
		Output characteristic	CC
TIG output	DC	Rated maximum output (A/V)	500/30
		Welding current range (A)	10~500
		Peak / base current range (A)	20~500
		Initial current range	10~500
		Pulse frequency range (Hz)	0.5~200
		Pulse duration range (%)	10~90
	AC	Rated maximum output (A/V)	500/30
		Welding current range (A)	10~500
		Peak / base current range (A)	20~500
		Initial current range	10~500
		Pulse frequency range (Hz)	0.5~200
		Pulse duration range (%)	10~90
		Initial current range (A)	5~400
		Pilot arc current range (A)	5~400
		Up slope time range (s)	0~10
		Base current range (A)	5~400
		Peak current range (A)	5~400
		Downslope time range (s)	0~10
		Post-flow time range (s)	0~15
		Pulse frequency range (Hz)	0.5~200
		Pulse duration ratio range (%)	10~90
		Spot welding time	0.1~10
		Arc ignition mode	HF /Lift arc ignition
		Output characteristic	CC

TECHNICAL SPECIFICATIONS (Continued)

Environment	Working temperature range (^{0}C)	-10~+40
	Storage temperature range (^{0}C)	-25~+55
	Humidity (%)	≤90% (no water condensate)
Structure	Enclosure ingress protection	IP21S
	Cooling mode	Forced air cooling
	Rated duty cycle (%)	MMA:30 TIG:50
	Efficiency (%)	85
	Insulation grade	F
	Overall size (L*W*H)	595*297*528
	Weight (Kg)	30

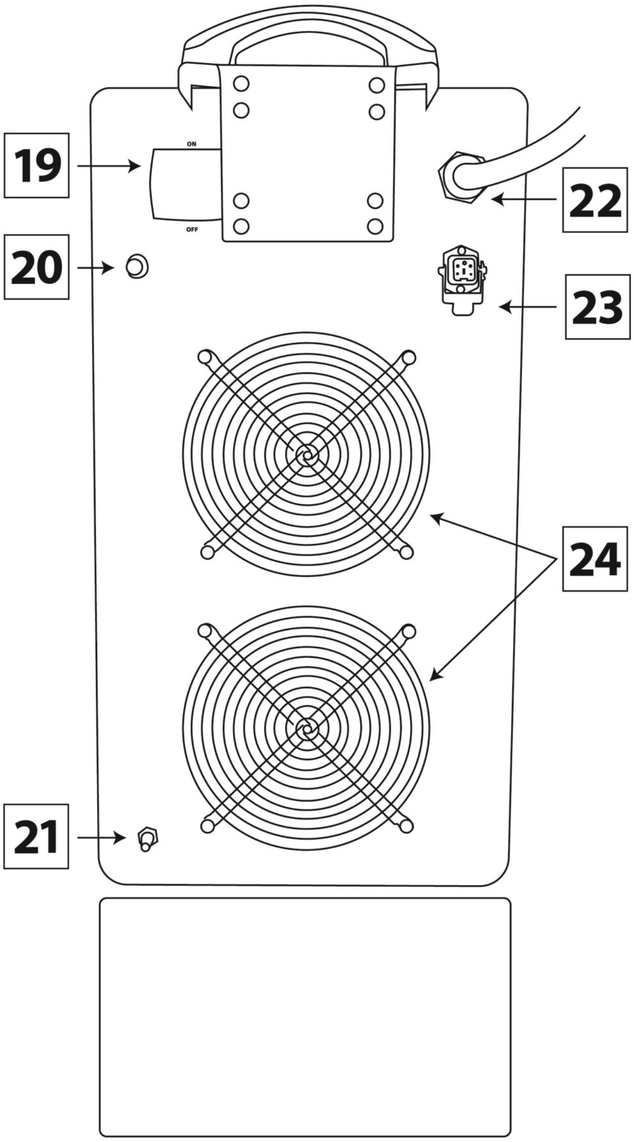
DESCRIPTION OF CONTROLS

Front view



No.	Part name	Function
1	Control panel	To select welding mode and parameters
2	Digital meter	Display parameters
3	Adjusting knob	Adjust various parameters
4	TIG parameters zone	Adjusting various TIG parameters
5	MMA parameters zone	Adjusting various MMA parameters
6	Water cooling selector	Selection of water or air cooling
7	Remote control selector	Selection of remote control
8	Air intake	Air intake grill
9	"+" output socket	Connection of work return
10	Control socket	Connection of torch switch or remote control
11	Power lamp	Water cooler power indicator
12	Fuse	Water cooler supply fuse
13	Water tank	Water tank with filler cap
14	"-" output socket	Connection of TIG torch power cable
15	Gas connection	Outlet for shield gas to TIG torch
16	Inlet connector (red)	Water return from torch connector
17	Outlet connector (blue)	Water supply to torch connector
18	Water drain	Drain cap

Rear View

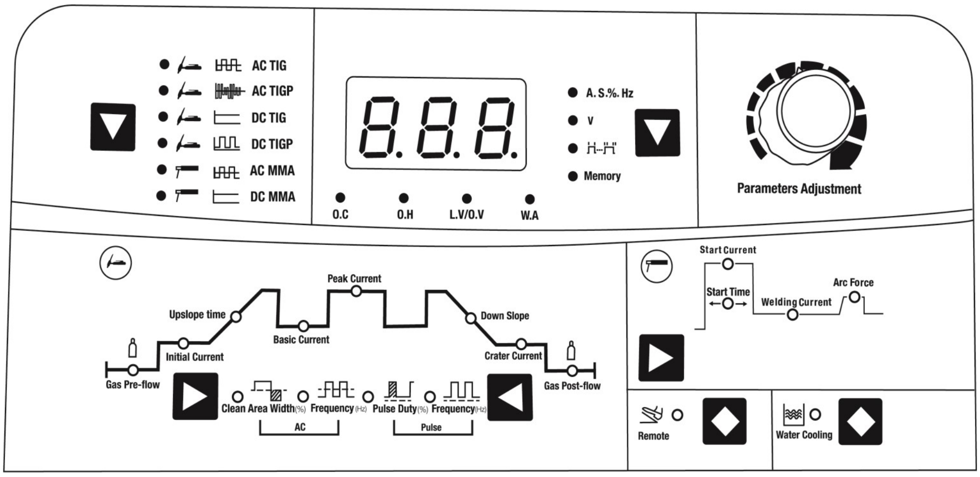


No.	Part name	Function
19	Switch	Mains power switch
20	Socket	Water cooling unit supply
21	Ground point	External ground point
22	Mains cable	Mains cable inlet
23	Fuse holder	Protection fuse
24	Fan guards	Fan protection

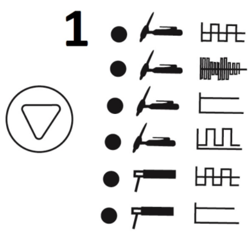
CONTROLS

Control panel view JT-500D AC/DC

1. Welding mode selection zone
2. Parameters selection /display zone
3. Parameters adjustment rotary knob
4. MMA welding parameters selection zone
5. TIG parameters selection zone
6. Remote control selector
7. Air / Water cooling selector



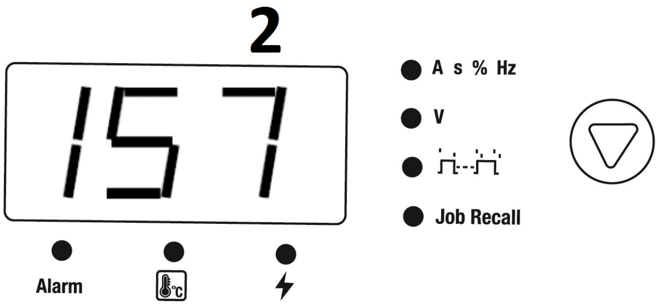
1. Welding mode selection:



The welding mode switch allows the user to switch between AC square-wave TIG, AC pulsed TIG, DC TIG, DC pulsed TIG, AC MMA and DC MMA with the corresponding LED lit. However, if the LED flashes, it indicates that welding is being carried out in the corresponding welding mode and that reselection cannot be performed.

2. Parameter and alarm displays:

The digital meter is used for displaying functional parameters and error codes, details are as below:



A. Generally, the digital meter displays the preset current, times, pulse duration ratio and frequency with the corresponding LED A, S, % or Hz being lit. Parameters can be adjusted by turning the adjustment knob. The digital meter displays the welding current during welding and parameters can be adjusted at this time as well. The display also shows the parameter being adjusted and after 3 seconds will turn the display back to showing welding current.

B. Press the key “↓” in this zone to shift the display of the digital meter between ‘A S % Hz’, V, trigger mode and job recall with the corresponding LED lit. ‘V’ indicates the output voltage and is also used for selecting the operation mode of TIG welding “MEMORY” which can store 5 groups of parameters and users may perform welding conveniently with these parameters.

C. The digital meter displays the software version after the machine is started and displays the preset current 2 seconds later.

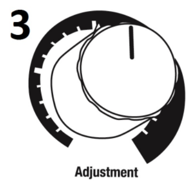
D. In the normal condition, all alarm LEDs are off. In case of any error, the corresponding LED will illuminate and the digital meter will display the corresponding error code.
When the “OC” LED illuminates and the digital meter displays “E-0” or “E-1” it indicates that over current occurs. Restart the machine and welding can be continued.

CONTROLS

When the “LV/OV” LED illuminates and the digital meter displays “E-2” it indicates that the mains voltage is overly low or that the secondary inverter drive power source fails. In the former condition, welding can be recovered when the mains voltage goes into normal. In the latter condition, please consult the service department.
When the “OH” LED illuminates and the digital meter displays “E-3” or “E-4” it indicates that welding is forced to stop because the main circuit of the machine is overheated. In this condition, it is unnecessary to turn off the machine, but just wait a few minutes and then welding can be continued.

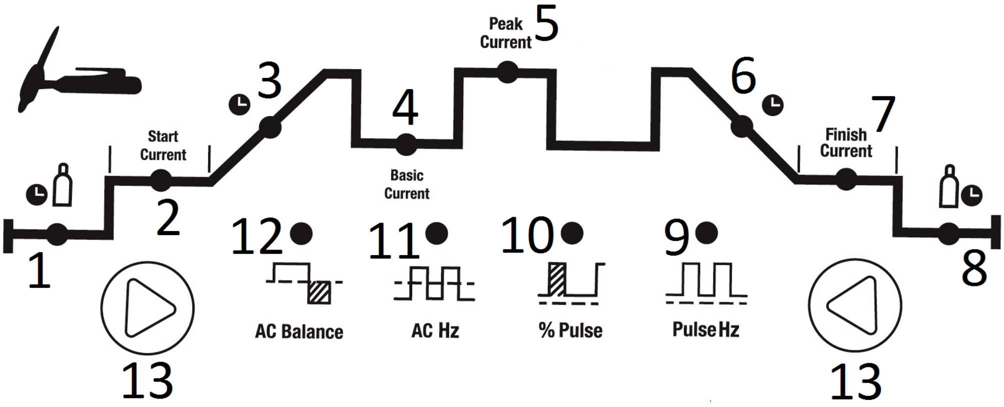
3. Parameter adjustment knob:

It is used to adjust all adjustable parameters.



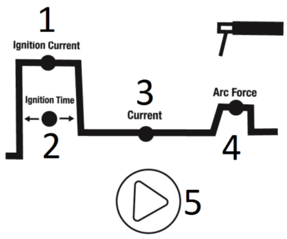
4. TIG parameter selection area:

1) Pre flow gas time
2) Initial current
3) Upslope time
4) Base current
5) Peak current
6) Downslope time
7) Final current
8) Post flow gas time
9) Pulse frequency
10) Pulse duration ratio
11) AC frequency
12) Wave balance
13) TIG welding parameter selection keys



5. MMA parameter selection area:

1) Arc ignition current
2) Arc ignition time
3) Welding current
4) Arc force current
5) MMA parameter selection switch



6. Remote control selection:

Selecting foot pedal will allow remote amperage to be controlled by pressing the foot pedal, pressing down on the foot pedal will increase the welding current and releasing the foot pedal will decrease the welding current.
To activate foot control, press the control key until the corresponding LED is on.
The welding current should be set to at least 30amps (to avoid arc breaking due to low current being set) and should not be higher than the preset current. The foot control is only effective in TIG mode.

7. **Water selector**
Selects either air or water cooled torch mode.

INSTALLATION

Unpacking

Check the packaging for any signs of damage.
Carefully remove the machine and retain the packaging until the installation is complete.

Location

The machine should be located in a suitable position and environment. Care should be taken to avoid moisture, dust, steam, oil or corrosive gases.
Place on a secure level surface and ensure that there is adequate clearance around the machine to ensure natural airflow.

Input connection

Before connecting the machine you should ensure that the correct supply is available. Details of the machine requirements can be found on the data plate of the machine or in the technical specifications table found on page 8 in the manual.
The equipment should be connected by a suitably qualified competent person. Always ensure the equipment has a proper grounding.
Never connect the machine to the mains supply with the panels removed.

Gas connections

Connect the gas hose to the regulator/flowmeter located on the shield gas cylinder and connect the other end to the machine.

Gas selection

A shielding gas is necessary for TIG welding because it is important to keep oxygen away from the weld pool. Shielding gas does this by replacing the oxygen around the weld pool.
Shielding gas for TIG welding is generally an inert gas with argon being the most commonly used inert gas for TIG welding most metals.

Output connections

Electrode polarity
In general when using manual arc welding electrodes the electrode holder is connected to the positive terminal and the work return to the negative terminal.
"+" output terminal: For MMA connect the electrode holder
"-" output terminal: For MMA connect the work return lead
Always consult the electrode manufacturer’s data sheet if you have any doubts.

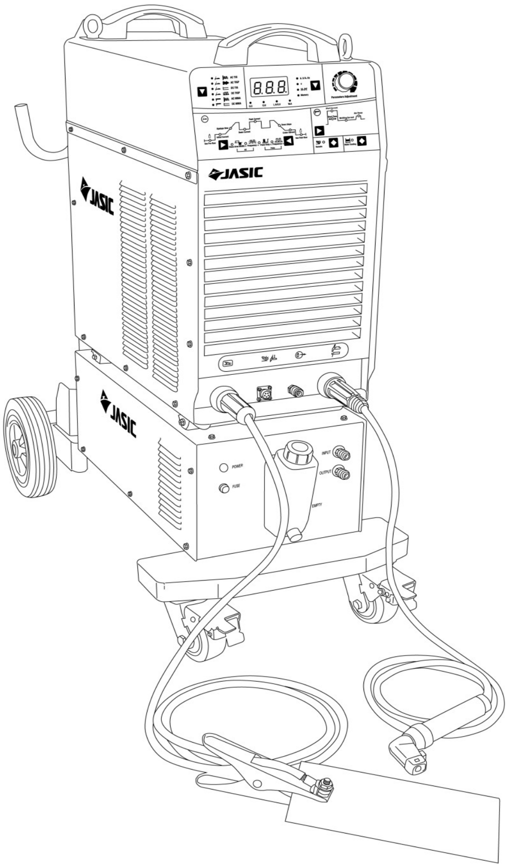
When using the machine for TIG welding the TIG torch should be connected to the negative terminal and the work return to the positive terminal.
"+" output terminal: For TIG connect the work return lead
"-" output terminal: For TIG connect the TIG torch

INSTALLATION

MMA welding

Insert the cable plug with electrode holder into the “+” socket on the front panel of the welding machine and tighten it clockwise.

Insert the cable plug of the work return lead into the “-” socket on the front panel of the welding machine and tighten it clockwise. See example shown opposite:



TIG welding

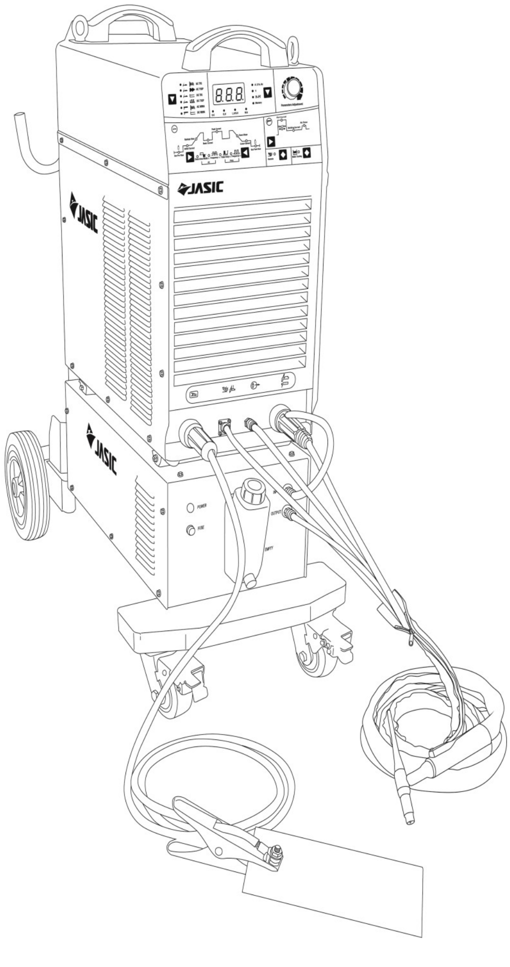
Insert the cable plug with the work clamp into the indicated work clamp socket on the front panel of the welding machine and tighten it clockwise.

Insert the power connection plug of the TIG torch into the indicated torch socket on the front panel of the machine and tighten clockwise. Connect the gas quick connector into the outlet on the machine front.

Connect the torch switch plug into the socket on the front panel.

Connect the water supply cables to the cooler unit.

Connect the gas hose to the regulator/flowmeter located on the shield gas cylinder and connect the other end to the machine. See example shown opposite:



OPERATION

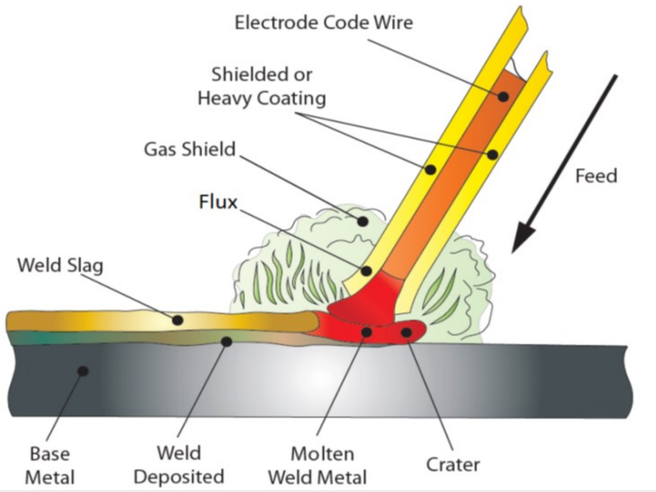
Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

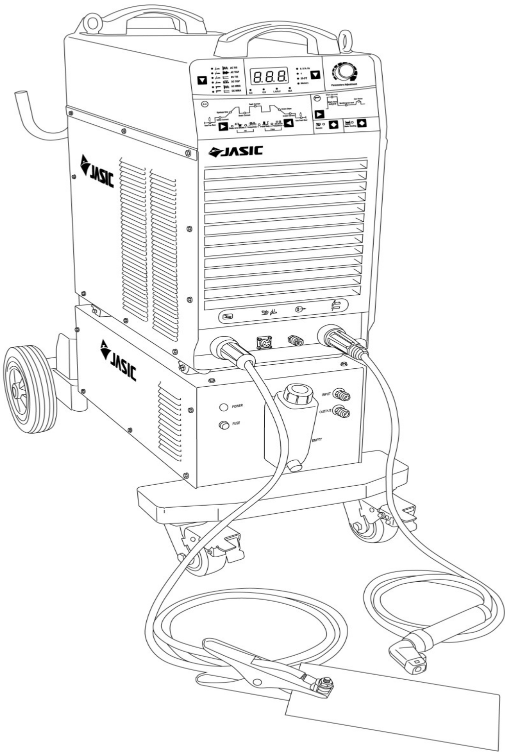
MMA welding mode

MMA (Manual Metal Arc), SMAW (Shielded Metal Arc Welding) or just Stick Welding.
Stick welding is an arc welding process which melts and joins metals by heating them with an arc between a covered metal electrode and the work.

Shielding is obtained from the electrode outer coating, often called flux. Filler metal is primarily obtained from the electrode core.

The electrodes outer coating called flux assists in creating the arc and provides a shielding gas and on cooling forms a slag covering to protect the weld from contamination.





When the electrode is moved along the work piece at the correct speed the metal core deposits a uniformed layer called the weld bead.

After connecting the welding leads as detailed you will need to switch the power switch on the back panel to “ON”.

Select MMA mode by switching to the welding mode selection key to either DC or AC depending on your welding application (see page 10). There is now open circuit voltage output at both output terminals.

Ensure you check that you have the electrode polarity correct and set the amperage on the machine suitable for the electrode being used.

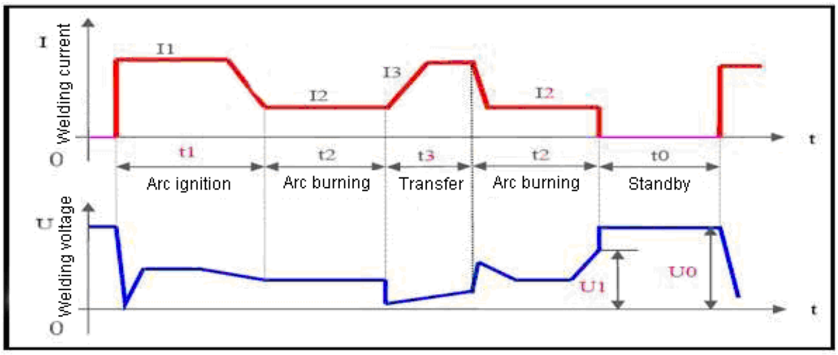
Please see the guide to amperages required below, although this MMA welding electrode guide can vary depending on material, work piece thickness, welding position and joint form.

Electrode Diameter (mm)	Recommended Welding Current (A)
1.6	25 ~ 45
2.0	35 ~ 65
2.5	50 ~ 90
3.2	60 ~ 130
4.0	100 ~ 180
5.0	150 ~ 250
6.0	200 ~ 310

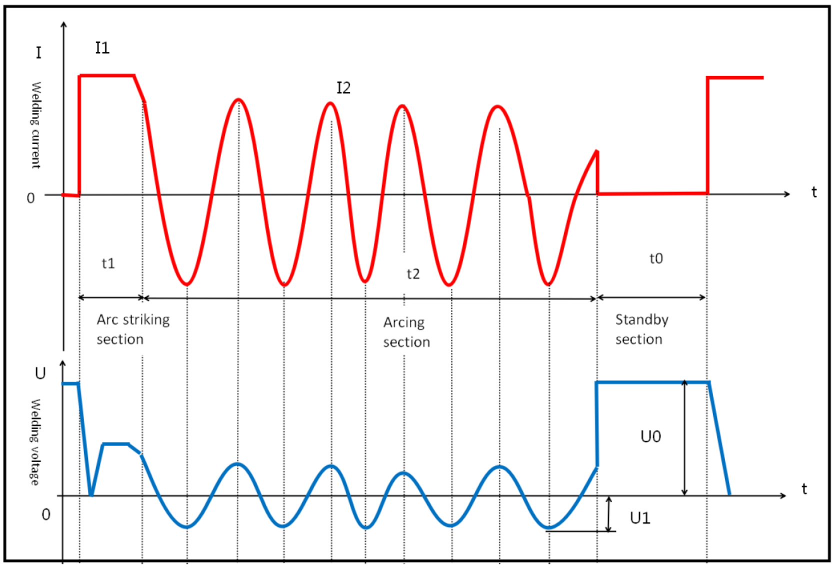
OPERATION

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

MMA welding



Current and Voltage Changes in DC MMA



Current and Voltage Changes in AC MMA

Note:
t0 - Standby section, no welding current, output no-load voltage
t1 - Arc striking section, the length adjusted according to hot arc striking time
t2 - Arcing section
t3 - Short circuit transition section
I1 - Arc strike current
I2 - Operating current
I3 - Arc force current
U1 - Operating voltage
U0 - No-load voltage

MMA AC mode outputs - 50Hz sine wave.

Current I2 - The current of the arcing section during welding, set by the user according to process requirements

OPERATION

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

MMA welding

Arc force

Arc force refers to the slope of the current rise during a short circuit and it is set to increase the current every millisecond on this machine. After a short circuit, the current rises from the set current according to this slope. For example, when the current is set to 100A and the arc force is 10, the current value after a short circuit of 5ms is: 100+5*10=150A. If the short circuit state still exists the arc force current can rise to the permitted maximum value of 270A. If the short circuit state lasts longer than 0.8 second, the welder enters anti stick mode where the current will drop to a low value and wait for the welder to break the electrode free. The arc force value should be determined according to rod diameter, set current and process requirements. Larger arc force results in quicker transition of the droplets and less freezing of the rod into the weld pool, but too much arc force will increase the spatter. Low arc force will result in lower spatter and good weld formation, but sometimes it will cause the arc to become soft or cause sticking.
In particular, the arc force should be increased when welding thick rods at low current. The arc force is generally 0-40.
There is no arc force current in MMA AC mode.

Hot start (ignition amps)

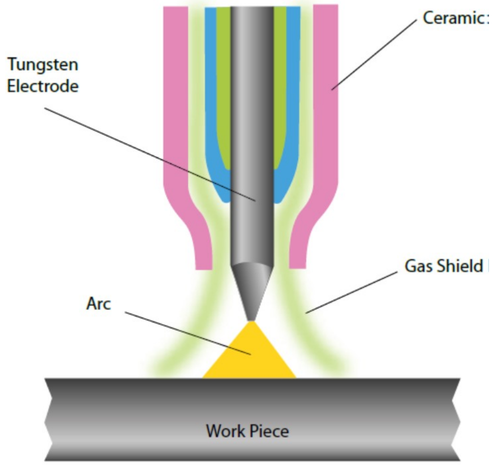
Hot start current is beneficial to the arc strike as it reduces the tendency of welding rod and weld material to stick. The size of the hot start striking current is generally determined according to rod type, the specifications and welding current. Rods with better arc striking performance and small diameter generally need lower hot start striking current, higher welding current often will not need any hot start current. The hot start striking time is related to the arc striking current. If the hot arc striking current is large, the hot start time can be shortened.
During DC welding, the heat of the welding arc is different on the positive and negative electrodes. Therefore, with a DC power supply the different polarities must be taken into account. The electrode negative (DCEN) means that the welding rod is connected to the negative electrode of the power supply and the work piece is connected to the positive outlet. At this time, the work piece acquires more heat, features high temperature, deep molten pool and easy penetration and it is suitable for welding thick material. The electrode positive (DCEP) means that the welding rod is connected to the positive outlet of the power supply and the work piece is connected to the negative outlet. At this time, the work piece acquires less heat, features low temperature, shallow molten pool and difficult penetration and it is suitable for welding thin pieces.

If AC welding equipment is used for welding, the polarities of the arcs will change alternately and instantaneously. Therefore, the two electrodes have same heating and basically same temperatures and there is no problem in positive connection and reverse connection.

OPERATION

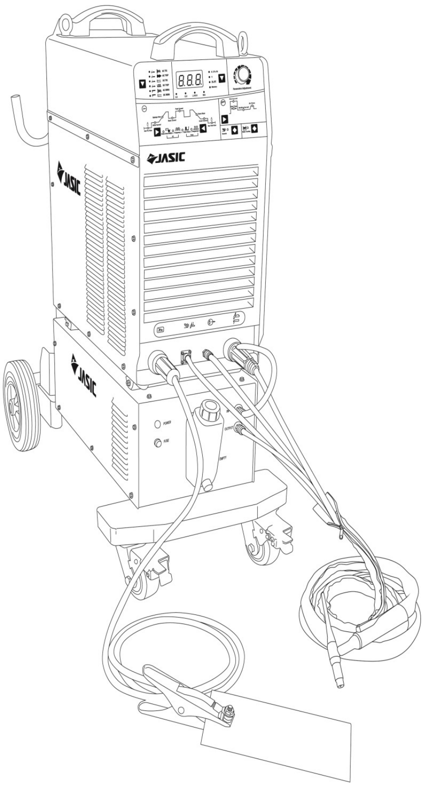
Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

TIG welding



Terms used: TIG – Tungsten Inert Gas, GTAW – Gas Tungsten Arc Welding.

TIG welding is an arc welding process that uses a non-consumable tungsten electrode to produce the heat for welding.
The weld area is protected from atmospheric contamination by a shielding gas (usually an inert gas such as argon or helium) and a filler rod matching the base material is normally used, though some welds, known as autogenous welds, are carried out without the need for filler wire.
TIG process can be either DC or AC modes:
DC - Direct current for welding steel, stainless steel, copper etc.
AC - Alternating current for welding aluminium and it's alloys.



DC TIG welding

- Connect the TIG torch leads as shown
- Ensure that a suitable inert gas supply is connected
- Switch the power switch on the back panel to "ON" the machine is started with the power LED on and the fan working
- Select TIG mode by switching to the welding mode selection key to either TIG DC or TIG DC with pulse depending on your welding application (see page 10)
- Open the gas valve of the cylinder and adjust the gas regulator and flow gas meter to obtain the desired flow rate. Press the torch trigger briefly, the solenoid valve will operate and gas will flow
- Adjust the welding current according to the thickness of the work piece to be welded (for a guide to welding parameters, please refer to the table below)
- Hold the torch 2-4mm away from the work piece and then press the torch trigger. After arc is ignited, the HF discharge will cease, the current will maintain the preset value and welding can be carried out
- After releasing the torch trigger, the welding arc stops but gas continues flowing for the post flow time and welding ends
- Adjust the downslope time potentiometer to change the time according to the welding process requirements

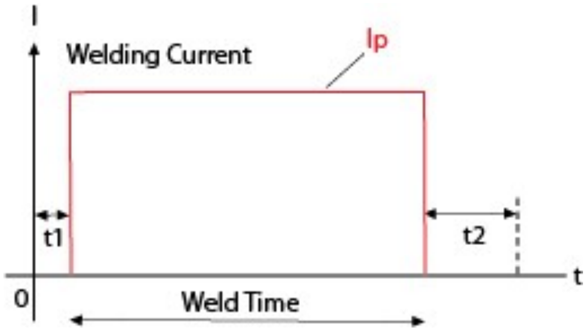
Tungsten Size	DC – Electrode Negative
1.0mm	15 – 80A
1.6mm	70 – 150A
2.4mm	150 – 250A
3.2mm	250A – 400A
4.0mm	400A – 500A
6.0mm	750A – 1000A

This amperage guide for TIG welding tungsten sizes shown can vary depending on material, work piece thickness, welding position and joint form.

OPERATION

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

DC TIG welding

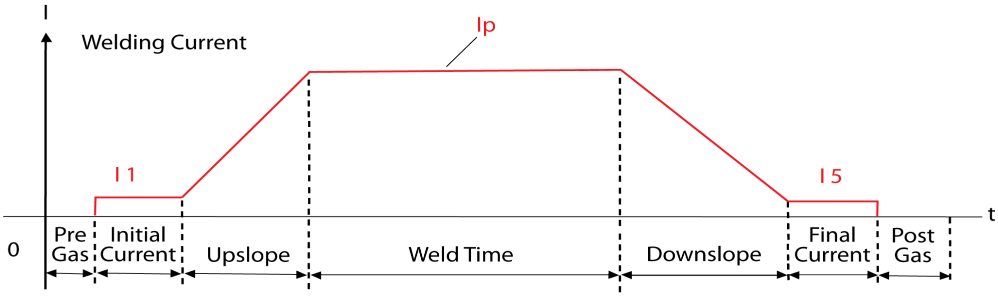


Ip: This parameter is set by the user according to process requirements and is the normal welding current.

t1: Is the fixed pre flow time which refers to the time from when the torch switch is pressed to deliver shield gas before arc striking. This is a fixed time of 0.5s which ensures that the argon has been delivered through the welding torch and to the weld zone at the normal flow rate when the arc is struck.

t2: Is the adjustable post flow gas time of the shield gas which flows after the arc is extinguished. Too long a time will cause a waste of shield gas and too short a time will cause the weld to oxidize due to premature shield gas flow and the weld cooling without the shield.

DC TIG welding with slope



Pre-gas time: Indicates the time from when the torch trigger is pressed to the arc being ignited in non-contact mode. Commonly, it should be longer than 0.5s to make sure that the gas has been delivered to the welding torch in normal flow before arc ignition. The pre flow time should be increased if the gas hose is long.

Initial current (I1): It is the current when arc is ignited by pushing the torch trigger and it should be set according to users own technical requirements. If the initial current is high enough, arc is easier to ignite. However, it should not be too high when welding thin plate, so as to avoid burn through the work piece during arc ignition. In some operation modes, the current can stay at the initial current value to preheat the work piece or illuminate the weld area.

Upslope: Indicates the time taken for the current to rise from 0 to the preset value and it should be set according to users technical requirements.

Ip: This parameter is set by the user according to process requirements and is the normal welding current.

Downslope: Indicates the time taken for the current to fall from the preset value to 0 and it should be set according to users technical requirements.

Final current: In some operation modes, the arc does not stop after current downslope but stays in the final arc state. The working current in this state is called pilot arc current and it should be set according to users technical requirements.

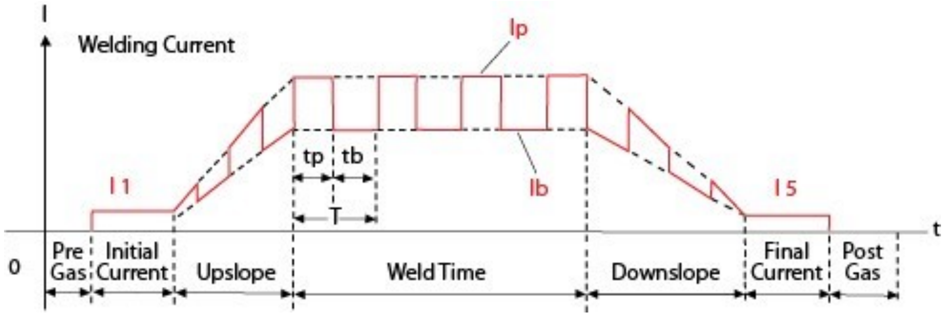
Post gas time: It indicates the time from the welding current being cut off to the gas valve inside the machine being closed. If it is too long, it will lead to a waste of shield gas; if it is too short, it will result in the oxidation of weld bead and electrode. With special material the time may be longer.

OPERATION

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

DC pulsed TIG welding

Pulse control is a variation of control of the welding current to control heat input. The control consists of a peak welding current and background welding current level with a fixed time of each level. In addition there is an adjustable frequency control.



Pre gas (t1): Is the pre flow time which refers to the time from when the torch switch is pressed to deliver shield gas before arc striking. Generally, it should be greater than 0.5s in order to ensure that the argon has been delivered through the welding torch and to the weld zone at the normal flow rate when the arc is struck. As an example, the pre flow time should be increased when using a long welding torch.

Initial current (I1): It is the current when arc is ignited by pushing the torch trigger and it should be set according to users own technical requirements. If the initial current is high enough, arc is easier to ignite. However, it should not be too high when welding thin plate, so as to avoid burn through the work piece during arc ignition. In some operation modes, the current can stay at the initial current value to preheat the work piece or illuminate the weld area.

Upslope: Indicates the time taken for the current to rise from 0 to the preset value and it should be set according to users technical requirements.

Ip: This parameter is set by the user according to process requirements and is the peak welding current when in pulse mode.

Ib: This parameter is set by the user according to process requirements and is the background welding current when in pulse mode.

T: Is the pulse frequency of the welding current when in pulse mode and measures in Hz the number of cycles per second the current travels between peak and background current settings.
Pulsed frequency (1/T): T=Tp+Tb. It should be adjusted according to users' technical requirements.
Pulse duration ratio (100%*Tp/T): The percentage peak current time holding in pulse period. It should be adjusted according to users technical requirements.

Downslope: Indicates the time taken for the current to fall from the preset value to 0 and it should be set according to users technical requirements.

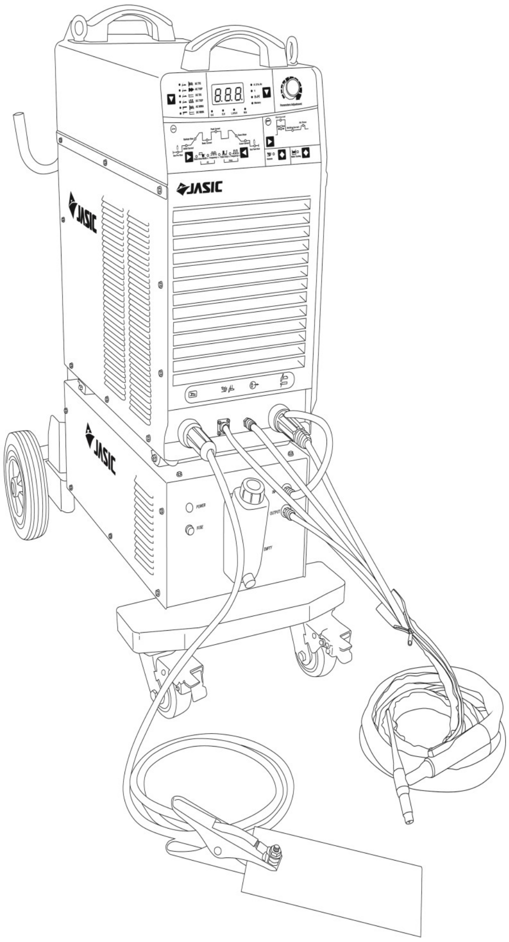
Final current: In some operation modes, the arc does not stop after current downslope but stays in the final arc state. The working current in this state is called pilot arc current and it should be set according to users technical requirements.

Post gas (t2): Is the post flow gas time the shield gas flows after the arc is extinguished. Too long a time will cause a waste of shield gas and too short a time will cause the weld to oxidize due to premature shield gas flow and the weld cooling without the shield.

OPERATION

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

AC TIG welding



Connect the TIG torch leads as shown.

Ensure that a suitable inert gas supply is connected.

Switch the power switch on the back panel to “ON” the machine will now start with the power LED on and the fan working.

Select TIG mode by switching to the welding mode selection key to either TIG DC or TIG DC with pulse depending on your welding application (see page 10).

Open the gas valve of the cylinder and adjust the gas regulator to obtain the desired flow rate. Press the torch trigger briefly, the solenoid valve will operate and gas will flow.

Adjust the welding current according to the thickness of the work piece to be welded (for a guide to welding parameters, please refer to the table below).

Hold the torch 2-4mm away from the work piece and then press the torch trigger. After arc is ignited, the HF discharge will cease, the current will maintain the preset value and welding can be carried out.

After releasing the torch trigger, the welding arc stops but gas continues flowing for the post flow time and welding ends.

Adjust the downslope time potentiometer to change the time according to the welding process requirements.

This amperage guide for TIG welding tungsten sizes can vary depending on material, work piece thickness, welding position and joint form.

Tungsten size	AC symmetrical wave	AC un-symmetrical wave
1.0mm	10 – 80A	20 – 60A
1.6mm	70 – 150A	60 – 120A
2.4mm	140 – 225A	100 – 100A
3.2mm	225A – 325A	160A – 250A
4.0mm	300A – 400A	200A – 320A
6.0mm	500A – 630A	340A – 525A

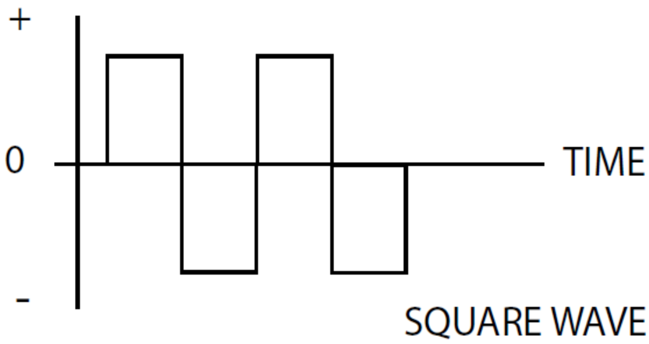
OPERATION

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

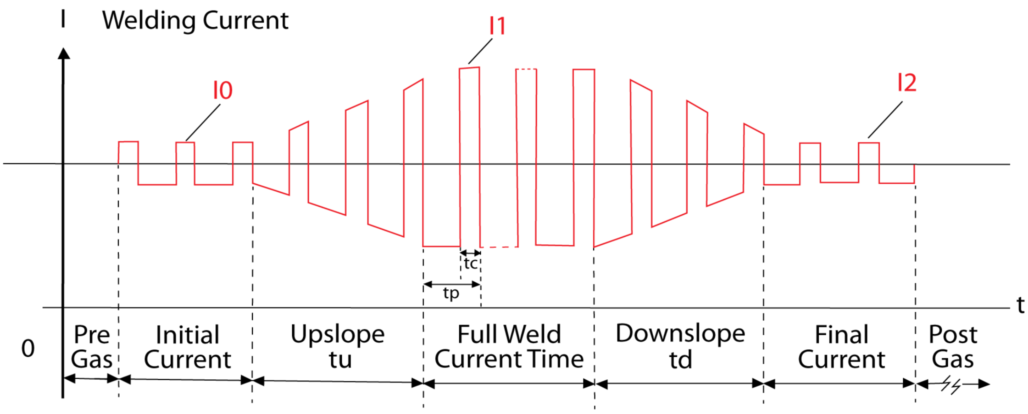
AC TIG welding square wave

With the electronic development of inverter power sources the square wave machine was developed. Due to these electronic controls the cross over from positive to negative and vice versa can be made almost in an instant which leads to more effective current in each half cycle due to a longer period at maximum. The effective use of the magnetic field energy stored creates waveforms which are very near square.

The 500D AC/DC square wave machine allows us control of the positive (cleaning) and negative (penetration) half cycles.
The balance condition if equal positive and negative half cycles giving a stable weld condition.
The problems that can be encountered are that once cleaning has occurred in less than the positive half cycle time then some of the positive half cycle is not productive and can also increase potential damage to the electrode due to overheating. However, this can be eliminated by the use of balance control which allows the time of the positive half cycle to be varied within the cycle time.



I0 - Initial current
I1 - Welding current
I2 - Final current
tu - Upslope time
td - Downslope time
tp - AC period
tc - Cathode current time



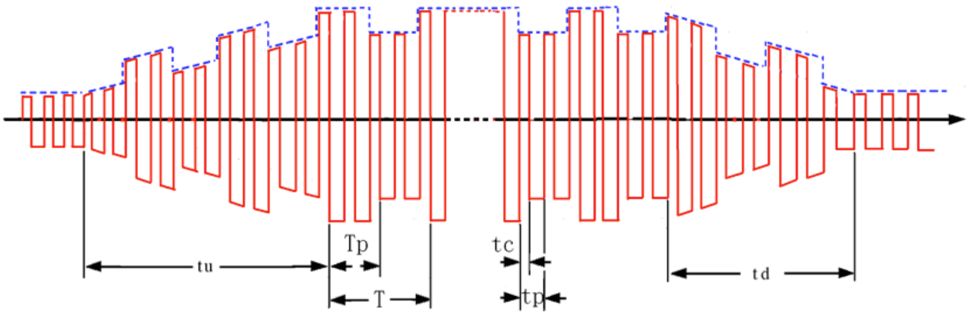
In AC square wave TIG welding, the pre flow time and post flow time are the same as in DC TIG welding. Others parameters are described as below.
Initial current (I0), welding current (I1) and pilot arc current (I2): The preset value of the three parameters is approximately the absolute average of the practical welding current and can be adjusted according to users technical requirements.
Pulse frequency (1/tp): It can be adjusted according to users technical requirements.
Cleaning strength (100%*Tc/Tp): Generally, in AC welding, when taking the electrode as the anode, the current is called the cathode current. Its main function is to break up the oxidized layer of the work piece and the cleaning strength is the percentage cathode current holding in the AC period.
This parameter is 10~40% commonly. When the value is smaller, arc is concentrated, the molten pool is narrow and deep and when it is larger, the arc is spread, the molten pool is wide and shallow.

OPERATION

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

AC pulsed TIG welding

Tc - Cathode current time
Tp - AC period
Tp - Pulsed peak current time
T - Pulse period

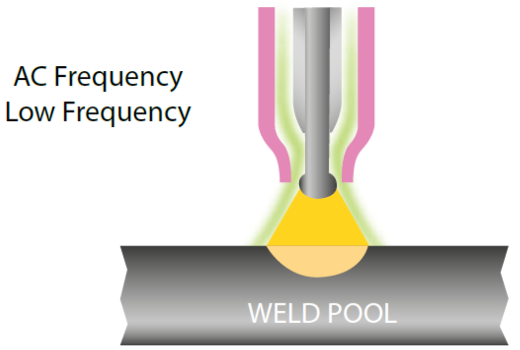


AC pulsed TIG welding is almost the same as AC square wave TIG welding and what makes them different is that in AC pulsed TIG welding, the welding current varies with the pulse peak current and base current. For the AC square wave parameter selecting and setting, please refer to the corresponding contents in AC square wave TIG welding. For the pulse frequency and pulse duration ratio, users may refer to the corresponding contents in DC pulsed TIG welding.
The pulse frequency (1/T) can be adjusted between 0.5Hz and 5Hz. The pulse duration ratio (Tp/T) can be adjusted between 10% and 90%.

AC frequency

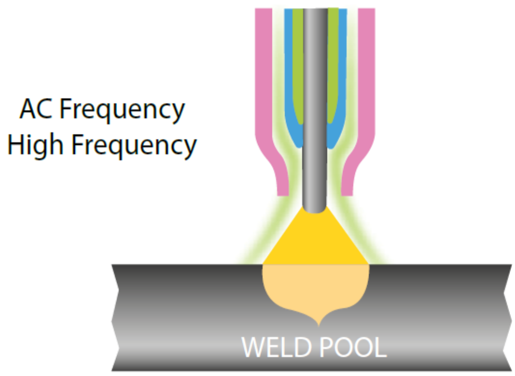
The normal mains frequency of equipment is 50Hz. However, this 500D AC/DC has an output adjustment range of between 20-70Hz.

Lower AC frequency would provide a soft and less forceful arc, wider arc with shallow penetration.



Soft Arc with Shallow Penetration

Increasing the AC frequency has the effect of concentrating the arc making it easily directional with deeper penetration.



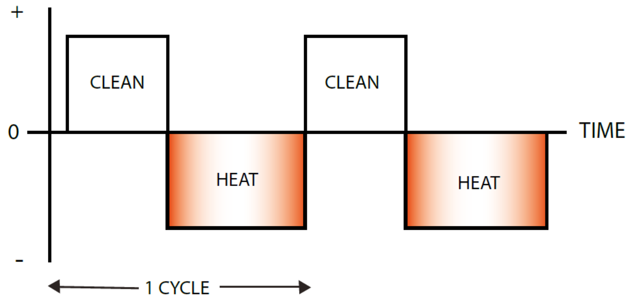
Tighter Arc with Deeper Penetration

OPERATION

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

Wave balance control

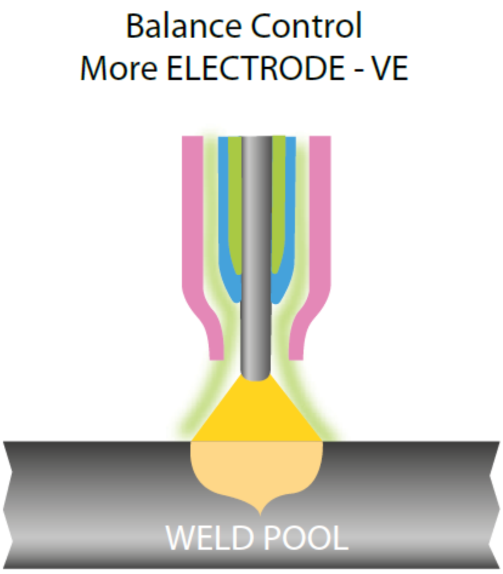
This selects the percentage of cleaning between positive and negative cycles in the AC welding mode.
Balance zero is normally 50:50 positive and negative.
More cleaning is more positive and less negative and more penetration is the opposite i.e. more negative and less positive. Controls will often show a zero as the balanced state and a +10 -10 indicator range either side of zero.



With the correct setting of the frequency and balance controls it is possible to use a smaller size tungsten.

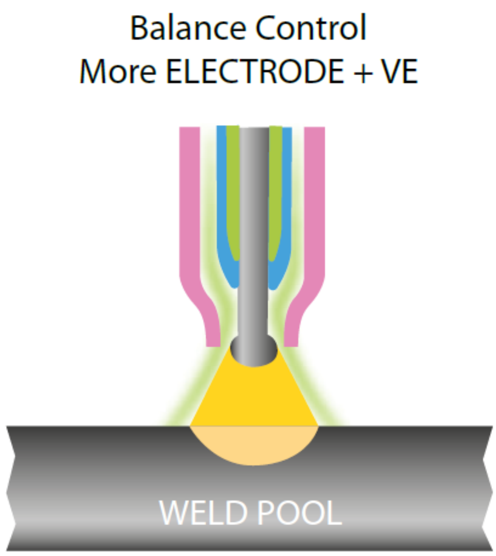
Maximum penetration

This can be achieved by placing the control to a position which will enable more time to be spent in the negative half cycle with respect to the positive half cycle. This will allow for higher current to be used with smaller electrodes as more of the heat is in the positive (work).
The increase in heat also results in deeper penetration when welding at the same travel speed as the balanced condition. A reduced heat affected zone and less distortion due to the narrower arc.



Maximum cleaning

This can be achieved by placing the control to a position which will enable more time to be spent in the positive half cycle with respect to the negative half cycle. This will allow for very active cleaning current to be used. It should be noted that there is an optimum cleaning time after which more cleaning will not occur and the potential of damage to the electrode is greater. The effect on the arc is to provide a wider clean weld pool with shallow penetration.



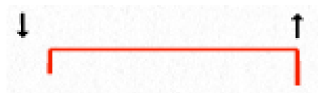
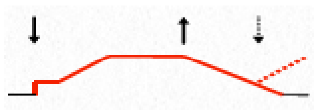
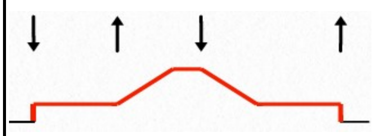
OPERATION

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

Torch trigger operation modes

Three TIG torch trigger operation modes are available for the 500D AC/DC machine, Trigger modes should be selected according to users technical requirements.

Torch trigger operation notes			
↓	Push the torch trigger.	↑	Release the torch trigger.
↓↑	Push the torch trigger and then release it at any time.	↑↓	Release the torch trigger and then push it at any time.
↕	Push and release the torch trigger within 0.5s, or release and push the torch trigger within 0.5s.	↕↕	Push the torch trigger twice within 0.5s, or release the torch trigger twice within 0.5s.

Mode Number	Operation	Torch trigger operation and current curve
0	**Follow mode:** 1. Push the torch trigger: Arc is ignited and current rises to the preset value. 2. Release it: Arc stops.	
2	**Standard 2T mode:** 1. Push the torch trigger: Arc is ignited and current rises gradually. 2. Release the torch trigger: Current drops gradually and arc stops. 3. If the torch trigger is re-operated again before arc stops, the current will gradually rise again to status 2.	
4	**Standard 4T mode:** 1. Push the torch trigger: Arc is ignited and current reaches the initial value. 2. Release it: Current rises gradually. 3. Push it again: Current drops to pilot arc current value. 4. Release it: Arc stops.	

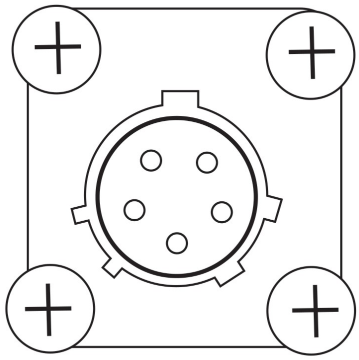
REMOTE CONTROL SOCKET

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the welding area.

Remote control socket

- This 5 pin socket is also used to connect a foot remote control pedal to control amperage and start the TIG process.
-

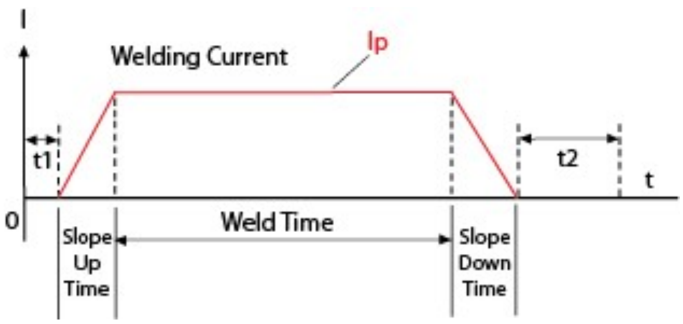
5 pin socket	
Pin	**Description**
1	Torch trigger
2	Torch trigger
3	Potentiometer (wiper)
4	Potentiometer (Max)
5	Potentiometer (min)



Foot pedal installation and operation

1. Plug in the JFC-06 foot pedal's 5 pin plug into the matching socket mounted on the front panel of the JT-500D and then ensure the remote/local switch is set to remote.
2. Ensure that the machine torch mode function is set to position 0 (zero).
3. Press the foot pedal down to start the machines output functions.
4. The foot pedal's internal potentiometer controls the welding current up to the preset level set on the welding power source control panel.
5. Please note: The maximum output current must be set on the power source control panel by the user prior to the foot control being connected.
6. With the foot control connected, the panel digital ammeter will only display minimum preview amps until the foot control is depressed then it displays actual welding current when the welding arc is established.
7. Pressing the foot pedal increases the welding current, letting up on the foot pedal decreases the welding current then releasing the pedal completely will extinguish the arc which in turn will initiate the post flow shielding gas time.

So for example, when the optional foot pedal is connected to the machine you then have the ability of controlling the slope up/down and welding current during TIG welding mode. The welding current and slope times are determined by the user by pressing and depressing the pedal.



TIG waveform with foot pedal connected with pulse off.

MAINTENANCE

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing the machine covers.

In order to guarantee that the arc welding machine works efficiently and in safety, it must be maintained regularly. Operators should understand the maintenance methods and means of arc welding machine operation. This guide should enable customers to carry out simple examination and safeguarding by oneself, try to reduce the fault rate and repair times of the arc welding machine so as to lengthen service life of arc welding machines.

Period	Maintenance item
Daily examination	Check the condition of the machine, mains cables, welding cables and connections. Check for any warnings LEDs and machine operation.
Monthly examination	Disconnect from the mains supply and wait for at least 5 minutes before removing the cover. Check internal connections and tighten if required. Clean the inside of the machine with a soft brush and vacuum cleaner. Take care not to remove any cables or cause damage to components. Ensure that ventilation grills are clear. Carefully replace the covers and test the unit. **This work should be carried out by a suitably qualified competent person.**
Yearly examination	Carry out an annual service to include safety check in accordance with the manufacturers standard (EN 60974-1). **This work should be carried out by a suitably qualified competent person.**

⇒ **Ensure the power is disconnected before working on the machine.**

⇒ **Always wait 5 minutes after power switch off before opening the case.**

TROUBLESHOOTING

The following operation requires sufficient professional knowledge on electric aspects and comprehensive safety knowledge. Make sure the input cable of the machine is disconnected from the electricity supply and wait for 5 minutes before removing the machine covers.

Before arc welding machines are dispatched from the factory, they have already been checked thoroughly. The machine should not be tampered with or altered. Maintenance must be carried out carefully. If any wire becomes loose or is misplaced, it maybe potentially dangerous to the user!

Only professional maintenance personnel should repair the machine!

Ensure the power is disconnected before working on the machine. Always wait 5 minutes after power switch off before opening the case.

Description of fault	Possible cause
The power LED is OFF and the fan is not functioning	The primary supply voltage has not been switched ON or input fuse has blown
	The welding power source input switch is switched OFF
	Loose connections internally
The fault LED is ON and the fan is running	The machine is under overheating protection status. It can recover automatically after the welding machine is cooled
	Check incoming mains supply to ensure its within 400V +/- 15%
No high frequency is produced	Process selection switch is set to manual metal arc (MMA)
	Torch trigger switch lead is disconnected or switch/lead is faulty
	High frequency spark gap too wide or short circuited
Welding current reduces when welding	Poor work lead connection to the work piece
TIG electrode melts when arc is struck	TIG torch is connected to the (+) terminal
No gas flow when the TIG torch trigger switch is depressed	Empty gas cylinder
	Gas regulator is turned off
	Gas hose is blocked or cut
	Torch trigger switch lead is disconnected or switch/lead is faulty
Difficult to ignite the arc	The arc ignition current is too low or the arc ignition time is too short
The electrode holder becomes very hot	The rated current of the electrode holder is smaller than its actual working current, replace it with a higher rated current capacity
Excessive spatter in MMA welding	The output polarity connection is incorrect, check and exchange the polarity if required
Other malfunction	Contact your supplier

⇒ Ensure the power is disconnected before working on the machine.
⇒ Always wait 5 minutes after power switch off before opening the case.

WELDING TROUBLESHOOTING

The following basic level of troubleshooting can be performed without special equipment or knowledge and without removing the covers from the power source or the wire feed unit. If further investigation work is required then please consult with a fully trained Technician.

Welding problem	Possible cause	Action
Excessive tungsten use	TIG set to DCEP (DC Electrode Positive)	Connect TIG for DCEN (DC Electrode Negative)
	Insufficient shield gas flow	Check for blockages and correct flow rate
		Check for drafts
	Electrode size to small	Select correct size
	Electrode contamination during cooling time	Extend post flow gas period
	Electrode melting up into shield cup when welding in AC	Balance control may be set too high in cleaning
		Electrode type incorrect
		Electrode size too small
Porosity/weld contamination	Loose torch or hose fittings	Check and tighten all fittings
	Inadequate shield gas flow	Adjust flow rate – normally 8-12L/m
	Incorrect shield gas	Use correct shield gas
	Gas hose damaged	Trace and replace damaged component
	Base material contaminated	Clean material properly
	Incorrect filler material	Check correct filler material grade in use
No operation when the torch switch is operated	Torch switch faulty	Check the torch switch continuity and replace if faulty
	Mains fuse blown	Check circuit breakers or fuses and replace as necessary
	Fault inside the equipment	Have a technician check the equipment
Low or no output current	Weld circuit broken	Check all connections and cables continuity, especially torch cables
	No shield gas flowing	Check cylinder contents, regulators and valves
		Could be a power source fault
Unstable arc when welding in AC	Poor cleaning of base material	Check and adjust balance control where necessary
	Arc length incorrect	Arc length should be between 3-6mm
	Material contaminated	Clean all base and filler materials
	Frequency setting incorrect	Check and reset to a parameter where the welding arc is stable
Unstable arc when welding in DC	Tungsten electrode contaminated	Break off contaminated end and regrind the electrode
	Arc length incorrect	Arc length should be between 3-6mm
	Material contaminated	Clean all base and filler materials
	Electrode connected to the wrong polarity	Reconnect to correct polarity
Arc is difficult to start	Incorrect electrode type or shield gas being used	Check that the correct electrode and gas is being used (argon shield gas) also check for leaks

EC Declaration of Conformity

The manufacturer, or its legal representative supplier in the European Community Wilkinson Star Limited, declares that the equipment described below is designed and produced according to following EU - Directives:

- Low Voltage Directive No: 2006/95/EEC
- EMC Directive No: 2004/108/EEC with their amendments

Inspected according to following EU - Norms:
- EN 60 974-1
- EN 60 974-10

Type: JT-500D AC/DC water cooled

Any alteration or change to these machines by any unauthorized person makes this declaration invalid.

Materials and their disposal

The equipment is manufactured with materials which do not contain any toxic or poisonous materials dangerous to the operator.
When the equipment is scrapped, it should be dismantled separating components according to the type of materials.
Do not dispose of the equipment with normal waste. The European Directive 2002/96/EC on Waste Electrical and Electronic Equipment states the electrical equipment that has reached its end of life must be collected separately and returned to an environmentally compatible recycling facility.
Wilkinson Star Jasic Technology has a relevant recycling system which is compliant and registered in the UK with the environment agency. Our registration reference is WEEMM3813AA.
In order to comply with WEEE regulations outside the UK you should contact your supplier.

RoHS Compliance Declaration

We herewith confirm, that the above mentioned product does not contain any of the restricted substances as listed in EU Directive 2011/65/EU in concentrations above the limits as specified therein.

Disclaimer:
Please note that this confirmation is given to the best of our present knowledge and belief.
Nothing herein represents and/or may be interpreted as warranty within the meaning of the applicable warranty law.

STATEMENT OF WARRANTY

All new Wilkinson Star Jasic Technology welders, plasma cutters and multi-process units sold by Wilkinson Star Jasic Technology shall be warrantied to the original owner, non transferable, against failure due to defective materials or production. The warranty period is 2 years following the date of purchase or 5 years if you register online within 28 days of purchase. The original invoice is documentation for the standard warranty period. The warranty period is based on a single shift pattern. Units purchased for rental or hire are subject to separate warranty terms and conditions.

Defective units shall be repaired or replaced by the company at our workshop. The company may opt to refund the purchase price (less any costs and depreciation due to use and wear). The company reserves the right to alter the warranty conditions at any time with effect for the future.

A prerequisite for the full warranty is that products are operated in accordance with the operating instructions supplied, observing the relevant installation and any legal requirements recommendations and guidelines and carrying out the maintenance instructions shown in the operator manual. This should be carried out by a suitably qualified competent person.

In the unlikely event of problem, this should be reported to Wilkinson Star Jasic Technology technical support team to review the claim.

The customer has no claim to loan or replacement products whilst repairs are being performed.

The following falls outside the scope of the warranty:

- Defects due to natural wear and tear
- Failure to observe the operating and maintenance instructions
- Connection to an incorrect or faulty mains supply
- Overloading during use
- Any modifications that are made to the product without the prior written consent
- Software errors due to incorrect operation
- Any repairs that are carried out using non-approved spare parts
- Any transport or storage damage
- Direct or indirect damage as well as any loss of earnings are not covered under the warranty
- External damage such as fire or damage due to natural causes e.g. flooding

NOTE: Under the terms of the warranty, welding torches, their consumable parts, wire feed unit drive rolls and guide tubes, work return cables and clamps, electrode holders, connection and extension cables, mains and control leads, plugs, wheels, coolant etc. are covered with a 3 month warranty.

Wilkinson Star Jasic Technology shall in no event be responsible for any third party expenses or expenses/ costs or any indirect or consequential expenses/costs.

Wilkinson Star Jasic Technology will submit an invoice for any repair work performed outside the scope of the warranty. A quotation for any non warranty will be raised prior to any repairs being carried out.

The decision about repair or replacement of the defective part(s) is made by Wilkinson Star Jasic Technology. The replaced part(s) remain(s) Wilkinson Star Jasic Technology property.

Warranty extends only to the machine, its accessories and parts contained inside. No other warranty is expressed or implied. No warranty is expressed or implied in regards to the fitness of the product for any particular application or use.

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