



# HIGH FREQUENCY 200A TIG/MMA ALUMINIUM WELDER

70052



UK  
CA CE

These instructions accompanying the product are the original instructions. This document is part of the product, keep it for the life of the product passing it on to any subsequent holder of the product. Read all these instructions before assembling, operating or maintaining this product.

This manual has been compiled by Draper Tools describing the purpose for which the product has been designed, and contains all the necessary information to ensure its correct and safe use. By following all the general safety instructions contained in this manual, it will ensure both product and operator safety, together with longer life of the product itself.

All photographs and drawings in this manual are supplied by Draper Tools to help illustrate the operation of the product.

Whilst every effort has been made to ensure the accuracy of information contained in this manual, the Draper Tools policy of continuous improvement determines the right to make modifications without prior warning.

# 1. INTRODUCTION

## 1.1 SCOPE


High frequency TIG/MMA aluminium welder containing the latest integrated digital technology for optimum performance.

This product is intended for trade use with the quality & features to meet and exceed the expectations of the most demanding user. Any application other than that it was intended for, is considered misuse.

This product is not a toy and must not be used by children or any person with reduced physical, sensory or mental capabilities or lack of experience and knowledge, or people unfamiliar with these instructions.

Local regulations may restrict the age of the operator.

## 1.2 UNDERSTANDING THIS MANUALS SAFETY CONTENT:

 **Warning!** – Information that draws attention to the risk of injury or death.

**Caution!** – Information that draws attention to the risk of damage to the product or surroundings.

## 1.3 EXPLANATION OF SYMBOLS



**Warning!**  
Read the instruction manual.



**Warning!**  
Wear suitable welding eye/face protection.



**Warning!**  
Wear ear defenders (During grinding operations).



**Warning!**  
Wear protective gloves.



Keep out of the reach of children.



**Warning!**



Danger of electric shock.



Danger of fire.



Danger of explosion.



Danger of fumes.



Danger of ultraviolet radiation.



Danger of burning splashes.



Fan cooled.



Duty cycle.



Input voltage.



Protection rating.



Thermal overload.



One pound-force applied to an area of one square inch.



Range.



Net machine weight.



WEEE –  
Waste Electrical & Electronic Equipment.  
Do not dispose of Waste Electrical & Electronic Equipment in with domestic rubbish.



Do not incinerate or throw onto fire.



For indoor use only.  
Do not expose to rain.



Class 1 appliance  
(Must be earthed).



UK Conformity Assessed.



European conformity.



**DIGITAL  
TECHNOLOGY  
INSIDE**

See page 6.


## 2. SPECIFICATION

### 2.1 SPECIFICATION

Stock No. ....	70052
Part No. ....	TW250A
Rated voltage .....	230~50Hz
Input current .....	200A
Current range .....	10 – 200A
Electrode size .....	1.6 – 5.0mm
Pulse frequency.....	.01. – 20Hz
Degree of protection.....	IP21S
Cooling .....	Air (fan)
Insulation class .....	F
Duty cycle .....	20% at 200A, 100% at 155A
Dimensions .....	.557 × 210 × 395mm
Weight (Gross/Net/machine only) .....	27/25.5/18kg

## 3. HEALTH AND SAFETY INFORMATION

### 3.1 GENERAL SAFETY INSTRUCTIONS

 **Warning! Read all safety warnings and all instructions.** When using electric tools basic safety precautions should always be followed to reduce the risk of fire, electric shock, and personal injury including the following.

**Read all these instructions before attempting to operate this product and save these instructions.**

#### Electric shock can kill:

- Remove the plug from the socket before carrying out adjustment, servicing, or maintenance.
- Allow 5 minutes waiting time for the capacitors to discharge before removing the panels for any maintenance operations.
- Do not touch live electrical parts.
- Never use electrode holders or cables with damaged or deteriorated insulation.
- Keep the working environment, equipment, cables, and clothing free from grease, oil, moisture, and dirt.
- Ensure the welding machine has been correctly earthed and all panels are fitted securely.
- The operator must be insulated from the floor and workbench using a dry insulation mat.
- Wear isolating footwear and gloves that are in good condition, i.e. without holes.
- In hazardous conditions of increased electric shock always ensure a second person is present in case of an accident.
- Never change electrodes with bare hands or damp gloves (for ARC/MMA welders).

- Keep welding cables away from power cables.
- Regularly inspect the condition of the welding, earth, and power cables for signs of damage.
- Do not leave the machine unattended and remove the plug from the socket when not in use.
- Do not use welding cables unsuitable for the amperage.
- Ensure the earth clamp is adjacent to the weld seam, secured to bare metal and when not in use is insulated for safety.
- Keep all equipment well maintained.
- The operator shall prevent gas cylinders in the vicinity of the workpiece from becoming part of the welding circuit.

#### Fumes & Gases can be harmful:

- The welding process generates hazardous fumes as a by-product. Inhalation of these fumes is hazardous to health.
- Keep your head away from the weld to avoid breathing the fumes.
- If welding in confined spaces ensure adequate ventilation and use a fume extractor.
- Welding fumes displace oxygen. The danger of suffocation.
- By-products of welding can react with other chemical vapours to produce a toxic/explosive environment.

#### Welding can cause fire or explosion:

- Arc welding and allied processes can cause fire and explosions and precautions shall be taken to prevent these hazards.
- Before starting a weld ensure the area is clear of flammable materials.
- Remove any inflammables to a safe distance, especially substances likely to generate a dangerous vapour.
- The welding arc can cause serious burns. Avoid contact with skin.
- Sparks and molten metal are cast out during welding. Take precautions to prevent fire igniting and wear protective clothing.
- Sparks and molten metal can pass through gaps. Be aware that fire can start out of sight. Flammables in a locked cabinet may not be safe.
- Do not weld pressurised containers.
- Do not weld tanks, drums, or other vessels until they have been correctly cleaned/prepared for welding.
- Always have appropriate and fully maintained fire-fighting equipment suitable for the materials used and for use in electrical environments available in close proximity at all times.
- Keep clothing free from oil and grease.
- Wear a hat, flame-proof apron, woollen clothing, gloves, long sleeve tops with closed neck, trousers (without turn-ups) to cover non-slip boots.

- Protective head and shoulder coverings should be worn when overhead welding.
- Avoid taking any fuels with you e.g. cigarette lighters or matches.
- Hot spots and their immediate surroundings should be observed until their temperature has dropped to normal.

#### **Personal Protection:**

- The body should be protected by suitable clothing.
- The use of neck protection may be necessary against reflected radiation.
- Wear safety glasses when chipping, wire brushing, grinding, or when near cooling welds as metal filings or slag can be thrown up. Fully enclosed goggles are advisable.
- Arc machines generate a magnetic field which is detrimental to pacemaker recipients. Consult your doctor before going near welding equipment/ operations.
- The UV and IR radiation generated by welding is highly damaging to the eye, causing burns. This can also affect the skin. Protect the eyes and face.
- The face and eyes shall be protected by suitable welding shields equipped with appropriate ocular protection filters.
- Where environments are subject to pedestrians and traffic ensure a protective screen is used to avoid accidental arc glare.
- Do not weld in the vicinity of children or animals and ensure no one is looking before striking up.
- In the welding environment, damaging levels of noise can exist. Wear hearing protection if the process dictates.
- Do not touch hot equipment or metal. Allow the weld time to cool, use the correct tool and wear protective welding gauntlets.
- Wear flame retardant clothing (leather, wool, etc.).
- Take care when adjusting or maintaining the torch that it has had time to cool sufficiently and is disconnected.
- The arc generates
  - ultra-violet radiation (can damage skin and eyes);
  - visible light (can dazzle eyes and impair vision);
  - infra-red (heat) radiation (can damage skin and eyes);
- Such radiation can be direct or reflected from surfaces such as bright metals and light coloured objects.

#### **Gas cylinders:**

- Gas cylinders should be located or secured so that they cannot be knocked over.
- Shield gas containers can explode if damaged. Take care when handling.
- Ensure gas cylinders are shut-off when not in use and between operations.

- Take care that no build-up of gas is permitted to form in confined areas.
- Cylinders must be in an upright position at all times during use and storage.
- The gas cylinder must never come in contact with the electrode.
- Follow the manufacturer's instructions for handling, storing, and using the gas bottle correctly and safely.
- Use the correct equipment to connect the gas bottle to the welding torch.

#### **Limitations:**

- Do not use for:
  - operations in severe conditions (e.g. extreme climates, freezer applications, strong magnetic fields, etc.);
  - operations subject to special rules (e.g. potentially explosive atmospheres, mines, etc);
  - operations that require ingress protection greater than IPX0, e.g. in rain or snow, etc;

#### **General:**

- Training should be sought out in
  - the safe use of this equipment;
  - the processes;
  - the emergency procedures;
- Welding power sources are not to be used for pipe thawing.
- Take precautions against toppling over, if the power source shall be placed on a tilted plane.
- All equipment should be kept in good working condition, inspected and, when defective, promptly repaired or withdrawn from service – All equipment should be placed so that it does not present a hazard in passageways, on ladders, or stairways, and should be operated in accordance with the manufacturer's instructions.
- In the vicinity of an arc, non-reflective curtains or screens shall be used to isolate persons from the arc radiation. A warning, e.g. a symbol for eye protection, should refer to the hazard of arc radiation.

## 4. UNPACKING AND CHECKING

### 4.1 PACKAGING

Carefully remove the product from the packaging and examine it for any sign of damage. Check contents against the parts shown in Fig A. If any part is damaged or missing, please contact the Draper Help Line (see back page). Do not attempt to use the product!

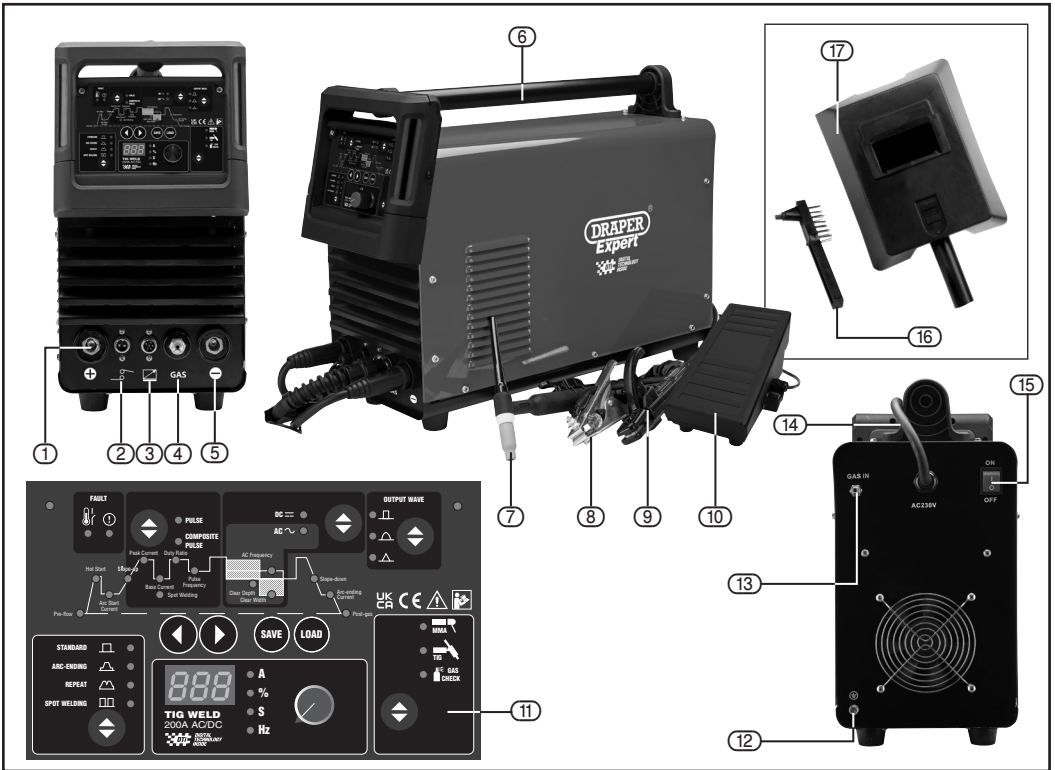
The packaging material should be retained during the warranty period, in case the product needs to be returned for repair.

### ⚠ Warning!

- Some of the packaging materials may be harmful to children. Do not leave any of these materials in reach of children.
- If any of the packaging is to be thrown away, make sure they are disposed of correctly, according to local regulations.

## 5. TECHNICAL DESCRIPTION

### 5.1 PRODUCT IDENTIFICATION – FIG.A



- ① MMA electrode connection.
- ② 2 Pin TIG torch trigger/foot pedal connection.
- ③ 6 Pin foot pedal control connection.
- ④ TIG torch connection.
- ⑤ Earth clamp connection.

- ⑥ Carry handle.
- ⑦ TIG torch.
- ⑧ Earth clamp.
- ⑨ MMA Electrode holder.
- ⑩ Foot pedal.
- ⑪ Control panel (see page 8 for technical overview).

- ⑫ 2nd Earthing point.
- ⑬ Gas input.
- ⑭ Power supply cable.
- ⑮ ON/OFF switch.
- ⑯ Brush/hammer.
- ⑰ Face mask.

FIG.A

**Note:** For details of our full range of accessories and consumables, please visit [drapertools.com](http://drapertools.com)

## 5.2 DTi – DIGITAL TECHNOLOGY INSIDE



Draper Tool's newest models of welding machines contain the latest digital technology, integrated into every element of the machine's control, improving every aspect of performance.

### More Functions

Internal micro-processors combined with digital circuitry allow more functions to be managed within a single machine, resulting in highly sophisticated machines which are compact and lightweight.

### Superior Performance

Digital signal stabilisation maintains the machine settings for optimum performance during use, automatically adjusting to humidity, temperature and other environmental factors to ensure superior welding performance in any conditions.

### Precision Control

Digital technology enables various machine settings to be applied with a high level of accuracy, giving the user precision control of every element of their welding.

## 6. ASSEMBLING THE WELDER

### 6.1 GENERAL

The excessive weight of this product means it should be handled by two persons. It contains dedicated circuitry and must be handled with care.

### 6.2 LOCATION

Locate the machine close to the correct power supply and allow a 500mm air gap around to ensure sufficient ventilation. There is a cooling fan located at the rear of the machine housing which must be kept clear. Equally, ensure no debris can be drawn into the machine.

### 6.3 CONNECTION TO THE POWER SUPPLY

Make sure the power supply information on the product's rating plate is compatible with the power supply you intend to connect it to.

**A suitable plug must be fitted by a qualified electrician.**

This product's wiring has insulation stripped in preparation for wiring a 32A plug (not supplied).

It is designed for connection to a 32 amp power supply rated at 230V AC.

Because it is constructed mostly of metal parts, it is a Class 1 machine; meaning, it must have an earth connection in the power supply. This is to prevent electrocution in the event of a failure.

**Note:** Remove the plug from the socket before carrying out adjustment, servicing or maintenance.

Check that the electrical supply delivers the voltage and frequency corresponding to the product and that it is fitted with a delayed fuse suited to the maximum delivered rated current.

**Note:** This product has been set to the highest voltage at the factory.

### 6.4 RATING PLATE

		<b>Stock No.70052</b> DTL S053 1YF, UK.		Serial No.:	
				EN IEC 60974-1	
		20A/20.8V – 200A/28V			
		X	20%	100%	
	U <sub>0</sub> =65V	I <sub>2</sub>	200A	155A	
		U <sub>2</sub>	28V	26.2V	
		5A/10.4V – 200A/18V			
		X	20%	100%	
	U <sub>0</sub> =65V	I <sub>2</sub>	200A	155A	
		U <sub>2</sub>	18V	16.2V	
	U <sub>1</sub> =230V	MMA	I <sub>1MAX</sub> =41A	I <sub>1eff</sub> =19A	
		TIG	I <sub>1MAX</sub> =26A	I <sub>1eff</sub> =11.8A	
IP21S			Class F		

IP21S

Unit's protection class rating.



Constant current.



MMA welder.



Alternating Current (AC) delivery.



TIG welder.



Do not dispose of WEEE\* as unsorted municipal waste.



Semiconductor diode rectifier.<sup>†</sup>



UK Conformity Assessed.



Power supply identifier, e.g. socket with 3 poles.



European conformity.



Direct Current (DC) delivery.<sup>†</sup>

U<sub>0</sub>=65V

Secondary no-load voltage.



Inverter frequency conversion stage.<sup>†</sup>

U<sub>1</sub>=230V

Rated supply voltage.



Transformer.<sup>†</sup>

X

Rated duty cycle.



Fan cooled.



Indoor use only. Do not expose to rain.

**Class F**

Insulation rating.

† Symbols can be combined, for example:



Single Phase D.C MMA Welder.

$I_2$

Welding current (AMPS)

$U_2$

Welding current (VOLTS)

$I_{MAX}=41A$

Unit's maximum absorbed current (AMPS).

$I_{eff}=19A$

Unit's effective absorbed current (AMPS).

EN IEC 60974-1

European reference safety standard.

\* Waste Electrical & Electronic Equipment

## 7. SETTING THE WELDER

Make certain the location does not pose any hazards as detailed in the safety instructions, before attempting to start the machine.

**Note:** Refer to the rating label for energy input details.

**Note:** For TIG operations, ensure the gas bottle is securely mounted and in a vertical position according to the manufacturer's instructions.

**⚠ Warning!** Remove the plug from the socket before carrying out adjustment, servicing or maintenance.

### 7.1 TUNGSTEN ELECTRODES – SELECTION & PREPARATION – FIGS.1 – 4

The correct selection of tungsten size and type will vary for each application dependent upon amperage, material thickness, equipment and shield gas, however as a general rule for DC output negative electrode machines a 1.6mm thorium oxide tungsten electrode will suffice.

Tungsten Ø	Amp Range
≤1.2mm	≤70A
1.6mm	70 - 140A
2.4mm	140 - 250A
3.2mm	≥240A

The selection of the ceramic shroud is based on the tungsten electrode and should be 4 to 6 times the tungstens diameter. For example a 1.6mm tungsten could be used with a No.4 (6.4mm) ceramic shroud, a No.5 (8.0mm) or at the maximum a No.6 (9.8mm).

There are a variety of different tungsten electrodes available with the most common categories, shown in the table below and on page 8.

Before welding can commence the electrode must be prepared, i.e. the tip ground to a suitable point.

For DC welding the tip should be ground into a point to help produce a stable arc. If using a grinding wheel, a dedicated abrasive wheel must be used to prevent contamination of the tungsten. The tip must be ground straight, i.e. perpendicular to the grinder's drive spindle.

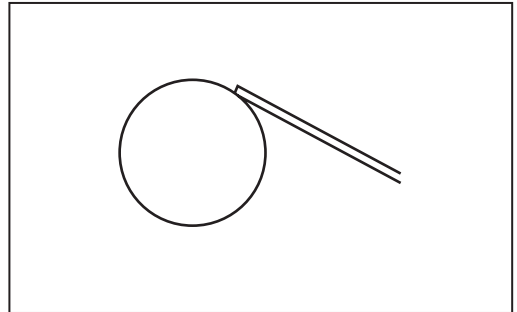


FIG. 1

Colour code Band	Content	Composition	Comments
Green	99%	Pure Tungsten	Predominantly AC providing a stable arc. Typically used for Aluminium welding.
Brown	0.3-0.5%	Zirconium Oxide	Predominantly AC with a high contamination resistance.
White	0.7-0.9%	Zirconium Oxide	

Yellow	0.9-1.2%	Thorium Oxide	Long life DC welding tungsten alloy providing improved ignition properties and a stable arc. See HSE guidelines.
Red	1.8-2.2%	Thorium Oxide	
Lilac	2.8-3.2%	Thorium Oxide	
Orange	3.8-4.2%	Thorium Oxide	
Black	0.9-1.2%	Lanthanum Oxide	Capable of AC/DC welding with similar properties to Thorium. A radioactive free alternative to thoriated tungsten.
Gold	1.2-1.8%	Lanthanum Oxide	
Blue	1.8-2.2%	Lanthanum Oxide	
Pink	0.8-1.2%	Cerium Oxide	Capable of AC/DC welding with reduced slag deposits.
Grey	1.8-2.2%	Cerium Oxide	

**Note:** The alloy content shown are a guide but generally range between 1% to 4%.

The general rule is to grind the point's length to match the electrodes diameter (Fig.2).

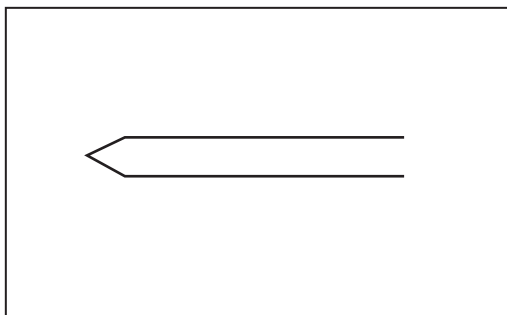


FIG. 2

However for low amperage/smaller diameter electrodes the points length should be double the electrodes diameter (Fig.3).

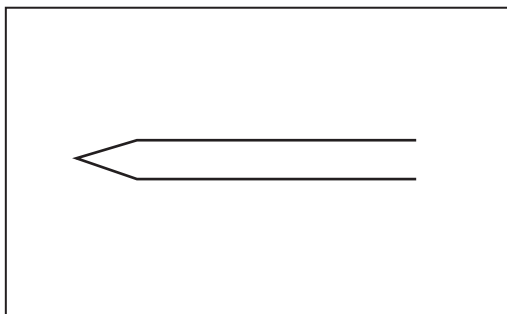


FIG. 3

**Note:** During the grinding process thorium alloy tungsten can release alpha ( $\alpha$ ) dust particles and in some instances beta ( $\beta$ ) and gamma ( $\gamma$ ) particles. Avoid inhalation as they act as a carcinogen.

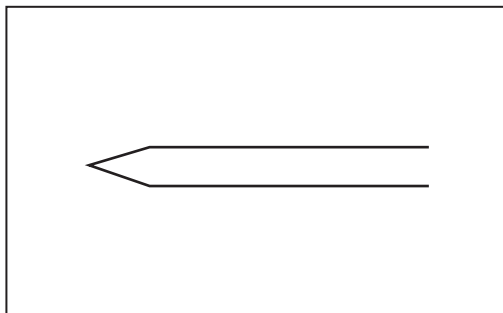


FIG. 4

In addition to dust protection, safety goggles must be worn to protect eyes from sparks and debris thrown up by the grinder.

Selection of the appropriate specification electrode is important to achieve a good quality weld. Seek guidance if unsure of selection.

**Note:** When the output is AC the tip should be rounded.

## 7.2 TIG (TUNGSTEN INERT GAS) SETUP – FIGS. 5 – 6

A suitable gas supply hose, fittings and pressure regulator will be required to connect the hose to the TIG torch.

- To attach the TIG torch (7) to the front panel coupling marked 'GAS' (4), plug in and twist to lock.
- Attach the earth clamp (8) into the coupling marked '⊖' (5) – plug in and twist to lock.
- To connect the torch trigger cable (7.1), fit the 2 pin plug into the corresponding connection port marked '⚡' (2).
- Secure the outer ring by screwing it onto the threaded outside part of the trigger connection port.

**Caution:** For shield gas always use Argon/Argon CO2 mix.

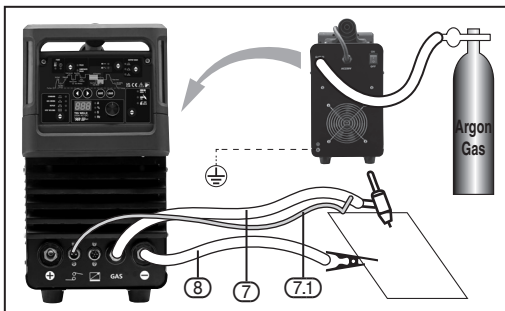


FIG. 5



FIG. 6

### 7.3 TIG WELDING FOOT PEDAL CURRENT CONTROL – FIG.7

The foot pedal (10) allows the welding current to be adjusted remotely from the main welding unit.

To connect the foot pedal:

- Plug both the 6 pin (3.1) and 2 pin (2.1) connector plugs of the foot pedal into the corresponding ports (3) / (2) located on the machine (the 2 pin plug connector of the TIG torch (7.1) becomes redundant and can be left hanging loose).

Operation:

- Set the dial (10.1) located on the side of the pedal to the desired current output.
- Depress the foot pedal to activate. The resulting pressure placed on the pedal controls the level of current incrementally until the maximum level, set by the dial is reached.

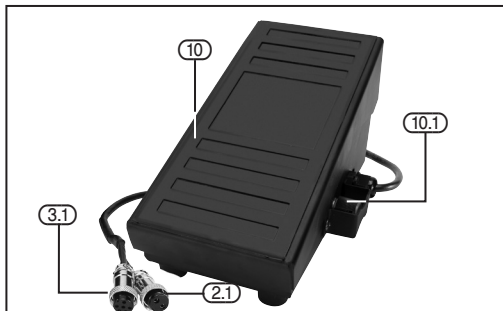


FIG. 7

### 7.4 MMA (MANUAL METAL ARC) SETUP – FIG.8

- To attach the electrode holder (9) to the front panel, insert the plug into the connection port marked '+' (1) and twist to lock.
- Attach the earth clamp (8) into the connection port marked '-' (5) – plug in and twist to lock.

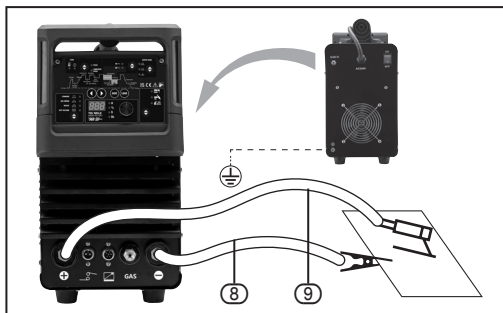


FIG. 8

### 7.5 MMA/ARC WELDING FILLER ROD (ELECTRODE) SELECTION – FIG.9

The correct selection of electrode size and type will vary for each application dependent upon material thickness, material type, amperage and equipment, however as a guide the figures below provide an indication.

MMA Electrode	Material Thickness	Amp Range
≤1.6mm	1-1.5mm	≤50A
2.0mm	1.2-3mm	45 - 75A
2.5mm	2-5mm	75 - 110A
3.25mm	4-8mm	100 - 150A

During the MMA welding process, the arc created between the work piece and the consumable electrode rod melts the parent metal and the filler metal in a weld pool.

The electrode's flux coating reacts during this process and develops into a shield gas protecting the weld bead. Part of this reaction leaves a trail of slag which solidifies behind the weld pool protecting the weld as it cools.

The most common varieties of electrodes are cellulosic, rutile and basic, the latter two being the most general purpose.

Selection of the appropriate specification electrode is important to achieve a good quality weld. Seek guidance if unsure of selection.

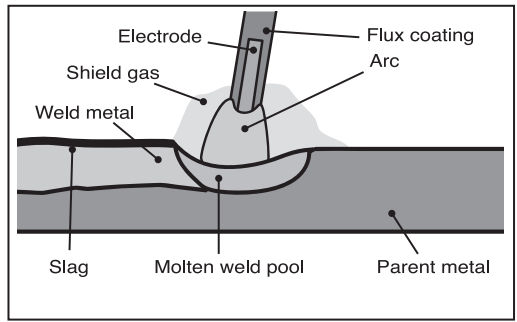


FIG. 9

## 7.6 CONTROL PANEL OVERVIEW – FIG.10

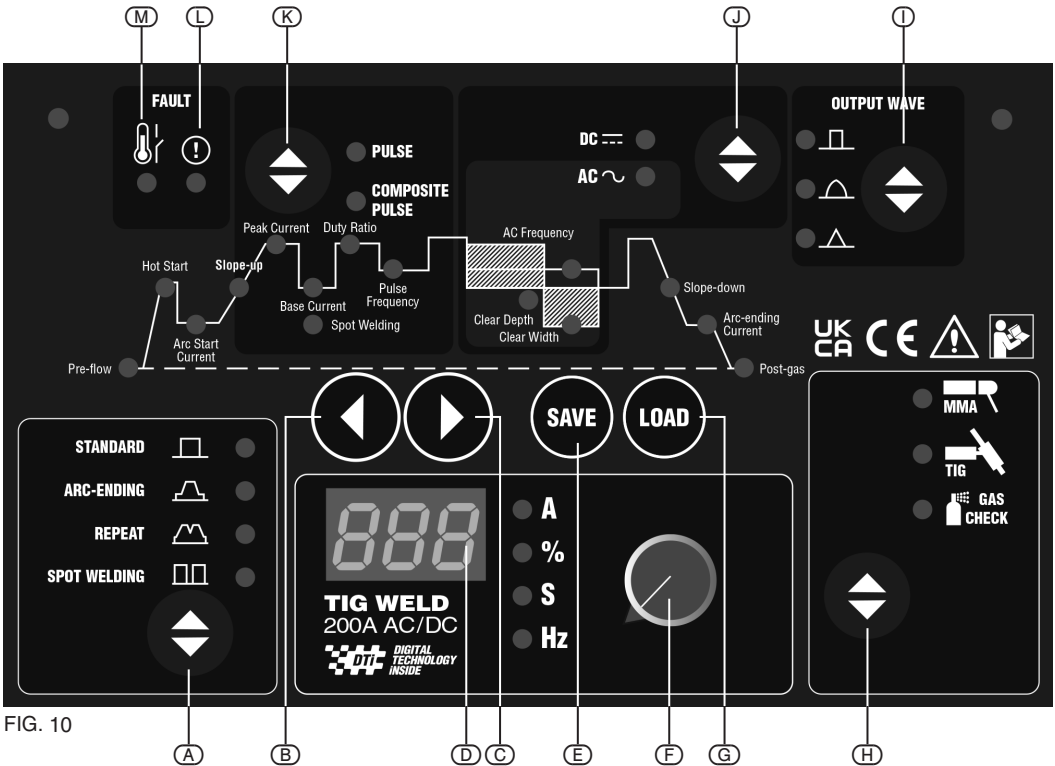


FIG. 10

Key:	Function:	Description
(A)	Welding function selection button	It is used to select welding mode under various functions, the standard is "without arc" function, and the slope is "with arc" function.
(B)	Parameter selection button	Move the indicator light to the left for preset parameters.
(C)	Parameter selection button	Move the indicator light to the right for preset parameters.

(D)	Display	Used to display the values of each parameter.
(E)	Data save button	Used for save welding data, which can store ten different sets of welding data.
(F)	Parameter adjusting knob	Adjust parameters.
(G)	Load button	Retrieve the stored welding parameters
(H)	Welding mode selection button	Hold for three seconds in the Argon welding, then release the convertible arc welding.
(I)	Waveform selection button	Square wave, sine wave and triangle wave can be selected.
(J)	AC and DC selection button	DC, AC function selection.
(K)	Pulse function selection	Choose the pulse and compound pulse function, and the compound pulse function can only be used in the state of AC
(L)	High voltage indicating light	no-load voltage indicator light
(M)	Alarm light	Welding machine overheat, over current alarm light.

## 7.7 FUNCTION PARAMETERS

Function:	Description:	Adjust Range:	Default value:
Pre-flow	The time of gas prior to welding	0~10 S	0.1 S
Hot start	Hot start current	5~200A	100A
Arc-start current	The preset starting current is adjusted when arc closing is controlled	5~200A	40 A
Slope up	When arc closing control is adopted, the rising time from arc starting current to welding current can be adjusted	0~20 S	5 S
Spot welding	The welding time in the spot welding functional state	0~10 S	3 S
Base current	When pulse mode is adopted, the low current of the pulse is adjusted	5~200A	10 A
Peak current/welding current	Adjust welding current or pulse peak current	5~200A	150 A
Duty ratio	Adjust the ratio of peak current to pulse period when pulse mode is adopted	10~90 %	50 %

Pulse frequency	Adjust the pulse frequency value when pulse mode is adopted	0.1~20HZ	5HZ
Clear width	Adjust the cleaning width when using AC welding	10~90 %	30 %
Clear depth	Adjust the cleaning depth when using AC welding	-50~+50 %	0%
AC frequency	Adjust the frequency of alternating current when welding by AC mode	20~200HZ	80HZ
Slop down	Adjust the time from welding current to arc current when arc current is controlled	0~10 S	5 S
Arc-ending current	Adjust the preset arc-ending current when arc closing is controlled	5~200A	20 A
Post gas	The time of delayed stopping of gas after welding	0~10 S	5 S

## 8. OPERATION

### 8.1 ARGON ARC WELDING

#### DC Argon ARC welding operation

- Make sure all parts are connected correctly.
- Turn on the power switch.
- The panel indicator is on and the fan starts to work.
- Press **(H)** on the operation settings control panel. Adjust the gas flow to the specified value according to the process specification.
- Press the button again to close the valve.
- Choose the welding method according to the process requirements. Press **(H)** For AC/DC selection.
- Choose the pulse function by pressing **(K)**.
- Press **(A)** selective control mode.

#### AC Argon ARC welding operation

- Make sure all parts are connected correctly.
- Turn on the power switch.
- The panel indicator is on and the fan starts to work.
- Press **(H)** on the operation settings control panel. Adjust the gas flow to the specified value according to the process specification.
- Press the button again to close the valve.
- Choose the welding method according to the process requirements. Press **(H)** For AC/DC selection.

- Choose the pulse and composite pulse function by pressing **(K)**.
- Press **(A)** selective control mode.

### 8.2 CLEAR WIDTH

- The cleaning width is essentially the ratio of the time it takes to adjust the positive current of the output current (current flowing from the workpiece to the tungsten needle) to the negative current (current flowing from the tungsten needle to the workpiece) – in other words, to act in one cycle. If the positive current decreases (increases) at a given time, the negative current increases (decreases) accordingly
- The positive current is mainly used for welding, while the negative current is mainly used for cleaning the oxide film of the workpiece. Therefore, adjusting the cleaning width allows the welder to find the best spot to effectively remove the oxide film without burning the tungsten needle.
- The setting position of cleaning width, welding effect and electrode consumption are shown in the table below:

Parameter (%)	10	33 Standard	50
Electrode Consumption	Few	Normal	Much
Penetration	Deep	Normal	Shallow
Clear width	Narrow	Normal	Wide

### 8.3 TIG WELDING

- Prepare the joint(s) to be welded. Select the electrode suitable for the application and insert it into the electrode holder as described in the manufacturers literature.
- The tungsten should extend 3-6mm past the end of shroud but no greater than the gas shroud diameter.
- With the earth clamp, electrode holder and gas bottle connected, connect the machine to the power supply. The power indicator (11) will illuminate as confirmation. Set the amperage adjustment appropriate to the selected electrode size.
- Secure the earth clamp to a clean sound section of the parent metal in the vicinity to the intended weld. With all safety equipment in place and personal protective clothing on begin welding.

**Note:** Ensure the gas bottle regulator is open.

- Open the torch gas control valve.
- Lower the electrode down toward the parent metal. When near the 'hot start' feature will aid start up of the initial arc.

### 8.4 MMA/ARC WELDING – FIG.11

- Prepare the joint(s) to be welded.
- Insert the electrode suitable for the application into the electrode holder (6) while pressing lever (6.1).
- With the earth clamp and electrode holder connected, connect the machine to the power supply. The power display will illuminate as confirmation. Set the amperage appropriate to the selected electrode size.
- Secure the earth clamp to a clean sound section of the parent metal in the vicinity to the intended weld.
- With all safety equipment in place and personal protective clothing on begin welding.
- Lower the electrode down toward the parent metal and strike the arc.
- The position of the electrode is critical to the arc and the end result.
- Achieving a good weld will take practice. For more detailed information refer to a industry standard welding publication and/or seek training on the subject.
- Use of an anti-spatter spray – Draper stock No.05709 – will help to achieve a cleaner finished weld.

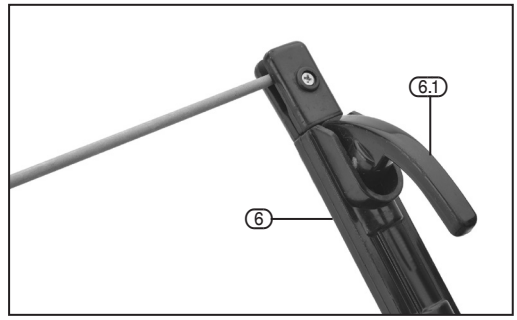


FIG. 11

### 8.5 DIRECTION OF WELD – FIG.12

- Strike the initial arc perpendicular to the parent metal before moving the electrode holder in the direction of travel 20-30° (Z, Y axis) and tilt it 20-30° (Z, X axis).
- Maintain a constant gap between the electrode tip and the weld pool of approximately 1 – 1.5 x the diameter of the electrode for a stable arc.

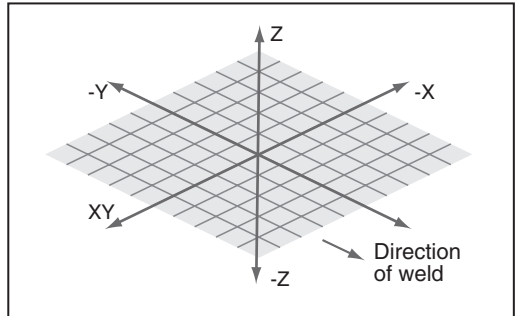


FIG. 12

### 8.6 DUTY CYCLE

Duty Cycle is a percentage of 10 mins, in which a machine can operate at a rated load without overheating and interruption from the thermal cut-out device.

**Example: 150A @ 30% Duty factor:**

  150A welding for 3 minutes

  7 minutes down time

**Example: 95A @ 100% Duty factor:**

  95A continuous welding

To increase the operation time, reduce the amperage.

**Note:** The heating tests have been carried out at ambient temperature and the duty cycle (duty factor) at 20°C has been determined by simulation.

## 8.7 THERMAL CUT-OUT – FIG.13

If welding for extended periods, the thermal cut-out will activate and the LED indicator (M) will illuminate, prohibiting use of the machine until sufficiently cool.

**Caution!** After completion of any welding task, leave the unit connected to the power supply for a sufficient period to allow the cooling fan to continue working.

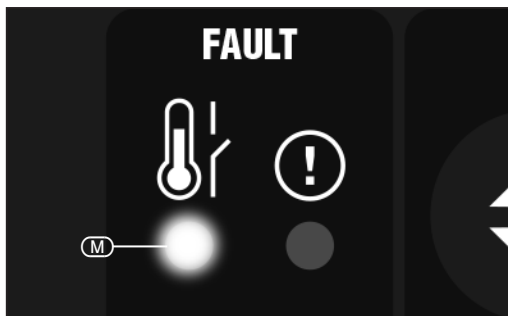


FIG. 13

## 9. MAINTENANCE AND TROUBLESHOOTING

### 9.1 MAINTENANCE

#### Warning!

**If the welding machine has just been turned off, you must not conduct any internal checks or maintenance for at least 5 minutes after the power distribution box switch or power switch is disconnected so that the capacitor inside the welding machine is completely discharged.**

- It is crucial to carry out regular checks on this product to ensure optimum performance and safe operation.
- The inspection table below offers guidance for the checking of components for general wear and tear or damage. Wherever necessary, clean or replace such items.

#### Warning! Any live electrical parts touched may cause fatal electric shock or serious burns.

For your own safety, turn the switch off and remove the plug from the power supply socket when carrying out any form of maintenance or cleaning. If in doubt, consult Draper Tools, or an authorised service agent.

#### Welding power supply:

Component	Check points	Advisories
Front panel	<ul style="list-style-type: none"> <li>– Check if any components are damaged or loose.</li> </ul>	Tighten or replace where necessary

Front panel	<ul style="list-style-type: none"> <li>– Check if the lower quick socket is loose.</li> </ul>	The lower quick socket is a regular item. If a defect occurs, it will be necessary to check the inside, re-fasten or replace components where necessary.
Rear panel	<ul style="list-style-type: none"> <li>– Check if the air intake of the cooling fan has foreign objects sticking to it.</li> </ul>	
Routine	<ul style="list-style-type: none"> <li>– Power on, and then check if the appearance has fading or too hot traces.</li> <li>– Check if the cooling fan has stable operation sound.</li> <li>– Check if the cooling fan takes in air from the air intake, if odour, abnormal vibration or noise (especially during welding) occurs.</li> </ul>	In-case of defects, it is necessary to check the inside of the device.
Top plate, bottom plate and side panel	<ul style="list-style-type: none"> <li>– When the machine cover is installed onto the housing, check if it is loose.</li> <li>– Check if bolts are loose.</li> </ul>	In case of defects, it is necessary to replace or fasten components, etc., as required.

## Cables:

Component	Check points	Advisories
<b>Grounding cable</b>	<ul style="list-style-type: none"> <li>– Check if all earth wires (for this device and parent metal grounding) are in place – check if the connections are safe and reliable.</li> </ul>	In order to avoid the risk of electrocution, be sure to conduct related checks.
<b>Cable</b>	<ul style="list-style-type: none"> <li>– Check if the cable insulation layer is worn, has other damage or conductive components are exposed.</li> <li>– Check if the cable suffers abnormal exterior force.</li> <li>– Check if the connection of the cable connecting with the parent metal is reliable and firm.</li> </ul>	Adopt a checking routine encompassing the conditions of the welding site. Daily checks should be fairly simple, whilst regular checking intervals should be more in-depth.

**Important!** In order to prevent the semiconductor and P plate from being damaged by static, please follow the instructions below:

- Before touching the conductor of the cables and P plate inside the unit, you must remove the static in advance by touching the housing metal position with your hand, etc.,
- In order to maintain the performance of this product over time, regular checking is advised.
- Inspect and clean the housing interior. Remove any dirt, dust or foreign matters. Use compressed air **without water** (dry air) to blow accumulated detritus away.
- Regular checking intervals should generally be conducted every 6 months. However, this should be extended to every 3 months if workplace conditions are regularly dusty or contains oily smoke and fumes.

## 9.2 TROUBLESHOOTING GUIDE

Faults	Possible causes	Solutions
<b>The fault indicator off, no HF discharge rustling, and arc striking effective</b>	<ul style="list-style-type: none"> <li>– The arc striking transformer primary cable has a poor touch with the power plate.</li> </ul>	<ul style="list-style-type: none"> <li>– Re-tighten</li> </ul>
	<ul style="list-style-type: none"> <li>– The discharging nozzle is oxidized or is too far.</li> </ul>	<ul style="list-style-type: none"> <li>– Remove the oxidized membrane on the surface of the discharging nozzle, or adjust its distance to approx. 1mm.</li> </ul>
	<ul style="list-style-type: none"> <li>– The manual welding Argon welding switch is broken.</li> </ul>	<ul style="list-style-type: none"> <li>– Replace</li> </ul>
	<ul style="list-style-type: none"> <li>– Some components of the HF arc striking circuit is damaged.</li> </ul>	<ul style="list-style-type: none"> <li>– Find and replace.</li> </ul>
<b>Large ARC splashes and very hard burning of the alkali welding rod</b>	<ul style="list-style-type: none"> <li>– Wrong polarity</li> </ul>	<ul style="list-style-type: none"> <li>– Exchange the polarity of the earth wire and the handle wire.</li> </ul>

<b>Fault indicator on and no output</b>	<ul style="list-style-type: none"> <li>- Over-heat protection has possibly been activated.</li> </ul>	<ul style="list-style-type: none"> <li>- Switch off the device and then restart it after the fault indicator is off.</li> <li>- Wait 2-3min without switching off the unit. The device may then naturally restore its self (the device of pure Argon arc welding does not have over-heat protection function)</li> </ul>
	<ul style="list-style-type: none"> <li>- Inverter circuit could be defective.</li> </ul>	<ul style="list-style-type: none"> <li>- Unplug the power supply plug of the main transformer on the MOS plate to restart the device.</li> </ul>
<b>The previous steps have been taken to remedy the situation, but the fault indicator is still on</b>	<ul style="list-style-type: none"> <li>- Switch off the device and unplug the power supply plug of the HF arc striking power supply. <ul style="list-style-type: none"> <li>• If the fault indicator is still on, it will indicate that some field-effect tubes on the MOS plate are broken.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Find and replace them with ones of the same type.</li> </ul>
	<ul style="list-style-type: none"> <li>• If the fault indicator is off, it will indicate that the voltage rise transformer in the HF arc striking circuit on the power supply plate is broken.</li> </ul>	<ul style="list-style-type: none"> <li>- Replace.</li> </ul>
<b>The previous steps have been taken to remedy the situation. The fault indicator is off, but there is no output.</b>	<ul style="list-style-type: none"> <li>• The medium plate transformer could be broken. Use an electric bridge to measure the primary inductance and Q value of the main transformer which should be <math>L=0.4-0.7\text{Mh}</math>.</li> <li>• Some the secondary rectifying tubes of the transformer could be punctured.</li> </ul>	<ul style="list-style-type: none"> <li>- Replace.</li> <li>- Find and replace with the ones of the same type.</li> </ul>

## 10. WARRANTY

### 10.1 WARRANTY

Draper tools have been carefully tested and inspected before shipment and are guaranteed to be free from defective materials and workmanship.

Should the tool develop a fault, please return the complete tool to your nearest distributor or contact:

Draper Tools Limited, Chandler's Ford, Eastleigh, Hampshire, SO53 1YF. England.

Telephone Sales Desk: +44 (0)23 8049 4333 or:

Product Helpline +44 (0)23 8049 4344.

A proof of purchase must be provided.

If upon inspection it is found that the fault occurring is due to defective materials or workmanship, repairs will be carried out free of charge. This warranty period covering labour is 12 months from the date of purchase except where tools are hired out when the warranty period is 90 days from the date of purchase. This warranty does not apply to any consumable parts, any type of battery or normal wear and tear, nor does it cover any damage caused by misuse, careless or unsafe handling, alterations, accidents, or repairs attempted or made by any personnel other than the authorised Draper warranty repair agent.

**Note:** If the tool is found not to be within the terms of warranty, repairs and carriage charges will be quoted and made accordingly.

This warranty applies in lieu of any other warranty expressed or implied and variations of its terms are not authorised.

Your Draper warranty is not effective unless you can produce upon request a dated receipt or invoice to verify your proof of purchase within the warranty period.

Please note that this warranty is an additional benefit and does not affect your statutory rights.

**Draper Tools Limited.**

## 11. DISPOSAL

### 11.1 DISPOSAL

- At the end of the machine's working life, or when it can no longer be repaired, ensure that it is disposed of according to national regulations.
- Contact your local authority for details of collection schemes in your area.

In all circumstances:

- Do not dispose of power tools with domestic waste.
- Do not incinerate.
- Do not dispose of WEEE\* as unsorted municipal waste.



\* *Waste Electrical & Electronic Equipment.*

