



# EZITIG 205DC INVERTER WELDER

## OPERATING INSTRUCTIONS



### 👉 IMPORTANT!

Read these Operating Instructions Completely before attempting to use this machine. Save this manual and keep it handy for quick reference. Pay particular attention to the safety instructions we have provided for your protection. Contact your distributor if you do not fully understand anything in this manual.



230V 50HZ  
SINGLE  
PHASE



IGBT  
INVERTER  
TECHNOLOGY



DIRECT  
CURRENT  
OUTPUT



SPIKE/  
GENERATOR  
SAFE



INTELLIGENT  
PROTECTION  
SYSTEM



IP23 CORROSION  
& SALT SPRAY  
RESISTANT



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## **EZITIG 205DC**

### **Congratulations on the purchase of your new Strata Welding Product!**

The Strata range of Welding Products from Euroquip utilises the latest design technology and is engineered to produce welding products that combine market leading value, features and durability. Designed for the discerning operator, who seeks professional results and quality. Design emphasis is placed on simple design and functional operation. All Strata products are subject to stringent quality control and are designed and manufactured to New Zealand and Australian standards.

Common applications for Strata products include:

- Engineering
- Automotive
- Manufacturing
- Farming
- Industrial Maintenance and Repair

For more industrial welding solutions, check out the full Strata Range from Euroquip at:

**[www.strata.co.nz](http://www.strata.co.nz)**

Euroquip is a market leading provider of innovative power equipment solutions to a wide range of industries across Australasia.



# STRATA

SUPERIOR WELDING PRODUCTS



## EZITIG205DC

### 200A DC INVERTER TIG / MMA WELDER

The EZITIG 205DC is a powerful highly portable, easy to use machine. Extreme stress tested to 440V with IP23 protection, the EZITIG 205DC is built to last in the harshest NZ work environments.

- IGBT inverter technology for smooth & stable welding output and increased reliability
- Industrial IP23 casing with front panel protection resists damage, moisture and corrosion
- Microprocessor control system for superior and dynamic arc characteristics
- Lightweight & compact design, ideal for portable applications
- Extreme stress tested in production up to 440V, ensuring rugged reliability
- Great control and easy to use MMA welding with adjustable arc force, hot start and auto anti-stick control
- Lift TIG and HF start modes gives versatility when welding around sensitive electronic equipment
- Electronic HF TIG arc ignition system, contamination free and easy arc starting with low EMF interference
- Spot welding function with 2T/4T trigger control
- Durable and reliable with high quality & over specified electronic components
- Intelligent protection system with temperature, voltage and current sensors for increased reliability and safety
- Designed to work with generator power supply with protection from power surges.
- Multi PCB construction is economical to service and repair compared to single PCB design
- Potentiometer torch/ foot pedal remote control with finger tip remote control
- All remote functions connect through single plug 12 pin connection
- Quick connect inlet gas fitting
- Accessories include 3m earth lead with heavy duty earth clamp, 4m MMA lead with heavy duty twist lock electrode holder, Strata Professional PRO26 12ft TIG torch with composite machine connection, 2 stage flowmeter, argon gas regulator, 4m gas hose, gas inlet quick connector and hose clamps.



**DIRECT CURRENT**



**CORROSION RESISTANT**



**SPIKE/ GENERATOR SAFE**



**IGBT INVERTER TECHNOLOGY**



**INTELLIGENT PROTECTION SYSTEM**



**230V 50HZ SINGLE PHASE**



**15 AMP PLUG**

DIMENSIONS (LxWxH)	WEIGHT	INPUT POWER SUPPLY	INPUT POWER SUPPLY TOLERANCE	MAXIMUM INPUT CURRENT	GENERATOR CAPACITY	MMA CURRENT OUTPUT	MMA O/C VOLTAGE	MMA DUTY CYCLE	TIG CURRENT OUTPUT	TIG DUTY CYCLE	TIG UP SLOPE DOWN SLOPE ADJUSTMENT
410 x 146 x 278mm	7kg	230V AC 15A 50/60Hz	±10%V	43A	10kVA	5 - 200A	89V	200A@15% 150A@60% 115A@100%	5 - 200A	200A@20% 155A@60% 120A@100%	0-2/0-10s

TIG PULSE FREQUENCY	TIG PULSE WIDTH RANGE	INSULATION CLASS	POWER EFFICIENCY	POWER FACTOR	STANDARDS	MMA ROD SIZE	WARRANTY
0.5 - 200Hz	5 - 95%	IP23	85%	0.75	EN60974-1: 2012	1.6 - 5.0mm	24 months



# EZITIG 205DC

## 1. EZITIG205DC Related Parts

EZITIG205DC	
Part number	Description
<b>TIG Torch &amp; Consumables</b>	
24219*	Pro26 TIG Torch 12 ft, c/w 12-pin plug & 3550 dinse adaptor
DCKIT	DC Tig Consumables Starter Kit - WP17, WP18, WP26
SW17847	12 Pin Strata TIG Remote Connection Plug
TBC57Y02	Long black cap
TER1MS-10	Ergo Tig Switch - 10k Pot
<b>Collets</b>	
<b>Variable Amp</b>	
TC10N23	Collet 1/16 (1.6mm) (2 pk)
TC10N24	Collet 3/32 (2.4mm) (2 pk)
TC10N25	Collet 1/8 3.2mm (Pkt 2)
<b>Collet Bodies</b>	
TCB10N31	Collet body 1/16 (1.6mm) (2pk)
TCB10N32	Collet body 3/32 (2.4mm) (2pk)
TCB10N28	Collet body 1/8 (3.2mm) (2 pk)
<b>Ceramic Cups</b>	
TCC10N48	Std. ceramic cup 10mm bore #6 (2pk)
TCC10N47	Std. ceramic cup 11mm bore #7 (2pk)
TCC10N46	Std. ceramic cup 13mm bore #8 (2pk)
TCC10N45	Std. ceramic cup 16mm bore #10 (2pk)
<b>MMA Consumables</b>	
AAL3550*	Arc Lead 25mm <sup>2</sup> cable, 35-70mm plug, 4m 300A Twist-lock Electrode holder
AEL3550*	Earth Lead 25mm <sup>2</sup> cable, 35-70mm plug, 3m 300A Heavy duty earth clamp
GR102ARFL*	Argon Gas Regulator
<b>Regulators</b>	
GR101ARFL	Argon regulator c/w flow tube
GR101AR-2FL	Argon regulator c/w twin flow tubes
<b>Gas Hose</b>	
SW17844	Gas hose coupling
31104*	4m Gas Hose
For Gas lens Parts Please see the Strata Consumables Guide.	

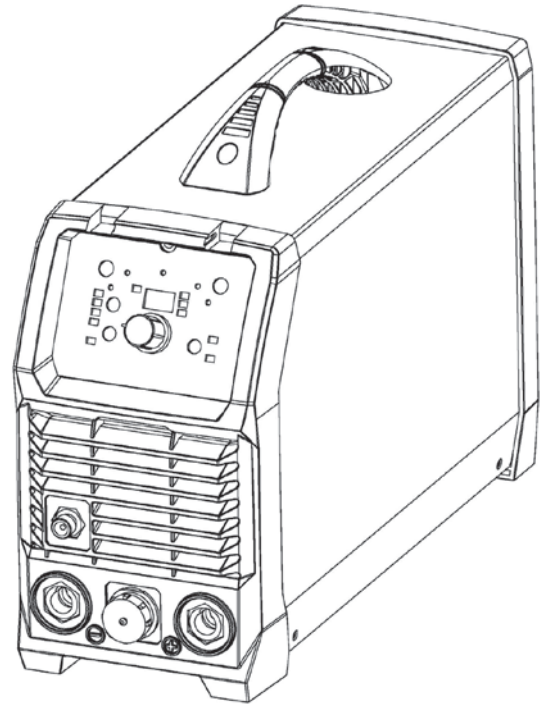
\*Included Accessories



## 2 Overview

### 2.1 Features

- Lift TIG and HF Start Modes for versatility when welding around sensitive electronic equipment.
- Adjustable arc force, hot start & anti stick control for greater control and ease of use when MMA welding.
- High performance on ultra thin surfaces with no deformation.
- 2T/4T trigger control.
- Digital display meter for accurate setting & feedback of welding output.
- Equipped with temperature/phase loss protection; voltage and current sensors for high protection.
- Designed to work with diesel generators and to avoid failures due to its voltage spikes.
- Up/ Down Button Remote Control torch. (optional)
- Roller wheel amps control on torch. (optional)
- Wireless Remote Control . (optional)
- Wire Foot Pedal. (optional)



### 2.2 Technical Data

Models Parameters	EZITIG205DC
Power Supply Voltage (V)	1~220V/230V/240V ± 10%
Frequency(HZ)	50/60
Rated input current (A)	43 MMA/ 34 TIG
Rated input power (KW)	6.2 MMA/ 4.9 TIG





## EZITIG 205DC

Duty cycle (40°C 10 min)	35% 200A
	60% 155A
	100% 120A
Welding Current Range (A)	5-200
Up slope/Down slope (S)	0-10
Pre/Post Flow (S)	0-2/0-10
Pulse frequency (HZ)	0.5-200
Pulse width range (%)	5-95
No Load Voltage(V)	89
Efficiency(%)	≥85%
Power Factor	0.75
Insulation class	H
Protection class	IP23
Cooling	AF
Net Weight(Kg)	7
Dimensions(mm)	410*146*278

**Note: The above parameters are subject to change with future machine improvement!**

### 2.3 Brief Introduction

TIG series of welding machines adopt the latest Pulse Width Modulation (PWM) technology and the Insulated Gate Bipolar Transistor (IGBT) power modules. It uses switching frequencies in the 20KHz-50KHz ranges so as to replace the traditional line-frequency transformer type welding machines. Thus, machines are characterized with portability, small size, lightweight, low energy consumption and noise, etc.

The parameters of the machine on the front panel all can be adjusted continuously and steplessly, such as start current, crater arc current, welding current, base current, duty ratio, upslope time, downslope time, pre-gas, post-gas, pulse frequency, hot start, arc force and arc length etc. When welding, it takes high frequency and high voltage for arc igniting to ensure the success ratio of igniting arc.

#### **EZITIG205DC PULSE Characteristics:**

★ DC Pulsed TIG and MMA, adopt IGBT and advanced PWM technology





## **EZITIG 205DC**

- ★ **High performance MCU, Digital control, Digital display**
- ★ **Preset all parameters with hold process**
- ★ **HF/Lift TIG, current down slope and up slope, gas post-flow, Pulse Frequency**
- ★ **Intelligent protection: over-voltage, under-voltage, over-current, over-heat**

1. For MMA, polarity connection can be chosen according to different electrodes, please refer to §3.3.1;

2. For DC TIG, DCEP is used normally (workpiece connected to positive polarity, while torch connected to negative polarity). This connection has many characters, such as stable welding arc, low tungsten pole loss, more welding current, narrow and deep weld;

3. DC Pulsed TIG has the following characters: 1) Pulse heating. Metal in Molten pool has short time on high temperature status and freezes quickly, which can reduce the possibility to produce hot crack of the materials with thermal sensitivity. 2) The workpiece gets little heat. Arc energy is focused. Be suitable for thin sheet and super thin sheet welding. 3) Exactly control heat input and the size of the molten pool. The depth of penetration is even. Be suitable for welding by one side and forming by two sides and all position welding for pipe. 4) High frequency arc can make metal for microlite fabric, eliminate blowhole and improve the mechanical performance of the joint. 5) High frequency arc is suitable for high welding speed to improve the productivity.

TIG series of welding machines is suitable for all positions welding for various plates made of stainless steel, carbon steel, alloyed steel, titanium, magnesium, cuprum, etc, which is also applied to pipe installment, mould mend, petrochemical, architecture decoration, car repair, bicycle, handicraft and common manufacture.

MMA—Manual Metal Arc welding;

PWM—Pulse-Width Modulation;

IGBT—Insulation Gate Bipolar Transistor;

TIG—Tungsten Inert Gas welding.

### **2.4 Duty cycle and Over-heat**

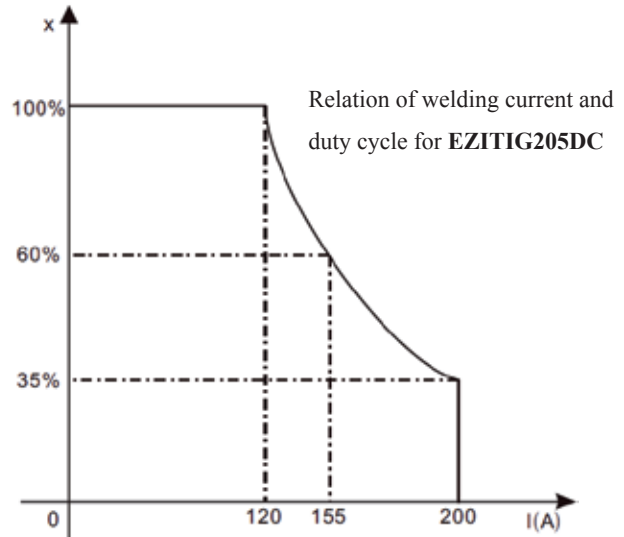
The letter “X” stands for Duty Cycle, which is defined as the portion of the time a welding machine can weld continuously with it’s rated output current within a certain time cycle (10 minutes).



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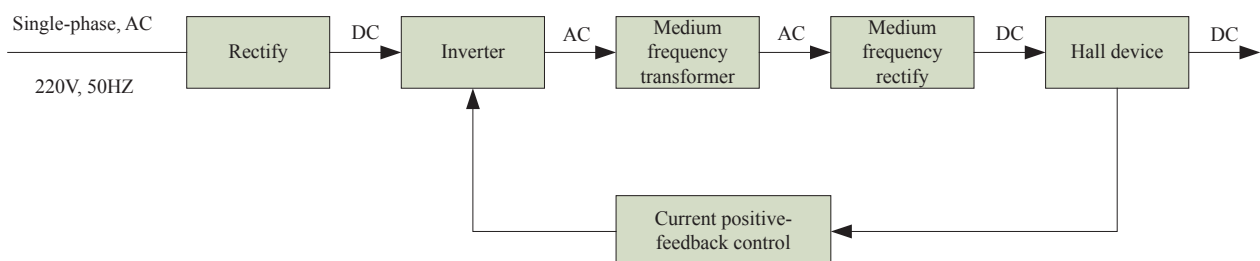
The relation between the duty cycle “X” and the output welding current “I” is shown as the right figure.

If the welding machine is overheating, the IGBT over-heat protection sensing will send a signal to the welding machine control unit to cut the output welding current OFF and light the over-heat pilot lamp on the front panel. In that case, the machine should not be welding for 10-15 minutes to cool down with the fanrunning. When operating the machine again, the welding output current or the duty cycle should be reduced.



### 2.5 Working Principle

The working principle of TIG series of welding machines is shown in the following figure. Single-phase 220V line frequency AC is rectified into DC (about 315V), then is converted to medium frequency AC (about 40KHz) by inverter device (IGBT), after reducing voltage by medium transformer (the main transformer) and rectified by medium frequency rectifier (fast recovery diode), and is outputted by inductance filtering. The circuit adopts current feedback control technology to ensure current output stability. Meanwhile, the welding current parameters can be adjusted continuously and steplessly to meet with the requirements of welding craft.



### 2.6 Volt-Ampere Characteristic

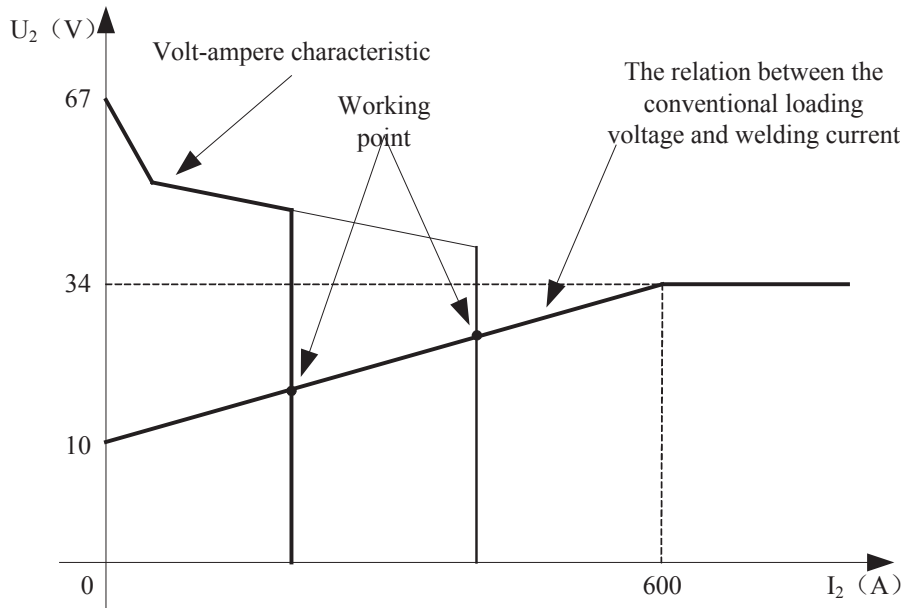
TIG series of welding machines has excellent volt-ampere characteristic. Referring to the following graph. In TIG welding, the relation between the rated loading voltage  $U_2$  and welding



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current  $I_2$  is as follows:

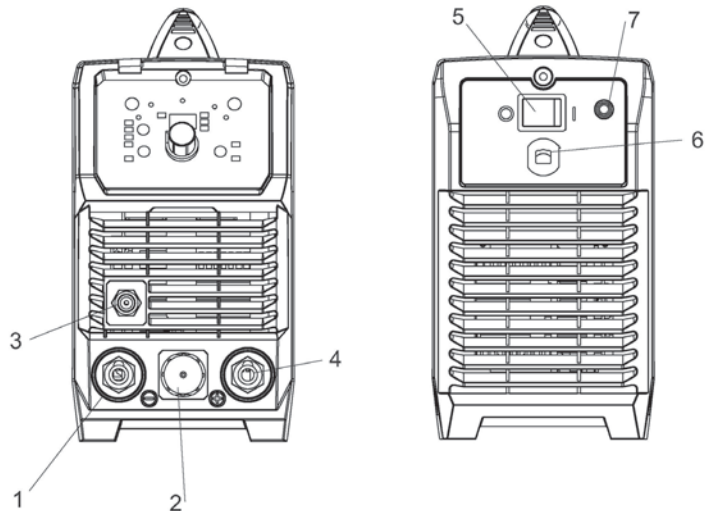
$$\text{When } I_2 \leq 600\text{A, } U_2 = 10 + 0.04 I_2 \text{ (V); When } I_2 > 600\text{A, } U_2 = 34 \text{ (V) .}$$



## 3 Installation & Operation

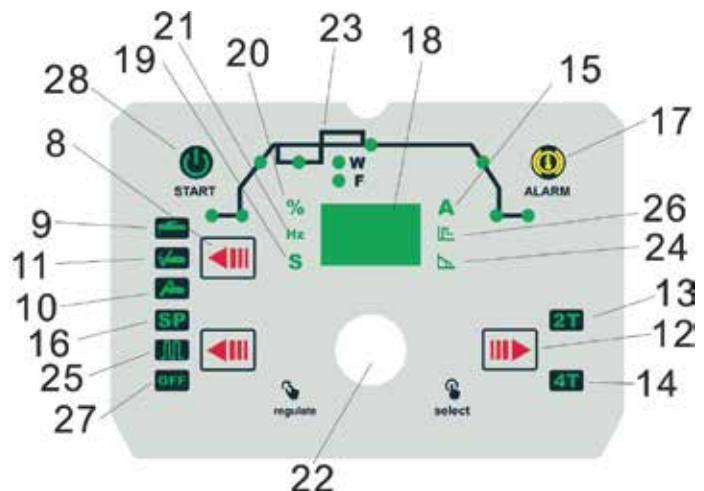
### 3.1 Layout for the front and rear panel

- (1) “-” Output terminal.
- (2) TIG torch remote connection socket.
- (3) TIG gas connection.
- (4) “+” Output terminal.
- (5) Power switch
- (6) Input power cable.
- (7) Inlet gas connector.



### Control Panel

- (8) Welding output mode button.
- (9) MMA mode indicator .
- (10) Lift TIG mode indicator. \*
- (11) Hf TIG mode indicator. \*
- (12) Trigger control mode button. \*
- (13) 2T trigger indicator.
- (14) 4T trigger indicator.
- (15) Digital display value current indicator.
- (16) Spot welding.
- (17) Alarm indicator. \*
- (18) Digital multifunction display. \*
- (19) Digital display value time indicator.
- (20) Digital display value percentage indicator.
- (21) Digital display value frequency indicator.
- (22) Parameter select/adjust Knob. \*
- (23) TIG parameter setting indicator. \*
- (24) MMA arc force setting Indicator. \*
- (25) Pulse welding.
- (26) MMA hot start setting Indicator. \*
- (27) Pulse welding off.
- (28) Power Indicator.





## **EZITIG 205DC**

\*Denotes more detailed explanation of function to follow.

### **Further Controls Explained**

#### **TIG HF/ Lift Ignition Modes (10,11)**

For TIG welding process, contact of the torch tungsten to the workpiece will cause contamination of the tungsten and the workpiece that will adversely affect the weld quality, especially when the tungsten is electrically energised.

**HF Ignition** (High Frequency) sends a pulse of high energy electricity through the torch system that is capable of 'jumping' between the tungsten and the workpiece, ensuring arc starting without any contact between the tungsten and workpiece. The disadvantage of HF ignition is that the high energy electrical pulse creates significant electrical and radio signal interference, which limits its use around sensitive electronic equipment such as computers.

**Lift TIG Ignition** is a compromise that minimises tungsten contamination while eliminating the electrical interference of HF start systems. Lift arc starting works by lightly resting the tungsten on the work piece, activating the torch trigger signal and then lifting the tungsten off. The control circuit will sense when the tungsten is removed from the work piece and send a low powered pulse of electricity through the tungsten that will cause the TIG arc to initiate. Because the tungsten is not 'live' when it is in contact with the work, contamination is minimised.

#### **TIG 2T/4T Trigger Control (12)**

2T mode the trigger is pulled and held on to activate the welding circuit, when the trigger is released, the welding circuit stops. 4T is known as 'latching' mode. The trigger is pulled once and released to activate the welding circuit, pulled and released again to stop the welding circuit. This function is useful to longer welds as the trigger is not required to be held on continuously. TIG series of welding machines also has more advanced current controls that can be used in 4T mode.

#### **Alarm Indicator (17)**

Lights when over voltage, over current or electrical overheating (due to exceeding duty cycle) is detected and protection is activated. When protection is activated, welding output will be disabled until the safety system senses the overload has reduced sufficiently and indicator lamp goes out. May also trigger if machine experiences an internal power circuit failure.

#### **Digital Multifunction Display (18)**



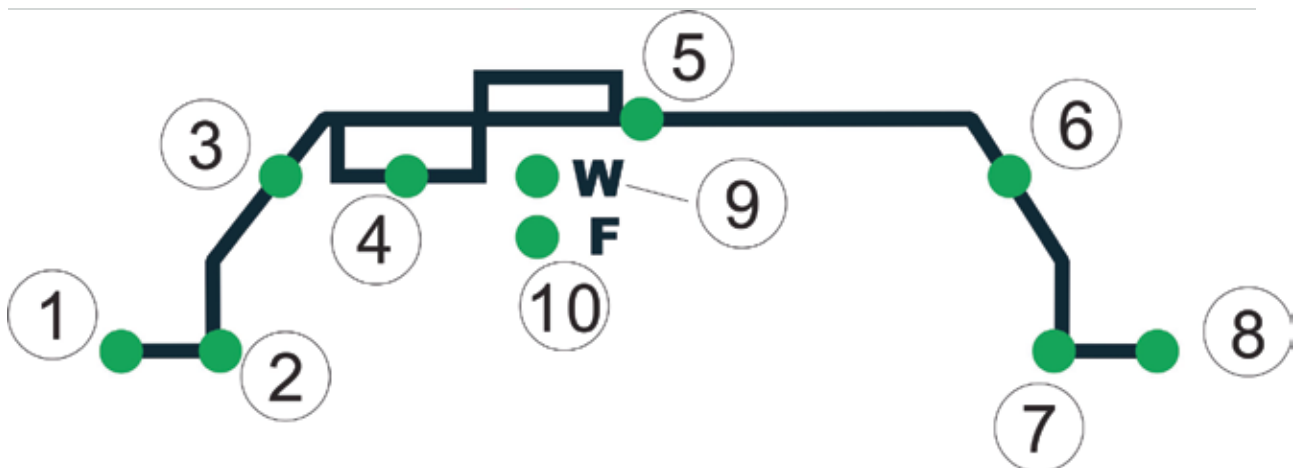
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Before welding displays the setting selected/being adjusted using the control knob (22). During welding, displays welding current. The parameter setting displayed is indicated by the LEDs 15, 16, 17, 19, 20, 21. If left inactive for several seconds, display will revert back to main welding current setting.

### Parameter Select/ Adjust Knob (22)

Switch between welding parameter settings by pressing this knob, adjust by turning the knob. Value of the parameter selected will be shown on the digital multifunction display (18).

### TIG Parameter Setting



#### Pre gas flow setting indicator (1)

Controls the period shielding gas will flow for when the torch is triggered before the arc starts. This purges the work area of atmospheric gas which could contaminate the weld before the weld starts. Unit(S) and setting range (0-2S).

#### Start current setting indicator (2)

Available in 4T trigger mode, sets a welding current 5-100% of the main welding current activated when the trigger is held on to 'latch' the trigger before the main weld current is started. Once the trigger is released, the current will go through the upslope (3) period if it is set, to the main welding current (4).

#### Up slope setting indicator (3)

When the trigger is activated, the welding current will increase gradually over the time selected up to the set main welding current (4). Unit(S) and setting range (0-10S).

#### TIG welding current setting indicator (4)



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Sets the main welding current . Unit(A) and setting range (5-200A).

### **Base current setting indicator (5)**

Only available when pulse mode (12) is selected. Sets the current of the low/ base pulse. Unit(A) and setting range (5-200A).

### **Down slope setting indicator (6)**

When the trigger is released, the welding current will reduce gradually over the time selected down to 0. This allows the operator to complete the weld without leaving a 'crater' at the end of the weld pool. Unit(S) and setting range (0-10S).

### **End current setting indicator (7)**

Available in 4T trigger mode, sets a welding current 5-100% of the main welding current activated when the trigger is held on to 'unlatch' the trigger before the weld is finished. If downslope (6) is set, the current will go through the downslope period before going to the end current set. When the trigger is released, the arc will stop.

### **Post gasflow setting indicator (8)**

Controls the period of time the shielding gas continues to flow for after the arc is stopped. This protects the weld area and torch tungsten from contamination while it is still hot enough to react with atmospheric gases, after the weld is finished. Unit(S) and setting range (0-10S).

### **Pulse width setting indicator (9)**

Only available when pulse mode (12) is selected. Sets the time proportion as a percentage between the peak current and base current when using pulse mode. Neutral setting is 50%, the time period of the peak current and base current pulse is equal. Higher pulse duty setting will give greater heat input, while lower pulse duty will have the opposite effect. Unit(%) and setting range (5-95%).

### **Pulse frequency setting indicator (10)**

Only available when pulse mode (12) is selected. Sets the rate that the welding output alternates between the peak and base current settings. Unit(Hz) and setting range (0.5-200Hz).

## **Pulse welding**

Pulse welding mode switches the welding output between a high and low current output in a cyclical manner. When used correctly this function has substantial benefits in the TIG welding





## **EZITIG 205DC**

process including greater weld penetration for less work heat input and greater control of the weld pool.

The basic theory for setting the base current using pulse mode is that the base current should be sufficient to maintain the existing molten weld pool, while the peak current is sufficient to melt new metal in order to move/ expand the molten weld pool. Increased pulse frequency will have the effect of making the arc more tightly focused which is useful for fine stainless work and similar. Pulsing can also be used to help move the weld pool, this technique is useful for welding out of position or with materials that have higher viscosity weld pool. Higher pulse duty setting will give greater heat input, while lower pulse duty will have the opposite effect.

### **MMA parameter settings**

#### **Hot start (26)**

Hot start provides extra power when the weld starts to counteract the high resistance of the electrode and workpiece as the arc is started. setting range (0-10).

#### **Arc force (24)**

An MMA welding power source is designed to produce constant output current (CC). This means with different types of electrode and arc length; the welding voltage varies to keep the current constant. This can cause instability in some welding conditions as MMA welding electrodes will have a minimum voltage they can operate with and still have a stable arc.

Arc Force control boosts the welding power if it senses the welding voltage is getting too low. The higher the arc force adjustment, the higher the minimum voltage that the power source will allow. This effect will also cause the welding current to increase. 0 is Arc Force off, 10 is maximum Arc Force. This is practically useful for electrode types that have a higher operating voltage requirement or joint types that require a short arc length such as out of position welds.

### **3.2 Power supply input Connection**

The TIG series of welding machines is designed to operate on a 220V AC power supply.

When the power supply voltage is over the safe work voltage, there are over voltage and under voltage protection inside the welder, the alarm light will on, at the same time, the current output will be cut off.

If the power supply voltage continually goes beyond the safe work voltage range, it will shorten the



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welder life-span. The below measures can be used:

- Change the power supply input net. Such as, connect the welder with the stable power supply voltage of distributor;
- Induce the machines using power supply in the same time;
- Set the voltage stabilization device in the front of power cable input.

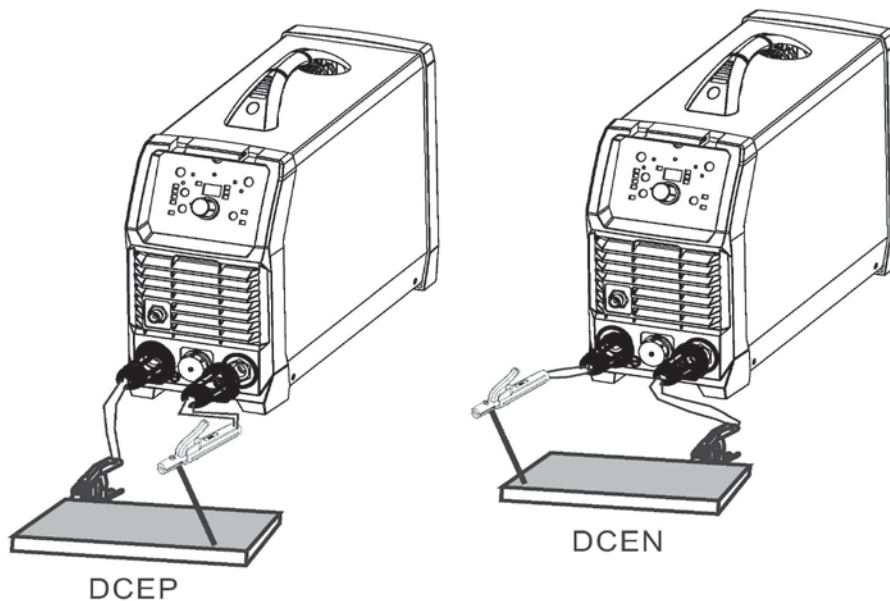
### 3.3 Installation & Operation for MMA Welding

#### 3.3.1 Set up installation for MMA Welding

Connection of Output Cables Two sockets are available on this welding machine. For MMA welding the electrode holder is shown be connected to the positive socket, while the earth lead (work piece) is connected to the negative socket, this is known as DCEP. However various electrodes require a different polarity for optimum results and careful attention should be paid to the polarity, refer to the electrode manufacturers information for the correct polarity.

DCEP: Electrode connected to “+” output socket.

DCEN: Electrode connected to “-” output socket.



- (1) Connect the earth lead to “-” , tighten clockwise;
- (2) Connect the earth clamp to the work piece. Contact with the work piece must be firm contact with clean, bare metal, with no corrosion, paint or scale at the contact point.



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- (3) Connect the electrode lead to “+” , tighten clockwise;
- (4) Each machine is equipped with a power cable should be based on the input voltage welding power cable connected to the appropriate position, not to pick the wrong voltage;
- (5) With the corresponding input power supply terminal or socket good contact and prevent oxidation;
- (6) With a multi meter measure the input voltage is within the fluctuation range;
- (7) The power ground is well grounded.

### 3.3.2 Operation for MMA Welding

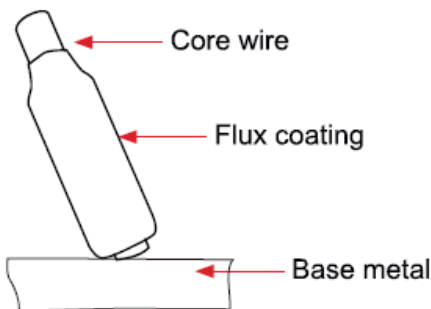
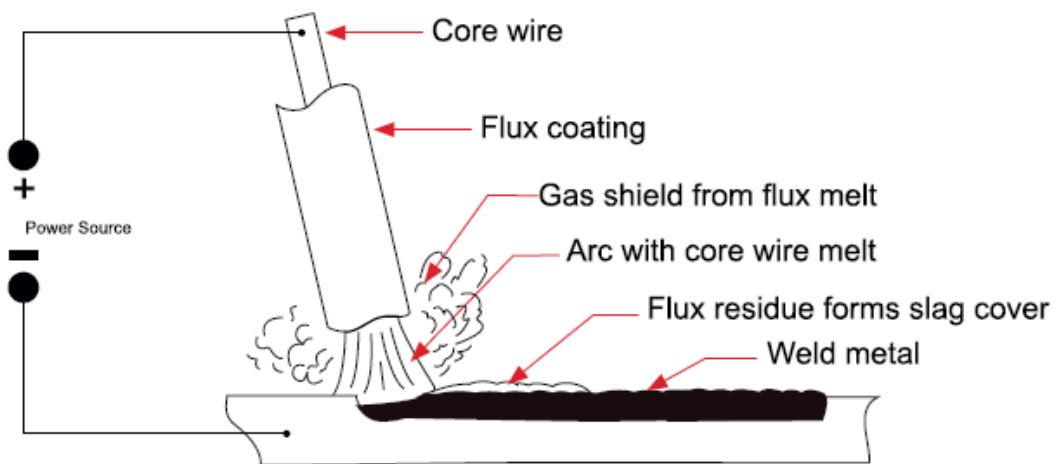
- (1) According to the above method to install is correct, turn the power switch, so that the power switch is “ON” position, then the power indicator light, the fan comes on, the device work properly.
- (2) Set the welding mode button to ‘MMA’.
- (3) Set the welding parameters as required using the parameters control knob (following the instructions in the previous section).
- (4) Place the electrode into the electrode holder and clamp tight.
- (5) Strike the electrode against the work piece to create an arc and hold the electrode steady to maintain the arc.
- (6) Commence welding. If necessary, readjust the Welding parameters control knob to obtain the welding condition required.
- (7) After completion of welding the Power Source should be left turned ON for 2 to 3 minutes. This allows the fan to run and cool the internal components.
- (8) Switch the ON/OFF Switch (located on the rear panel) to the OFF position.

#### NOTE:

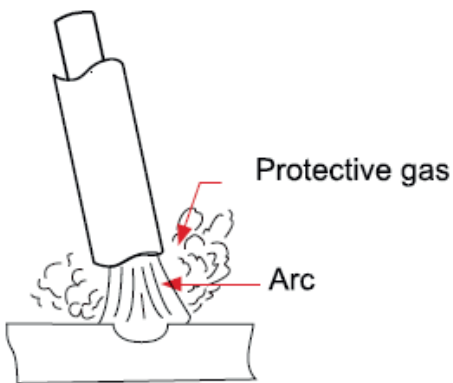
- Note the polarity of wiring, the general DC welding wire in two ways. Selected according to the technical requirements of welding the appropriate connection, if you choose incorrectly will result in arc instability and spatter large adhesion and other phenomena, such cases can be quickly reversed to joints.
- If the work piece distance from the welding machine, the second line (electrode holder and ground) is longer, so choose the appropriate conductor cross-sectional area should be larger to reduce cable voltage drop.

### 3.3.3 MMA Welding

One of the most common types of arc welding is manual metal arc welding (MMA) or stick welding. An electric current is used to strike an arc between the base material and a consumable electrode rod or 'stick'. The electrode rod is made of a material that is compatible with the base material being welded and is covered with a flux that gives off gaseous vapours that serve as a shielding gas and providing a layer of slag, both of which protect the weld area from atmospheric contamination. The electrode core itself acts as filler material the residue from the flux that forms slag covering over the weld metal must be chipped away after welding.



- The arc is initiated by momentarily touching the electrode to the base metal.
- The heat of the arc melts the surface of the base metal to form a molten pool at the end of the electrode.
- The melted electrode metal is transferred across the arc into the molten pool and becomes the deposited weld metal.
- The deposit is covered and protected by a slag which comes from the electrode coating.
- The arc and the immediate area are enveloped by an atmosphere of protective gas.



Manual metal arc ( stick) electrodes have a solid metal wire core and a flux coating. These electrodes are identified by the wire diameter and by a series of letters and numbers. The letters and numbers identify the metal alloy and the intended use of the electrode.

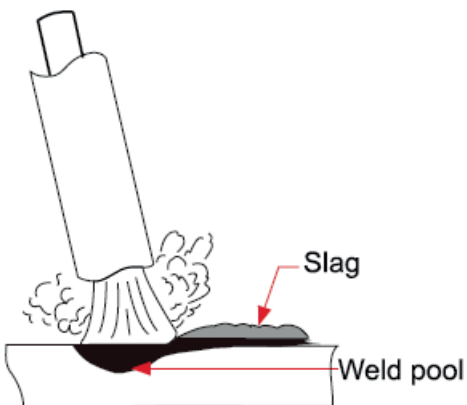
The **Metal Wire Core** works as conductor of the current that maintains the arc. The core wire melts and is deposited into the welding pool.

The covering on a shielded metal arc welding electrode is called **Flux**.

The flux on the electrode performs many different functions.

These include:

- producing a protective gas around the weld area
- providing fluxing elements and deoxidizer
- creating a protective slag coating over the weld as it cools
- establishing arc characteristics
- adding alloying elements.



Covered electrodes serve many purposes in addition to filler metal to the molten pool. These additional functions are provided mainly by the covering on the electrode.

### 3.3.4 MMA Welding Fundamentals

#### ■ Electrode Selection

As a general rule, the selection of an electrode is straight forward, in that it is only a matter of selecting an electrode of similar composition to the parent metal. However, for some metals there is a choice of several electrodes, each of which has particular properties to suit specific classes of work. It is recommended to consult your welding supplier for the correct selection of electrode.



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### ■ Electrode Size

Average Thickness of Material	Maximum Recommended Electrode Diameter
1.0-2.0 mm	2.5 mm
2.0-5.0 mm	3.2 mm
5.0-8.0 mm	4.0 mm
>8.0 mm	5.0 mm

The size of the electrode generally depends on the thickness of the section being welded, and the thicker the section the larger the electrode required. The table gives the maximum size of electrodes that maybe used for various thicknesses of section base on using a general purpose type 6013 electrode.

### ■ Welding Current (Amperage)

Electrode Size ø mm	Current Range (Amps)
2.5 mm	60-95
3.2 mm	100-130
4.0 mm	130-165
5.0 mm	165-260

Correct current selection for a particular job is an important factor in arc welding. With the current set too low, difficulty is experienced in striking and maintaining a stable arc. The electrode tends to stick to the work, penetration is poor and beads with a distinct rounded profile will be deposited. Too high current is accompanied by overheating of the

electrode resulting undercut and burning through of the base metal and producing excessive spatter. Normal current for a particular job may be considered as the maximum, which can be used without burning through the work, over-heating the electrode or producing a rough spattered surface. The table shows current ranges generally recommended for a general purpose type 6013 electrode.

### ■ Arc Length

To strike the arc, the electrode should be gently scraped on the work until the arc is established. There is a simple rule for the proper arc length; it should be the shortest arc that gives a good surface to the weld. An arc too long reduces penetration, produces spatter and gives a rough surface finish to the weld. An excessively short arc will cause sticking of the electrode and result in poor quality welds. General rule of thumb for down hand welding is to have an arc length no greater than the diameter of the core wire.



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### ■ Electrode Angle

The angle that the electrode makes with the work is important to ensure a smooth, even transfer of metal. When welding in down hand, fillet, horizontal or overhead the angle of the electrode is generally between 5 and 15 degrees towards the direction of travel. When vertical up welding the angle of the electrode should be between 80 and 90 degrees to the work piece.

### ■ Travel Speed

The electrode should be moved along in the direction of the joint being welded at a speed that will give the size of run required. At the same time, the electrode is fed downwards to keep the correct arc length at all times. Excessive travel speeds lead to poor fusion, lack of penetration etc, while too slow a rate of travel will frequently lead to arc instability, slag inclusions and poor mechanical properties.

### ■ Material and Joint Preparation

The material to be welded should be clean and free of any moisture, paint, oil, grease, mill scale, rust or any other material that will hinder the arc and contaminate the weld material. Joint preparation will depend on the method used include sawing, punching, shearing, machining, flame cutting and others. In all cases edges should be clean and free of any contaminants. The type of joint will be determined by the chosen application.

### 3.3.5 MMA Welding trouble shooting

The following chart addresses some of the common problems of MMA welding. In all cases of equipment malfunction, the manufacturer's recommendations should be strictly adhered to and followed.

NO.	Problem	Possible Reason	Suggested Remedy
1	No arc	Incomplete welding circuit	Check earth lead is connected. Check all cable connections.
		No power supply	Check that the machine is switched on and has a power supply
		Wrong mode selected	Check the MMA selector switch is selected





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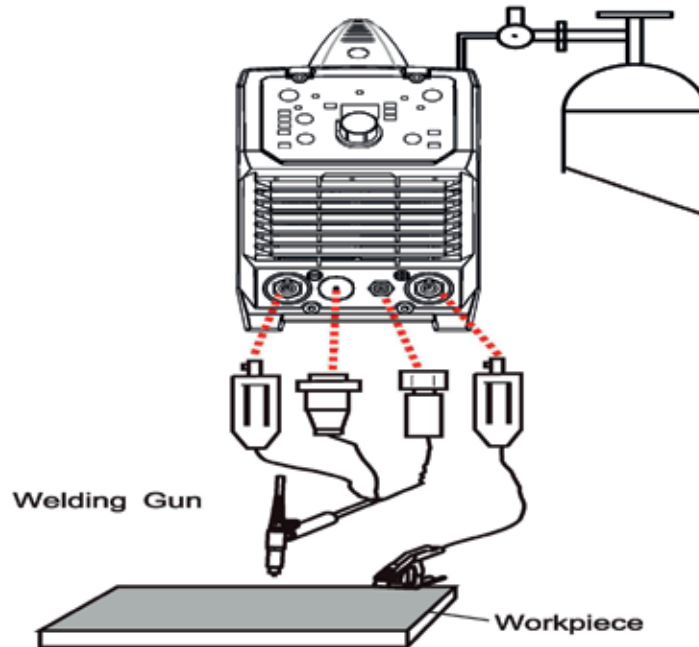
2	<b>Porosity – small cavities or holes resulting from gas pockets in weld metal</b>	Arc length too long	Shorten the arc length
		Work piece dirty, contaminated or moisture	Remove moisture and materials like paint, grease, oil, and dirt, including mill scale from base metal
		Damp electrodes	Use only dry electrodes
3	<b>Excessive Spatter</b>	Amperage too high	Decrease the amperage or choose a larger electrode
		Arc length too long	Shorten the arc length
4	<b>Weld sits on top, lack of fusion</b>	Insufficient heat input	Increase the amperage or choose a larger electrode
		Work piece dirty, contaminated or moisture	Remove moisture and materials like paint, grease, oil, and dirt, including mill scale from base metal
		Poor welding technique	Use the correct welding technique or seek assistance for the correct technique
5	<b>Lack of penetration</b>	Insufficient heat input	Increase the amperage or choose a larger electrode
		Poor welding technique	Use the correct welding technique or seek assistance for the correct technique
		Poor joint preparation	Check the joint design and fit up, make sure the material is not too thick. Seek assistance for the correct joint design and fit up
6	<b>Excessive penetration - burn through</b>	Excessive heat input	Reduce the amperage or use a smaller electrode
		Incorrect travel speed	Try increasing the weld travel speed
7	<b>Uneven weld appearance</b>	Unsteady hand, wavering hand	Use two hands where possible to steady up, practise your technique
8	<b>Distortion – movement of base metal during welding</b>	Excessive heat input	Reduce the amperage or use a smaller electrode
		Poor welding technique	Use the correct welding technique or seek assistance for the correct technique
		Poor joint preparation and or joint design	Check the joint design and fit up, make sure the material is not too thick. Seek assistance for the correct joint design and fit up
9	<b>Electrode welds with different or unusual arc characteristic</b>	Incorrect polarity	Change the polarity, check the electrode manufacturer for correct polarity



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### 3.4 Installation & Operation for TIG Welding

#### 3.4.1 Set up installation for TIG Welding



- (1) Switch the ON/OFF Switch (located on the rear panel) to OFF.
- (2) Connect the earth lead to “+”, tighten clockwise;
- (3) Connect the earth clamp to the work piece. Contact with the work piece must be firm contact with clean, bare metal, with no corrosion, paint or scale at the contact point.
- (4) Connect the TIG torch cable to “-”, tighten clockwise;
- (5) Connect TIG torch gas connection to the TIG gas outlet and TIG torch remote plug to remote socket, ensuring all connections are tight.
- (6) Connect the gas regulator to the Gas Cylinder and connect the gas line to the Gas Regulator.
- (7) Connect the gas line to the machine inlet gas connector via the quick push lock connector located on the rear panel. **Check for Leaks!**
- (8) Open gas cylinder valve and adjust regulator, flow should be between 5-10 l/min depending on application. Re-check regulator flow pressure with torch valve open as static gas flow setting may drop once gas is flowing.
- (9) Each machine is equipped with a power cable should be based on the input voltage welding power cable connected to the appropriate position, not to pick the wrong voltage;
- (10) With the corresponding input power supply terminal or socket good contact and prevent oxidation;



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- (11) With a multi meter measure the input voltage is within the fluctuation range;
- (12) The power ground is well grounded.

### **NOTE:**

- Secure the gas cylinder in an upright position by chaining them to a stationary support to prevent falling or tipping.

### **3.4.2 Operation for TIG Welding**

- (1) According to the above method to install is correct, turn the power switch to the “ON” position, the power L.E.D. light should illuminate, the fan comes on, the device work properly.
- (2) Set the welding mode button to ‘Lift TIG’ or ‘HF TIG’.
- (3) Set the welding parameters as required using the parameters control knob (following the instructions in the previous section).
- (4) The tungsten must be ground to a blunt point in order to achieve optimum welding results. It is critical to grind the tungsten electrode in the direction the grinding wheel is turning.
- (5) Install the tungsten with approximately 3mm to 7mm sticking out from the gas cup, ensuring you have correct sized collet.
- (6) Tighten the back cap.
- (7) Commence welding. If necessary, readjust the parameters control knob to obtain the welding condition re-quired.
- (8) After completion of welding the Power Source should be left turned ON for 2 to 3 minutes. This allows the fan to run and cool the internal components.
- (9) Switch the ON/OFF Switch (located on the rear panel) to the OFF.

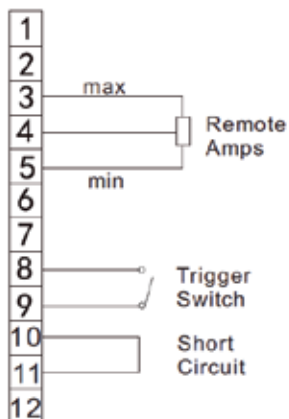
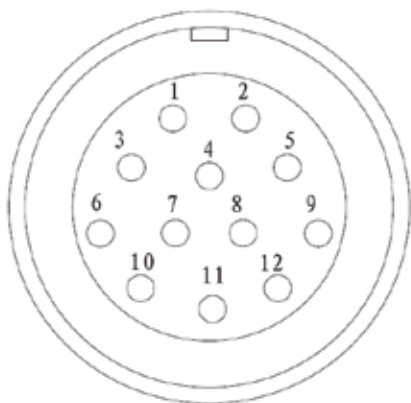
### **3.4.3 Remote current control**

TIG series of welding machines can accept remote current control from a potentiometer/ analogue signal or a digital up/down button signal. Potentiometer remote control will change the current from the 5A minimum to the maximum set using the machine current control .Using an up/ down button remote signal, the current may be increased or decreased in 1A increments, or ‘scrolls’ up to 30A at a time if the button is held down. This is very useful for precision work.

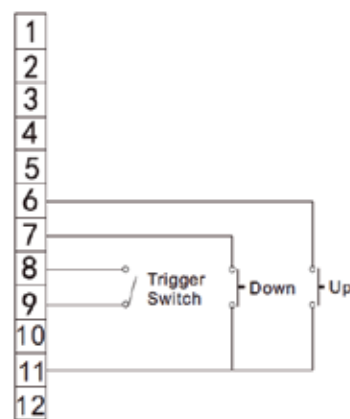


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## 12 Pin Remote Plug Connection



Potentiometer

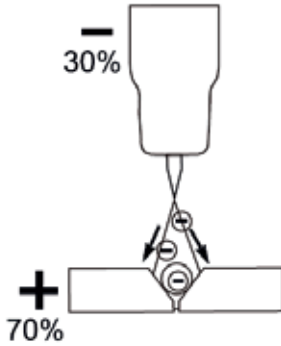


Up/down

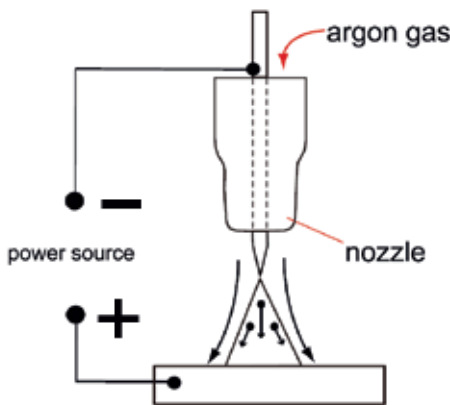
Socket Pin	Function	
	Potentiometer	Up/down
1	Not connected	Not connected
2	Not connected	Not connected
3	10k ohm (maximum) connection to 10k ohm remote control potentiometer	Not connected
4	Wiper arm connection to 10k ohm remote control potentiometer	Not connected
5	Zero ohm (minimum) connection to 10k ohm remote control potentiometer	Not connected
6	Not connected	The button of "UP" input
7	Not connected	The button of "DOWN" input
8	Trigger Switch Input	Trigger Switch Input
9	Trigger Switch Input	Trigger Switch Input
10	Be shorted with 11	Not connected
11	Be shorted with 10	The button of "UP"& "DOWN" input
12	Not connected	Not connected

## 3.4.4 Tig Welding Techniques

### DC TIG Welding



The DC power source uses what is known as DC (direct current) in which the main electrical component known as electrons flowing only one direction from the negative pole (terminal) to the positive pole (terminal). In the DC electrical circuit there is an electrical principle at work which should always be taken into account when using any DC circuit. With a DC circuit 70% of the energy (heat) is always on the positive side. This needs to be understood because it determines what terminal the TIG torch will be connected to (this rule applies to all other forms of DC welding as well).

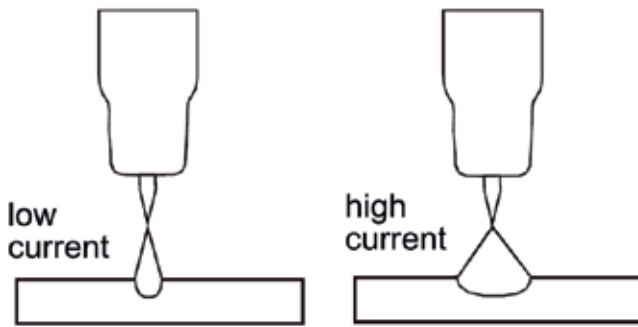


DC TIG welding is a process in which an arc is struck between a TUNGSTEN electrode and the metal work piece. The weld area is shielded by an inert gas flow to prevent contamination of the tungsten, molten pool and weld area. When the TIG arc is struck the inert gas is ionized and superheated changing its molecular structure which converts

it into a plasma stream. This plasma stream flowing between the tungsten and the work piece is the TIG arc and can be as hot as 19,000°C. It is a very pure and concentrated arc which provides the controlled melting of most metals into a weld pool. TIG welding offers the user the greatest amount of flexibility to weld the widest range of material and thickness and types. DC TIG welding is also the cleanest weld with no sparks or spatter.



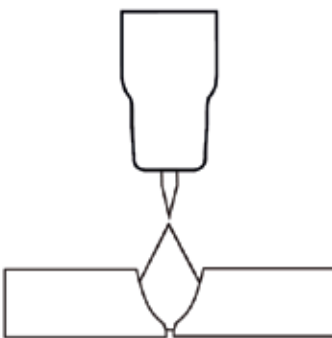
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The intensity of the arc is proportional to the current that flows from the tungsten. The welder regulates the welding current to adjust the power of the arc. Typically thin material requires a less powerful arc with less heat to melt the material so less current (amps) is

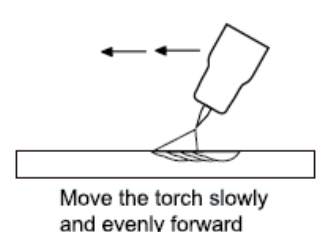
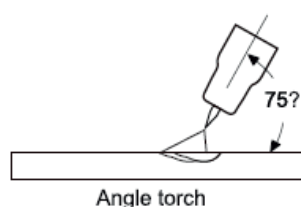
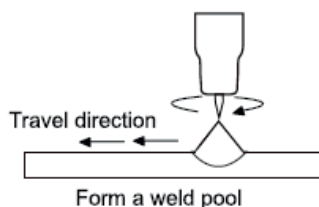
required, thicker material requires a more powerful arc with more heat so more current (amps) are necessary to melt the material.

### TIG Welding Fusion Technique

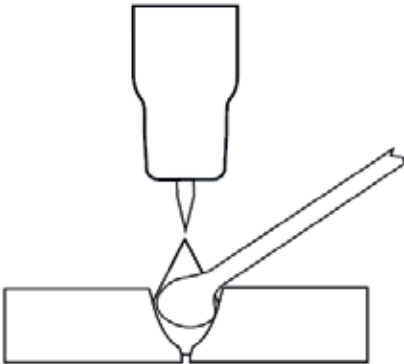


Manual TIG welding is often considered the most difficult of all the welding processes. Because the welder must maintain a short arc length, great care and skill are required to prevent contact between the electrode and the work piece. Similar to Oxygen Acetylene torch welding, Tig welding normally requires two hands and in most instances requires the welder to manually feed a filler wire into the

weld pool with one hand while manipulating the welding torch in the other. However, some welds combining thin materials can be accomplished without filler metal like edge, corner, and butt joints. This is known as Fusion welding where the edges of the metal pieces are melted together using only the heat and arc force generated by the TIG arc. Once the arc is started the torch tungsten is held in place until a weld pool is created, a circular movement of the tungsten will assist in creating a weld pool of the desired size. Once the weld pool is established tilt the torch at about a 75° angle and move smoothly and evenly along the joint while fusing the materials together.

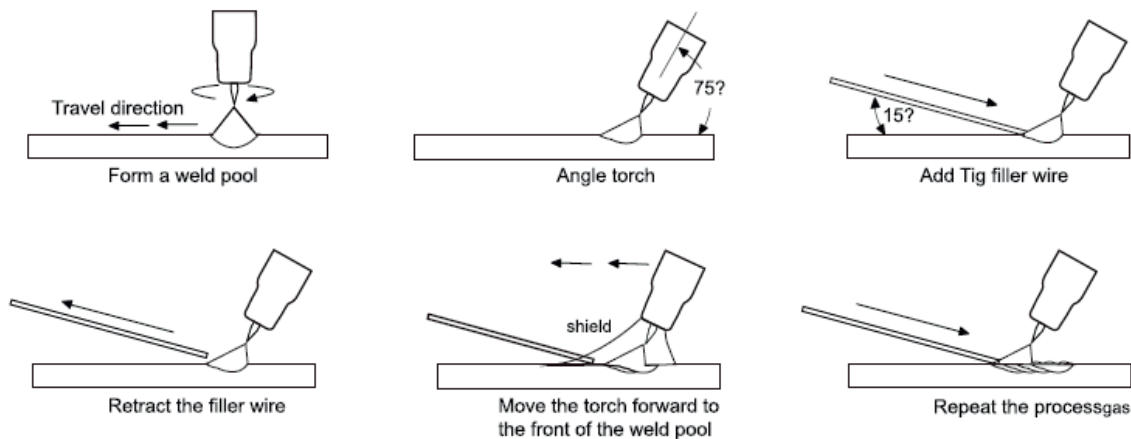


## TIG Welding with Filler Wire Technique



It is necessary in many situations with TIG welding to add a filler wire into the weld pool to build up weld reinforcement and create a strong weld. Once the arc is started the torch tungsten is held in place until a weld pool is created, a circular movement of the tungsten will assist in creating a weld pool of the desired size. Once the weld pool is established tilt the torch at about a 75° angle and move smoothly and evenly along the joint.

The filler metal is introduced to the leading edge of the weld pool. The filler wire is usually held at about a 15° angle and fed into the leading edge of the molten pool, the arc will melt the filler wire into the weld pool as the torch is moved forward. Also a dabbing technique can be used to control the amount of filler wire added, the wire is fed into the molten pool and retracted in a repeating sequence as the torch is moved slowly and evenly forward. It is important during the welding to keep the molten end of the filler wire inside the gas shield as this protects the end of the wire from being oxidised and contaminating the weld pool.



### 3.4.5 Electrodes

#### Tungsten Electrodes

Tungsten is a rare metallic element used for manufacturing TIG welding electrodes. The TIG process relies on tungsten's hardness and high-temperature resistance to carry the welding current to the arc. Tungsten has the highest melting point of any metal, 3,410 degrees Celsius. Tungsten electrodes are non-consumable and come in a variety of sizes, they are made from pure tungsten or an alloy of tungsten and other rare earth elements. Choosing the correct tungsten depends on the





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material being welded, amps required and whether you are using AC or DC welding current. Tungsten electrodes are colour-coded at the end for easy identification.

### Thoriated

Thoriated tungsten electrodes (AWS classification EWTh-2) contain a minimum of 97.30 percent tungsten and 1.70 to 2.20 percent thorium and are called 2 percent thoriated. They are the most commonly used electrodes today and are preferred for their longevity and ease of use.

Thorium increases the electron emission qualities of the electrode, which improves arc starts and allows for a higher current-carrying capacity. This electrode operates far below its melting temperature, which results in a considerably lower rate of consumption and eliminates arc wandering. Compared with other electrodes, thoriated electrodes deposit less tungsten into the weld puddle, so they cause less weld contamination.

Thorium is a low-level radioactive hazard and many users have switched to other alternatives. Thorium is an alpha emitter but when enclosed in a tungsten matrix, the risks are negligible. Thus holding a stick of Thoriated tungsten in your hand should not pose a great threat unless a welder has open cuts on their skin. Thoriated tungsten should not get in contact with open cuts or wounds. The more significant danger to welders can occur when thorium oxide gets into the lungs. This can happen from the exposure to vapours during welding or from ingestion of material/ dust in the grinding of the tungsten. Follow the manufacturer's warnings, instructions, and the Safety Data Sheet (SDS) for its use.

### E3 (Color Code: Purple)

E3 tungsten electrodes (AWS classification EWG) contain a minimum of 98% percent tungsten and up to 1.5 percent Lanthanum and small percentages of Zirconium and Yttrium they are called E3 Tungsten. E3 Tungsten Electrodes provide conductivity similar to that of thoriated electrodes. Typically, this means that E3 Tungsten Electrodes are exchangeable with thoriated electrodes without requiring significant welding process changes. E3 deliver superior arc starting, electrode lifetime, and overall cost-effectiveness. When E3 Tungsten Electrodes are compared with 2% thoriated tungsten, E3 requires fewer re-grinds and provides a longer overall lifetime. Tests have shown that ignition delay with E3 Tungsten Electrodes actually improves over time, while 2% thoriated tungsten starts to deteriorate after only 25 starts. At equivalent energy output, E3 Tungsten Electrodes run cooler than 2% thoriated tungsten, thereby extending overall tip lifetime.



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E3 Tungsten Electrodes work well on AC or DC. They can be used DC electrode positive or negative with a pointed end, or balled for use with AC power sources.

**Ceriated** (Color Code: Orange) 

Ceriated tungsten electrodes (AWS classification EWCe-2) contain a minimum of 97.30 percent tungsten and 1.80 to 2.20 percent cerium and are referred to as 2 percent ceriated. Ceriated tungstens perform best in DC welding at low current settings. They have excellent arc starts at low amperages and become popular in such applications as orbital tube welding, thin sheet metal work. They are best used to weld carbon steel, stainless steel, nickel alloys, and titanium, and in some cases it can replace 2 percent thoriated electrodes. Ceriated tungsten is best suited for lower amperages it should last longer than Thoriated tungsten higher amperage applications are best left to Thoriated or Lanthanated tungsten.

**Lanthanated** (Color Code: Gold) 

Lanthanated tungsten electrodes (AWS classification EWL a-1.5) contain a minimum of 97.80 percent tungsten and 1.30 percent to 1.70 percent lanthanum, and are known as 1.5 percent lanthanated. These electrodes have excellent arc starting, a low burn off rate, good arc stability, and excellent re-ignition characteristics. Lanthanated tungstens also share the conductivity characteristics of 2 percent thoriated tungsten. Lanthanated tungsten electrodes are ideal if you want to opti-mise your welding capabilities. They work well on AC or DC electrode negative with a pointed end, or they can be balled for use with AC sine wave power sources. Lanthanated tungsten maintains a sharpened point well, which is an advantage for welding steel and stainless steel on DC or AC from square wave power sources.

**Zirconiated** (Color Code: White) 

Zirconiated tungsten electrodes (AWS classification EWZr-1) contain a minimum of 99.10 percent tungsten and 0.15 to 0.40 percent zirconium. Most commonly used for AC welding Zirconiated tungsten produces a very stable arc and is resistant to tungsten spitting. It is ideal for AC welding because it retains a balled tip and has a high resistance to contamination. Its current-carrying capacity is equal to or greater than that of thoriated tungsten. Zirconiated tungsten is not recommended for DC welding.



## Tungsten Electrodes Rating for Welding Currents

Tungsten Diameter mm	DC Current Amps Torch Negative 2% Thoriated	AC Current Amps Un-Balanced Wave 0.8% Zirconiated	AC Current Amps Balanced Wave 0.8% Zirconiated
1.0mm	15-80	15-80	20-60
1.6mm	70-150	70-150	60-120
2.4mm	150-250	140-235	100-180
3.2mm	250-400	225-325	160-250
4.0mm	400-500	300-400	200-320

## Tungsten Preparation

Always use **DIAMOND** wheels when grinding and cutting. While tungsten is a very hard material, the surface of a diamond wheel is harder, and this makes for smooth grinding. Grinding without diamond wheels, such as aluminium oxide wheels, can lead to jagged edges, imperfections, or poor surface finishes not visible to the eye that will contribute to weld inconsistency and weld defects.

Always ensure to grind the tungsten in a longitudinal direction on the grinding wheel. Tungsten electrodes are manufactured with the molecular structure of the grain running lengthwise and thus grinding crosswise is “grinding against the grain.” If electrodes are ground crosswise, the electrons have to jump across the grinding marks and the arc can start before the tip and wander. Grinding longitudinally with the grain, the electrons flow steadily and easily to the end of the tungsten tip. The arc starts straight and remains narrow, concentrated, and stable.



## Electrode Tip/Flat

The shape of the tungsten electrode tip is an important process variable in precision arc welding. A good selection of tip/flat size will balance the need for several advantages. The bigger the flat, the more likely arc wander will occur and the more difficult it will be to arc start. However, increasing the flat to the maximum level that still allows arc start and eliminates arc wander will improve the weld penetration and increase the electrode life. Some welders still grind electrodes to a sharp point, which makes arc starting easier. However, they risk decreased welding performance from melting at the tip and the possibility of the point falling off into the weld pool.



## Electrode Included Angle/Taper

DC Welding Tungsten electrodes for DC welding should be ground longitudinally and concentrically with diamond wheels to a specific included angle in conjunction with the tip/flat preparation. Different angles produce different arc shapes and offer different weld penetration capabilities. In general, blunter electrodes that have a larger included angle provide the following benefits:

- Last Longer
- Have better weld penetration
- Have a narrower arc shape
- Can handle more amperage without eroding.

Sharper electrodes with smaller included angle provide:

- Offer less arc weld
- Have a wider arc
- Have a more consistent arc

The included angle determines weld bead shape and size. Generally, as the included angle increases, penetration increases and bead width decreases.





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### Tungsten Electrode Preparation

Tungsten Diameter	Diameter at the Tip - mm	Constant Included Angle - Degrees	Current Range Amps	Current Range Pulsed Amps
1.0mm	.250	20	05 - 30	05 - 60
1.6mm	.500	25	08 - 50	05 - 100
1.6mm	.800	30	10 - 70	10 - 140
2.4mm	.800	35	12 - 90	12 - 180
2.4mm	1.100	45	15 - 150	15 - 250
3.2mm	1.100	60	20 - 200	20 - 300
3.2mm	1.500	90	25 - 250	25 - 350

### 3.4.6 TIG Welding trouble shooting

The following chart addresses some of the common problems of TIG welding. In all cases of equipment malfunction, the manufacturer's recommendations should be strictly adhered to and followed.

NO.	Problem	Possible Reason	Suggested Remedy
1	<b>Tungsten burning away quickly</b>	Incorrect Gas or No Gas	Use pure Argon. Check cylinder has gas, connected, turned on and torch valve is open
		Inadequate gas flow	Check the gas is connected, check hoses, gas valve and torch are not restricted.
		Back cap not fitted correctly	Make sure the torch back cap is fitted so that the o-ring is inside the torch body
		Torch connected to DC +	Connect the torch to the DC- output terminal
		Incorrect tungsten being used	Check and change the tungsten type if necessary
		Tungsten being oxidised after weld is finished	Keep shielding gas flowing 10–15 seconds after arc stoppage. 1 second for each 10amps of weld current.
		Tungsten melting back into the nozzle on AC welding	Check that correct type of tungsten is being used. Check the balance control is not set too high on the balance-reduce to lower setting



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2	<b>Contaminated tungsten</b>	Touching tungsten into the weld pool	Keep tungsten from contacting weld puddle. Raise the torch so that the tungsten is off of the work piece 2 - 5mm
		Touching the filler wire to the tungsten	Keep the filler wire from touching the tungsten during welding, feed the filler wire into the leading edge of the weld pool in front of the tungsten
		Tungsten melting into the weld pool	Check that correct type of tungsten is being used. Too much current for the tungsten size so reduce the amps or change to a larger tungsten
3	<b>Porosity - poor weld appearance and colour</b>	Wrong gas / poor gas flow /gas leak	Use pure argon. Gas is connected, check hoses, gas valve and torch are not restricted. Set the gas flow between 6-12 l/min. Check hoses and fittings for holes, leaks et
		Contaminated base metal	Remove moisture and materials like paint, grease, oil, and dirt from base metal
		Contaminated filler wire	Remove all grease, oil, or moisture from filler metal
		Incorrect filler wire	Check the filler wire and change if necessary
4	<b>Yellowish residue / smoke on the alumina nozzle &amp; discoloured tungsten</b>	Incorrect Gas	Use pure Argon gas
		Inadequate gas flow	Set the gas flow between 10 - 15 l/min flow rate
		Inadequate post flow gas	Increase the post flow gas time
		Alumina gas nozzle too small	Increase the size of the alumina gas nozzle
5	<b>Unstable Arc during welding</b>	Torch connected to DC +	Connect the torch to the DC- output terminal
		Contaminated base metal	Remove materials like paint, grease, oil, and dirt, including mill scale from base metal.
		Tungsten is contaminated	Remove 10mm of contaminated tungsten and re grind the tungsten
		Arc length too long	Lower torch so that the tungsten is off of the work piece 2 - 5mm
6	<b>HF present but no welding power</b>	Incomplete welding circuit	Check earth lead is connected. Check all cable connections. If using a water cooled torch check that the power cable is separated.



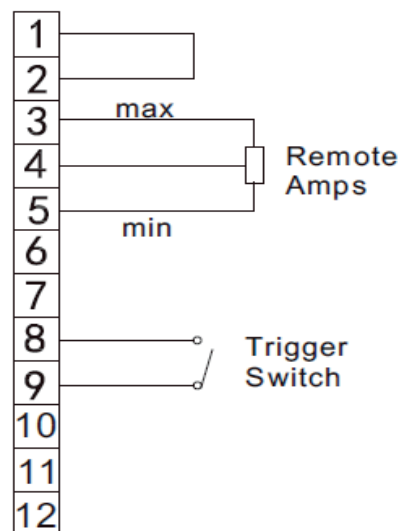
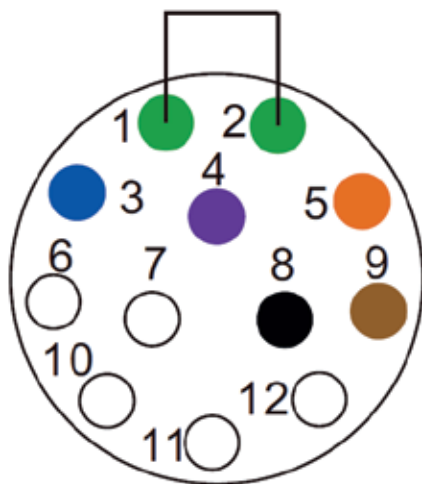
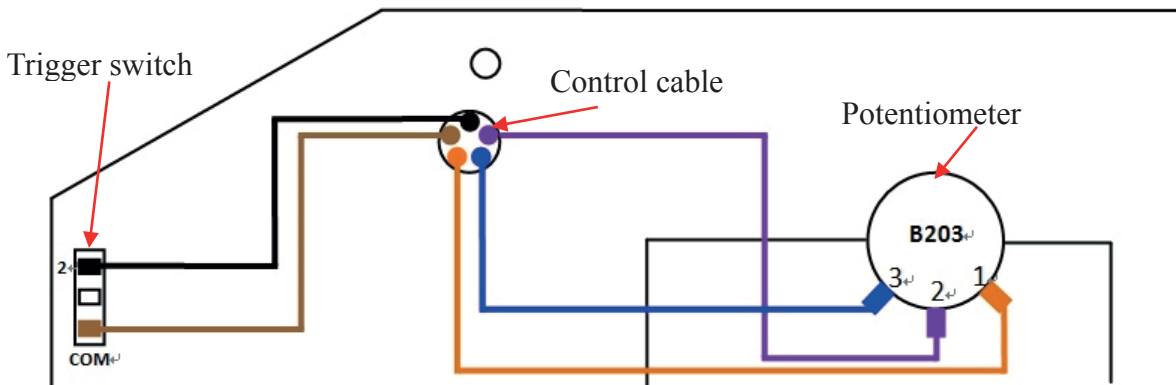
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6	<b>HF present but no welding power</b>	No gas	Check the gas is connected and cylinder valve open, check hoses, gas valve and torch are not restricted Set the gas flow between 10 - 15 l/min
		Tungsten melting into the weld pool	Check that correct type of tungsten is being used. Too much current for the tungsten size so reduce the amps or change to a larger tungsten
7	<b>Arc wanders during welding</b>	Poor gas flow	Check and set the gas flow between 10 - 15 l/min flow rate
		Incorrect arc length	Lower torch so that the tungsten is off of the work piece 2 - 5mm
		Tungsten incorrect or in poor condition	Check that correct type of tungsten is being used. Remove 10mm from the weld end of the tungsten and re sharpen the tungsten
		Poorly prepared tungsten	Grind marks should run lengthwise with tungsten, not circular. Use proper grinding method and wheel.
		Contaminated base metal or filler wire	Remove contaminating materials like paint, grease, oil, and dirt, including mill scale from base metal. Remove all grease, oil, or moisture from filler metal
		Incorrect filler wire	Check the filler wire and change if necessary
8	<b>Arc difficult to start or will not start welding</b>	Incorrect machine set up	Check machine set up is correct
		No gas, incorrect gas flow	Check the gas is connected and cylinder valve open, check hoses, gas valve and torch are not restricted. Set the gas flow between 10 - 15 l/min flow rate
		Incorrect tungsten size or type	Check and change the size and or the tungsten if required
		Tungsten is contaminated	Remove 10mm of contaminated tungsten and regrind the tungsten
		Loose connection	Check all connectors and tighten
		Earth clamp not connected to work	Connect the earth clamp directly to the work piece wherever possible
		Loss of high frequency	Check torch and cables for cracked insulation or bad connections.



## 3.5 Wire foot pedal Configuration

- When plug the twelve-lead aero-socket of pedal switch in it. Welder will identify the pedal switch, the welding current knob on the front panel will can't use, and only 2T can be selected.
- When use the adjustment knob of max-welding current beside the pedal, can set the max-current you want.



Remote Control Socket

Socket Pin	Function
1	Be shorted with 2
2	Be shorted with 1
3	20k ohm (maximum) connection to 20k ohm remote control potentiometer
4	Wiper arm connection to 20k ohm remote control potentiometer
5	Zero ohm (minimum) connection to 20k ohm remote control potentiometer



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6	Not connected
7	Not connected
8	Trigger Switch Input
9	Trigger Switch Input
10	Not connected
11	Not connected
12	Not connected

### 3.6 Operation environment

- ▲ Height above sea level  $\leq 1000$  M
- ▲ Operation temperature range  $-10 \sim +40^{\circ}\text{C}$
- ▲ Air relative humidity is below 90 % (  $20^{\circ}\text{C}$  )
- ▲ Preferable site the machine some angles above the floor level, the maximum angle does not exceed 15 .
- ▲ Protect the machine against heavy rain AND against direct sunshine.
- ▲ The content of dust, acid, corrosive gas in the surrounding air or substance cannot exceed normal standard.
- ▲ Take care that there is sufficient ventilation during welding. There must be at least 30cm free distance between the machine and wall.

### 3.7 Operation Notices

- ▲ Read Section §1 carefully before starting to use this equipment.
- ▲ Connect the ground wire with the machine directly.
- ▲ Ensure that the input is single-phase: 50/60Hz, 220V  $\pm 10\%$ .
- ▲ Before operation, none concerned people should not be around the working area and especially children. Do not watch the arc in unprotected eyes.
- ▲ Ensure good ventilation of the machine to improve Duty Cycle.
- ▲ Turn off the engine when the operation finished for energy consumption efficiency.
- ▲ When power switch shuts off protectively because of failure. Don't restart it until problem is resolved. Otherwise, the range of problem will be extended.
- ▲ In case of problems, contact your local dealer if no authorized maintenance staff is available!



## 4 Maintenance & Troubleshooting

### 4.1 Maintenance

In order to guarantee safe and proper operation of welding machines, they must be maintained regularly. Let customers understand the maintenance procedure of welding machines. Enable customers to carry on simple examination and inspections. Do your best to reduce the fault rate and repair times of welding machines to lengthen service life of arc welding machine. Maintenance items in detail are in the following table.

- **Warning: For safety while maintaining the machine, please shut off the main input power and wait for 5 minutes, until capacitors voltage already drop to safe voltage 36V!**

Date	Maintenance items
Daily	<p>Observe that the knobs and switches in the front and at the back of arc welding machine are flexible and put correctly in place. If any knob has not been put correctly in place, please correct. If you can't correct or fix the knob, please replace immediately;</p> <p>If any switch is not flexible or it can't be put correctly in place, please replace immediately! Please get in touch with maintenance service department if there are no accessories.</p> <p>After turn-on power, watch/listen if the arc-welding machine has shaking, whistle calling or peculiar smell. If there is one of the above problems, find out the reason and clear it. If you can't find out the reason, please contact your local service repair station or distributor/Agent.</p> <p>Observe that the display value of LED is intact. If the display number is not intact, please replace the damaged LED. If it still doesn't work, please maintain or replace the display PCB.</p> <p>Observe that the min./max. Values on LED agree with the set value. If there is any difference and it has affected the normal welding results, please adjust it.</p> <p>Check whether the fan is damaged and whether it is normal to rotate or control. If the fan is damaged, please change immediately. If the fan does not rotate after the machine is overheated, observe if there is something blocking the blade. If it is blocked, please clear the problem. If the fan does not rotate after getting rid of the above problems, you can poke the blade by the rotation direction of fan. If the fan rotates normally, the start capacity should be replaced. If not, change the fan.</p> <p>Observe whether the fast connector is loose or overheated. If the arc-welding machine has the above problems, it should be fastened or changed.</p> <p>Observe whether the current output cable is damaged. If it is damaged, it should be insulated or changed.</p>



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Monthly	<p>Using the dry compressed air to clear the inside of arc welding machine. Especially for clearing up the dusts on radiator, main voltage transformer, inductors, IGBT modules, fast recover diodes, PCB's, etc.</p> <p>Check the screws and bolts in the machine. If any is loose, please screw it tight. If it is shaved, please replace. If it is rusty, please erase rust on all bolts to ensure it works well.</p>
Quarter-yearly	<p>Check whether the actual current accords with the displaying value. If they did not accord, they should be regulated. The actual welding current value can be measured by and adjusted by plier-type ampere meter.</p>
Yearly	<p>Measure the insulating impedance among the main circuit, PCB and case, if it below <math>1M\Omega</math>, insulation is thought to be damaged and need to change, and need to change or strengthen insulation.</p>

### 4.2 Troubleshooting

- Before the welding machines are dispatched from the factory, they have already been tested and calibrated accurately. **It is forbidden for anyone who is not authorized by our company to do any change to the equipment!**
- Maintenance course must be operated carefully. If any wire becomes flexible or is misplaced, it maybe potential danger to user!
- Only professional maintenance staff that is authorized by our company could overhaul the machine!
- **Be sure to shut off the Main Input Power before doing any repair work on the welding machine!**
- If there is any problem and there is no authorized professional maintenance personal on site, please contact local agent or the distributor!

If there are some simple troubleshooting needed with the welding machine, you can consult the following Chart:

S/N	Problem	Reasons	Solution
1	Turn on the power source, and the power lamp is on, but fan doesn't work	There is something in the fan	Clear out
		The start capacitor of fan damaged	Change capacitor
		The fan motor damaged	Change fan



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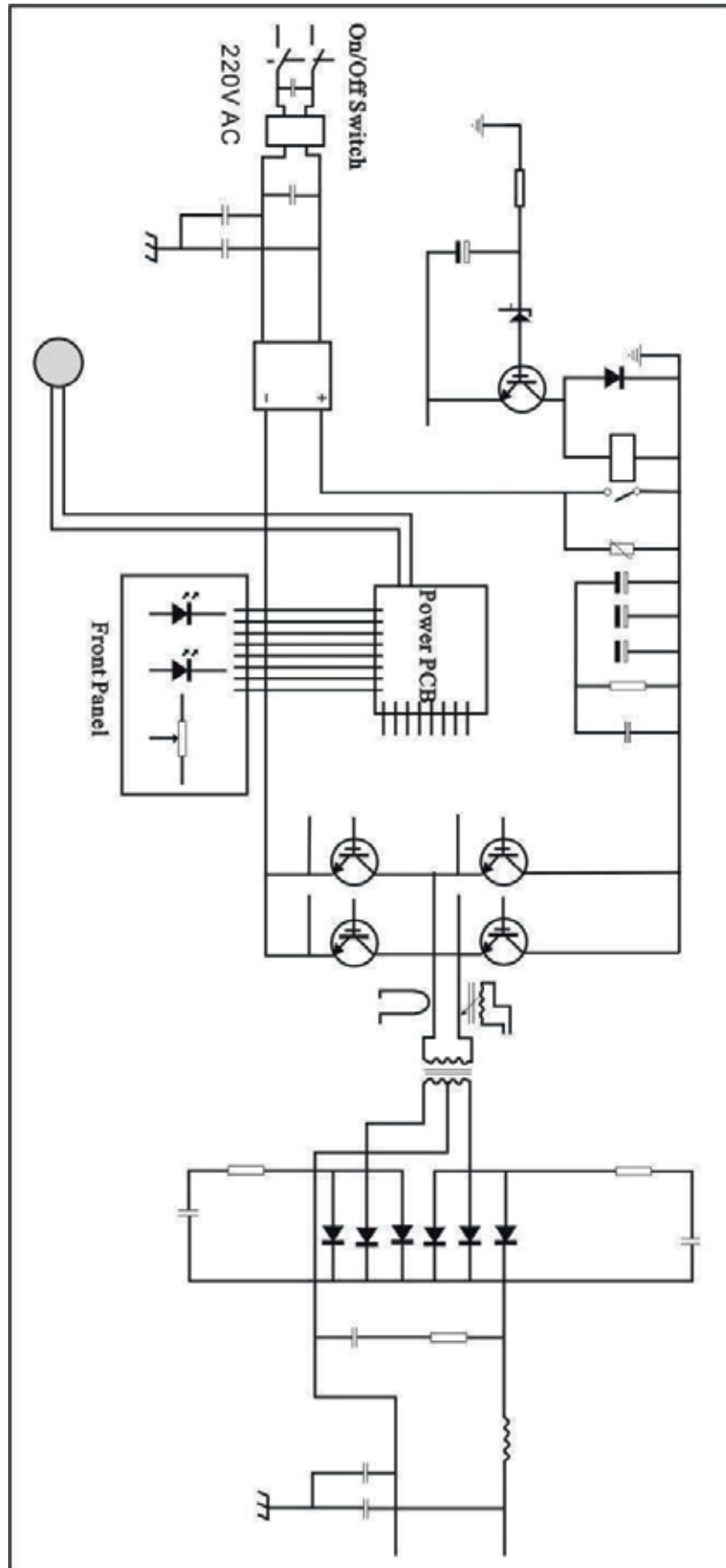
S/N	Problem		Reasons	Solution
2	The number on the display is not intact.		The LED in the display is broken	Change the LED
3	The max and min value displayed doesn't accord with the set value.		The max value is not accordant	Adjust potentiometer I <sub>max</sub> on the control board.
			The min value is not accordant	Adjust potentiometer I <sub>min</sub> the current meter.
4	No no-load voltage output		The machine is damaged	Check the main circuit and the Pr4.
5	Arc can not be ignited (TIG)	There is spark on the HF igniting board.	The welding cable is not connected with the two output of the welder.	Connect the welding cable to the welder's output.
			The welding cable damaged.	Repair or change it.
			The earth cable connected unstably.	Check the earth cable.
			The welding cable is too long.	Use an appropriate welding cable.
			There is oil or dust on the workpiece.	Check and remove it.
			The distance between tungsten electrode and workpiece is too long.	Reduce the distance (about 3mm).
	There is not spark on the HF igniting board.	The HF igniting board does not work.	Repair or change Pr8	
		The distance between the discharger is too short.	Adjust this distance (about 0.7mm).	
The malfunction of the welding gun switch.		Check the welding gun switch, control cable and aero socket.		
6	No gas flow (TIG)		Gas cylinder is close or gas pressure is low	Open or change the gas cylinder
			Something in the valve	Remove it
			Electromagnetic valve is damaged	Change it
7	Gas always flows		The gas-test on the front panel is on	The gas-test on the front panel is off
			Something in the valve	Remove it
			Electromagnetic valve is damaged	Change it
			The adjustment knob of pre-gas time on the front panel is damaged	Repair or change it
8	The welding current can not be adjusted		The welding current potentiometer on the front panel connection is not good or damaged	Repair or change the potentiometer
9	The welding current displayed isn't accordant with the actual value.		The min value displayed isn't accordant with the actual value.	Adjust potentiometer I <sub>min</sub> on the power board.
			The max value displayed isn't accordant with the actual value.	Adjust potentiometer I <sub>max</sub> on the power board.
10	The penetration of molten pool is not enough.		The welding current is adjusted too low	Increase the welding current
11	The alarm lamp on the front panel is on		Over heat protection	Two much welding current
				Working time too long



## 4.3 List of error codes

Error Type	Error code	Description	Lamp status
Thermal relay	E01	Over-heating(1st thermal relay)	Yellow lamp(thermal protection) always on
	E02	Over-heating(2nd thermal relay)	Yellow lamp(thermal protection) always on
	E03	Over-heating(3rd thermal relay)	Yellow lamp(thermal protection) always on
	E04	Over-heating(4th thermal relay)	Yellow lamp(thermal protection) always on
	E09	Over-heating(Program in default)	Yellow lamp(thermal protection) always on
Welding machine	E10	Phase loss	Yellow lamp(thermal protection) always on
	E11	No water	Yellow lamp(lack water) always on
	E12	No gas	Red lamp always on
	E13	Under voltage	Yellow lamp(thermal protection) always on
	E14	Over voltage	Yellow lamp(thermal protection) always on
	E15	Over current	Yellow lamp(thermal protection) always on
	E16	Wire feeder over load	
Switch	E20	Button fault on operating panel when switch on the machine	Yellow lamp(thermal protection) always on
	E21	Other faults on operating panel when switch on the machine	Yellow lamp(thermal protection) always on
	E22	Torch fault when switch on the machine	Yellow lamp(thermal protection) always on
	E23	Torch fault during normal working process	Yellow lamp(thermal protection) always on
Accessory	E30	Cutting torch disconnection	Red lamp blink
	E31	Water cooler disconnection	Yellow lamp(lack water) always on
Communication	E40	Connection problem between wire feeder and power source	
	E41	Communication error	

## 4.4 Electrical schematic drawing







## Safety

### Store and Retain this Manual

Retain this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number into the NOTES section at the rear, and keep this manual and the receipt in a safe and dry place for future reference.

### Important Safety Information

Failure to follow the warnings and instructions may result in electric shock, fire, serious injury and/or death. Save all warnings and instructions for future reference.



**This is the safety alert symbol to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.**



**DANGER!** indicates a hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING!** indicates a hazardous situation which, if not avoided, could result in death or serious injury.



**CAUTION,** used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

**NOTE,** used to address practices not related to personal injury.

### General Safety Warnings

**1. Maintain labels and nameplates on the welder.** These carry important information. If unreadable or missing, contact Euroquip for a replacement.

**2. Avoid unintentional starting.** Make sure the welder is setup correctly and you are prepared to begin work before turning on the welder.

**3. Unplug before performing maintenance.** Always unplug the welder from its electrical outlet before performing any inspection, maintenance, or cleaning procedures.

**4. Never leave the welder unattended while energised.**  
Turn power off before leaving the welder unattended.

**5. Do not touch live electrical parts.** Wear dry, insulating gloves. Do not touch the electrode or the conductor tong with bare hands. Do not wear wet or damaged gloves.

**6. Protect yourself from electric shock.** Do not use the welder outdoors. Insulate yourself from the work piece and the ground. Use non-flammable, dry insulating material if possible, or use dry rubber mats, dry wood or plywood, or other dry insulating material large enough to cover the area of contact with the work or the ground.

**7. Avoid inhaling dust.** Some dust created by power sanding, sawing, grinding, drilling, cutting, welding and other construction activities, contain chemicals known to cause cancer, birth defects or other harm. Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals, work in a well-ventilated area, and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles.

**8. People with pacemakers should consult their physician(s) before using this machine.**



**WARNING!**

Electromagnetic fields in close proximity to a heart pacemaker could cause interference, or failure of the pacemaker. The use of a Welder is **NOT RECOMMENDED** for pacemaker wearers. Consult your doctor.

**9. Ensure that the unit is placed on a stable location before use.**



**WARNING!**

If this unit falls while plugged in, severe injury, electric shock, or fire may result.

**10. Transportation Methods** Lift unit with the handles provided, or use a handcart or similar device of adequate capacity. If using a fork lift vehicle, secure the unit to a skid before transporting.



**CAUTION!**

Disconnect input power conductors from energized supply line before moving the welding power source.

**11. Exercise good work practices.** The warnings, precautions, and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be considered by the operator.



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### Welding Safety Instructions & Warnings



#### WARNING!

Protect yourself and others from possible serious injury or death. Keep children away. Read the operating/Instruction manual before installing, operating or servicing this equipment. Have all installation, operation, maintenance, and repair work performed by qualified people.

If an operator does not strictly observe all safety rules and take precautionary actions, welding products and welding processes can cause serious injury or death, or damage to other equipment or property. Safe practices have developed from past experience in the use of welding and cutting.

These practices must be learned through study and training before using this equipment. Some of these practices apply to equipment connected to power lines; other practices apply to engine driven equipment. Anyone not having extensive training in welding and cutting practices should not attempt to weld.

Safe practices are outlined in the European Standard EN60974-1 entitled: Safety in welding and allied processes.



#### WARNING!

Only use safety equipment that has been approved by an appropriate standards agency. Unapproved safety equipment may not provide adequate protection. Eye and breathing protection must be AS/NZS compliant for the specific hazards in the work area.



#### DANGER!

Always wear AS/NZS compliant safety glasses and full face shield fitted with appropriate filter shade number (Refer Filter Table on page 17.)



#### CAUTION!

Heavy-duty work gloves, non-skid safety shoes and hearing protection used for appropriate conditions will reduce personal injuries.



#### CAUTION!

Have the equipment serviced by a qualified repair person using identical replacement parts. This will ensure that the safety of the power tool is maintained.

### Personal Safety



#### CAUTION!

Keep the work area well lit. Make sure there is adequate space surrounding the work area. Always keep the work area free of obstructions, grease, oil,

trash, and other debris. Do not use equipment in areas near flammable chemicals, dust, and vapours. Do not use this product in a damp or wet location.

1. **Stay alert**, watch what you are doing and use common sense when operating equipment. Do not use a tool while you are tired or under the influence of drugs, alcohol or medication. A moment of distraction when operating equipment may result in serious personal injury.
2. **Do not over-reach**. Keep proper footing and balance at all times. This enables better control of the power tool in unexpected situations.

### Arc Rays can Burn Eyes and Skin



#### DANGER!

Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin.

1. **Use a Welding Helmet or Welding Face Shield fitted with a proper shade filter** (refer AS 60974-1, AS/NZS 1337.1 and AS/NZS 1338.1 Safety Standards) to protect your face and eyes when welding or watching. (See Filter Table on Page 20)
2. Wear approved safety glasses. Side shields are recommended.
3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
4. Wear protective clothing made from durable, flame resistant material (wool and leather) and foot safety protection
5. Never wear contact lenses while welding

### Noise Can Damage Hearing



#### CAUTION!

Noise from some processes can damage hearing. Use AS/NZS compliant ear plugs or ear muffs if the noise level is high.

### Work Environment Safety



#### DANGER!

Remove any combustible material from the work area.



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1. When possible, move the work to a location well away from combustible materials. If relocation is not possible, protect the combustibles with a cover made of fire resistant material.
  2. Remove or make safe all combustible materials for a radius of 10 metres around the work area. Use a fire resistant material to cover or block all doorways, windows, cracks, and other openings.
  3. Enclose the work area with portable fire resistant screens. Protect combustible walls, ceilings, floors, etc., from sparks and heat with fire resistant covers.
  4. If working on a metal wall, ceiling, etc., prevent ignition of combustibles on the other side by moving the combustibles to a safe location. If relocation of combustibles is not possible, designate someone to serve as a fire watch, equipped with a fire extinguisher, during the welding process and well after the welding is completed.
  5. Do not weld or cut on materials having a combustible coating or combustible internal structure, as in walls or ceilings, without an approved method for eliminating the hazard.
  6. After welding, make a thorough examination for evidence of fire. Be aware that visible smoke or flame may not be present for some time after the fire has started. Do not weld or cut in atmospheres containing dangerously reactive or flammable gases, vapours, liquids, and dust. Provide adequate ventilation in work areas to prevent accumulation of flammable gases, vapours, and dust.
  7. Do not apply heat to a container that has held an unknown substance or a combustible material whose contents, when heated, can produce flammable or explosive vapours. Clean and purge containers before applying heat. Vent closed containers, including castings, before preheating, welding, or cutting.
- wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.
1. Do not touch live electrical parts.
  2. Wear dry, hole-free insulating gloves and body protection.
  3. Insulate yourself from the work and the ground using dry insulating mats or covers.
  4. Disconnect input power before installing or servicing this equipment. Lock input power, disconnect switch open, or remove line fuses so power cannot be turned on accidentally.
  5. Properly install and ground this equipment according to national, state, and local codes.
  6. Turn off all equipment when not in use. Disconnect power to equipment if it will be left unattended or out of service.
  7. Use fully insulated electrode holders. Never dip the holder in water to cool it or lay it down on the ground or the work surface. Do not touch holders connected to two welding machines at the same time or touch other people with the holder or electrode.
  8. Do not use worn, damaged, undersized, or poorly spliced cables.
  9. Do not wrap cables around your body.
  10. Connect work piece to a good electrical ground.
  11. Do not touch the electrode while in contact with the work (ground) circuit.
  12. Use only well-maintained equipment. Repair or replace damaged parts as soon as practical.
  13. In confined spaces or damp locations, do not use a welder with AC output unless equipped with a voltage reducer.

### Electricity Can Kill



#### **DANGER!**

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on.

The input power circuit and machine internal circuits are also live when power is on. In semi-automatic or automatic

Arc rays from the welding process produce intense heat and strong ultraviolet rays that can burn eyes and skin. Use the following table to select the appropriate shade number for a Welding Helmet or Welding Face Shield.



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Recommended Protective Filters for Electric Welding		
Description of Process	Approximate Range of Welding Current in Amps	Minimum Shade Number of Filter(s)
Manual Metal Arc Welding - Covered Electrodes (MMA)	Less than or equal to 100	8
	100 to 200	10
	200 to 300	11
	300 to 400	12
	Greater than 400	13
Gas Metal Arc Welding (GMAW) (MIG) other than Aluminium And Stainless Steel	Less than or equal to 150	10
	150 to 250	11
	250 to 300	12
	300 to 400	13
	Greater than 400	14
Gas Metal Arc Welding (GMAW) (MIG) Aluminium and Stainless Steel	Less than or equal to 250	12
	250 to 350	13
Gas Tungsten Arc Welding (GTAW) (TIG)	Less than or equal to 100	10
	100 to 200	11
	200 to 250	12
	250 to 350	13
	Greater than 350	14
Flux-Cored Arc Welding (FCAW) - with or without Shielding Gas	Less than or equal to 300	11
	300 to 400	12
	400 to 500	13
	Greater than 500	14
Air - Arc Gouging	Less than or equal to 400	12
Plasma - Arc Cutting	50 to 100	10
	100 to 400	12
	400 to 800	14
Plasma - Arc Spraying	—	15
Plasma - Arc Welding	Less than or equal to 20	8
	20 to 100	10
	100 to 400	12
	400 to 800	14
Submerged - Arc Welding	—	2 (5)
Resistance Welding	—	Safety Spectacles or Eye Shield

Refer to standard AS/NZS 1338.1 for comprehensive information regarding the above table.

## Fumes And Gases



### WARNING!

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.


1. Keep your head out of the fumes. Do not breathe the fumes.
2. If inside, ventilate the area and/or use an exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Safety Data Sheets (SDS) and the manufacturer's instruction for the metals, consumables, coat-ings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.
6. Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapours to form highly toxic and irritating gases.



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7. Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well venti-lated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.


### Fire & Explosive Risks

**WARNING!**  
 Sparks and spatter fly off from the welding arc. The flying sparks and hot metal, weld spatter, work piece, and hot equipment can cause fires and burns.

Accidental contact of electrode or welding wire to metal objects can cause sparks, overheating, or fire.


1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 10m of the welding site.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks or drums.
8. Connect the work lead/clamp to the job as close to the welding area as practical to prevent welding current from travelling long, possibly unknown paths and causing electric shock and fire hazards.
9. Do not use a welder to thaw frozen pipes.
10. Remove the stick electrode from the holder or cut off the welding wire at the contact tip when not in use.

### Sparks & Hot Metal

**WARNING!**  
 Chipping and grinding causes flying metal, and as welds cool they can throw off slag.

1. Wear an AS/NZS approved face shield or safety goggles. Side shields are recommended.
2. Wear appropriate safety equipment to protect the skin and body.

### Cylinders

**WARNING!**  
 Gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, and arcs.
2. Install and secure cylinders in an upright position by chaining them to a stationary support or equipment cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.
4. Never allow a welding electrode to touch any cylinder.
5. Use appropriate shielding gas, regulators, hoses, and fittings designed for the specific application; maintain them and their associated parts in good condition.
6. Turn your face away from the valve outlet when opening the cylinder valve.





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# Warranty

As part of an on-going commitment to excellence in product support, Euroquip offers a comprehensive product warranty program.

### Warranty period for the EZITIG 205DC:

**Commercial Use: 24 Months**

**Domestic Use: 24 Months**

Warranty covers failure caused by manufacturing and material defects in the product, during the warranty period specified. The warranty period begins when the product is purchased by the end user. Warranty is not transferrable and is only claimable by the original purchaser.

Warranty does not cover parts that are subject to wear and tear from usage.

Warranty covers failure of a product caused by defective materials and/or manufacturing for the period given and the usage specified by Euroquip. The warranty period begins when the product is purchased by the end user. Warranty is not transferrable and is only claimable by the original purchaser.

Warranty also does not cover failure caused by the untimely replacement or service of the above wearing parts. Evidence must be provided that the product has been maintained and serviced suitably for a claim to be considered under warranty.

Failure caused by incorrect operation of the product, lack of proper care and maintenance of the product, external damage, external circumstances such as contaminated fuel or poor water supply, modifications to the product, attempted repair/ service by a party other than an Approved Service Agent, is not covered under warranty.

Warranty does not cover pre delivery service and adjustment, or failure that may occur as a result of lack of/ incorrect pre delivery service and adjustment.

Warranty does not cover any incidental, indirect or consequential loss, damage or expense that may result from any defect, failure or malfunction of a product.

Should any issue be found to be a combination of a warranty failure and a non-warranty issue, the repair cost component to rectify and repair the non-warranty failure is the customers' full responsibility.

The decision that an issue with a product qualifies as a warranty claim is made at the sole jurisdiction of Euroquip.

No costs incurred will be considered under warranty if repairs are carried out by a party other than a Euroquip Approved Service Agent, unless with prior consent in writing from Euroquip.

It is the responsibility of the purchaser to deliver a product under warranty to the nearest relevant service agent or product reseller. Warranty does not cover call outs, mile-age and freight costs.

If a product is repaired under warranty, parts and labour required for the repair will be supplied at no charge. Warranty assessment and repair will be scheduled and executed according to the normal work flow at the service location and depending on the availability of suitable replacement parts.

This warranty policy is an additional benefit and does not affect the legal rights of any end user, reseller or service agent.



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Congratulations on your new STRATA product. We are proud to have you as our customer and will strive to provide you with the best service and reliability in the industry. This product is backed by our extensive warranty. To locate your nearest distributor or service agency visit [www.strata.co.nz](http://www.strata.co.nz), or email us at [CustomerService@euroquip.co.nz](mailto:CustomerService@euroquip.co.nz)

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