



MULTI PROCESS

INVERTER WELDER

00588



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. TITLE PAGE

1.1 INTRODUCTION:

USER MANUAL FOR: Multi Process Inverter Welder

Stock No: 00588

Part No: MPW200

1.2 REVISIONS:

Date first published August 2018.

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As our user manuals are continually updated, users should make sure that they use the very latest version.

Downloads are available from: <http://drapertools.com/manuals>

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1.3 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.

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DECLARATION OF CONFORMITY ENCLOSED

3. WARRANTY

3.1 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: (023) 8049 4333 or Product Help Line (023) 8049 4344.

A proof of purchase **must** be provided with the tool.

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. The warranty is extended to 24 months from the date of purchase for parts only. 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.

4. INTRODUCTION

4.1 SCOPE

This TIG/MIG/ARC welding machine is designed to weld ferrous metals such as steel and iron. This machine can perform MIG, TIG and ARC/MMA welding. Any other application is considered misuse.

4.2 SPECIFICATION

Stock no	00588	
Part no	MPW200	
Input:		
Voltage U_1	230V~	
Phase	1	
Frequency	50-60Hz	
Rated Maximum Supply Current I_{MAX}	16A	
Output:		
Max. amperage	180A	
Amperage range	20-180A	
Duty cycle.....		
MIG	60%@200A	100%@155A
TIG	100%@180A	
MMA	60%@180A	100%@155A
Welding processes	MIG, TIG, MMA	
Wire sizes for MIG welding.....	0.6 and 0.8mm	
MMA/ARC Electrode Size	1.5-4.0mm	
Gas or Gasless modes.....	Gas and Gas-less modes	
Degree of Protection	IP21S	
Cooling	Air (Fan)	
Max. Working Temperature	40°	
Dimensions (L x W x H).....	580x245x360mm	
Weight (gross)	14.08kg	
† No plug fitted.		

Recommended power supply current 16A. This machine will not function and maybe damaged attempting to run on a 13A supply.

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

4.3 HANDLING & STORAGE

- Care must be taken when handling this product.
 - Dropping this tool could have an effect on its accuracy and could also result in personal injury. This tool is not a toy and must be respected.
- Environmental conditions can have a detrimental effect on this product if neglected.
 - Exposure to damp air can gradually corrode components.
 - If the product is unprotected from dust and debris, components will become clogged.
 - If not cleaned and maintained correctly or regularly, the machine will not perform at its best.

5. HEALTH AND SAFETY INFORMATION

When using any type of power tool there are steps that should be taken to make sure that you, as the user, remain safe.

Common sense and a respect for the tool will help reduce the risk of injury.

5.1 GENERAL SAFETY INSTRUCTIONS FOR POWER TOOL USE

Warning!

- Read all safety warnings and all instructions. Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.
- The term "power tool" in the warnings refers to your mains operated (corded) power tool or battery-operated (cordless) power tool.

Most important: You must know how to safely start and stop this machine, especially in an emergency.

Keep the work area tidy and clean. Attempting to clear clutter from around the machine during use will reduce your concentration. Mess on the floor creates a trip hazard. Any liquid spilled on the floor could result in you slipping.

Find a suitable location. If the machine is bench mounted, the location should provide good natural light or artificial lighting as a replacement. Avoid damp and dusty locations as it will have a negative effect on the machine's performance. If the machine is portable do not expose the tool to rain. In all cases do not operate power tools near any flammable materials.

Keep bystanders away. Children, onlookers and passers by must be restricted from entering the work area for their own protection. The barrier must extend a suitable distance from the tool user.

Unplug and house all power tools that are not in use. A power tool should never be left unattended while connected to the power supply. They must be housed in a suitable location, away locked up and from children.

Do not overload or misuse the tool. All tools are designed for a purpose and are limited to what they are capable of doing. Do not attempt to use a power tool (or adapt it in any way) for an application it is not designed for. Select a tool appropriate for the size of the job. Overloading a tool will result in tool failure and user injury. This covers the use of accessories.

Dress properly. Loose clothing, long hair and jewellery are all dangerous because they can become entangled in moving machinery. This can also result in parts of body being pulled into the machine. Clothing should be close fitted, with any long hair tied back and jewellery and neck ties removed. Footwear must be fully enclosed and have a non-slip sole.

Wear personal protective equipment (PPE). Dust, noise, vibration and swarf can all be dangerous if not suitably protected against. If the work involving the power tool creates dust or fumes wear a dust mask. Vibration to the hand, caused by operating some tools for longer periods must be protected against. Wear vibration reducing gloves and allow long breaks between uses. Protect against dust and swarf by wearing approved safety goggles or a face shield. These are some of the more common hazards and preventions, however, always find out what hazards are associated with the machine/work process and wear the most suitable protective equipment available.

Do not breathe contaminated air. If the work creates dust or fumes connect the machine (if possible) to an extraction system either locally or remotely. Working outdoors can also help if possible.

Move the machine as instructed. If the machine is hand held, do not carry it by the power supply cable. If the product is heavy, employ a second or third person to help move it safely or use a mechanical device. Always refer to the instructions for the correct method.

Do not overreach. Extending your body too far can result in a loss of balance and you falling. This could be from a height or onto a machine and will result in injury.

Maintain your tools correctly. A well maintained tool will do the job safely. Replace any damaged or missing parts immediately with original parts from the manufacturer. As applicable keep blades sharp, moving parts clean, oiled or greased, handles clean and emergency devices working.

5. HEALTH AND SAFETY INFORMATION

Wait for the machine to stop. Unless the machine is fitted with a safety brake, some parts may continue to move due to momentum. Wait for all parts to stop, then unplug it from the power supply before making any adjustments, carrying out maintenance operations or just finishing using the tool.

Remove and check setting tools. Some machinery requires the use of additional tools or keys to set, load or adjust the power tool. Before starting the power tool always check to make certain they have been removed and are safely away from the machine.

Prevent unintentional starting. Before plugging any machine in to the power supply, make sure the switch is in the OFF position. If the machine is portable, do not hold the machine near the switch and take care when putting the machine down, that nothing can operate the switch.

Carefully select an extension lead. Some machines are not suitable for use with extension leads. If the tool is designed for use outdoors, use an extension lead also suitable for that environment. When using an extended lead, select one capable of handling the current (amps) drawn by the machine in use. Fully extend the lead regardless of the distance between the power supply and the tool. Excess current (amps) and a coiled extension lead will both cause the cable to heat up and can result in fire.

Concentrate and stay alert. Distractions are likely to cause an accident. Never operate a power tool if you are under the influence of drugs (prescription or otherwise), including alcohol or if you are feeling tired. Being disorientated will result in an accident.

Have this tool repaired by a qualified person. This tool is designed to conform to the relevant international and local standards and as such should be maintained and repaired by someone qualified, using only original parts supplied by the manufacturer. This will ensure the tool remains safe to use.

CAUTION!

5.2 CONNECTION TO THE POWER SUPPLY

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

This machine is supplied without a plug. It is designed for connection to a 16A power supply rated at 230V AC using a 16A site plug. Connection of the plug should be carried out by a qualified electrician.

This machine will not function and may be damaged attempting to run on a 13A supply.

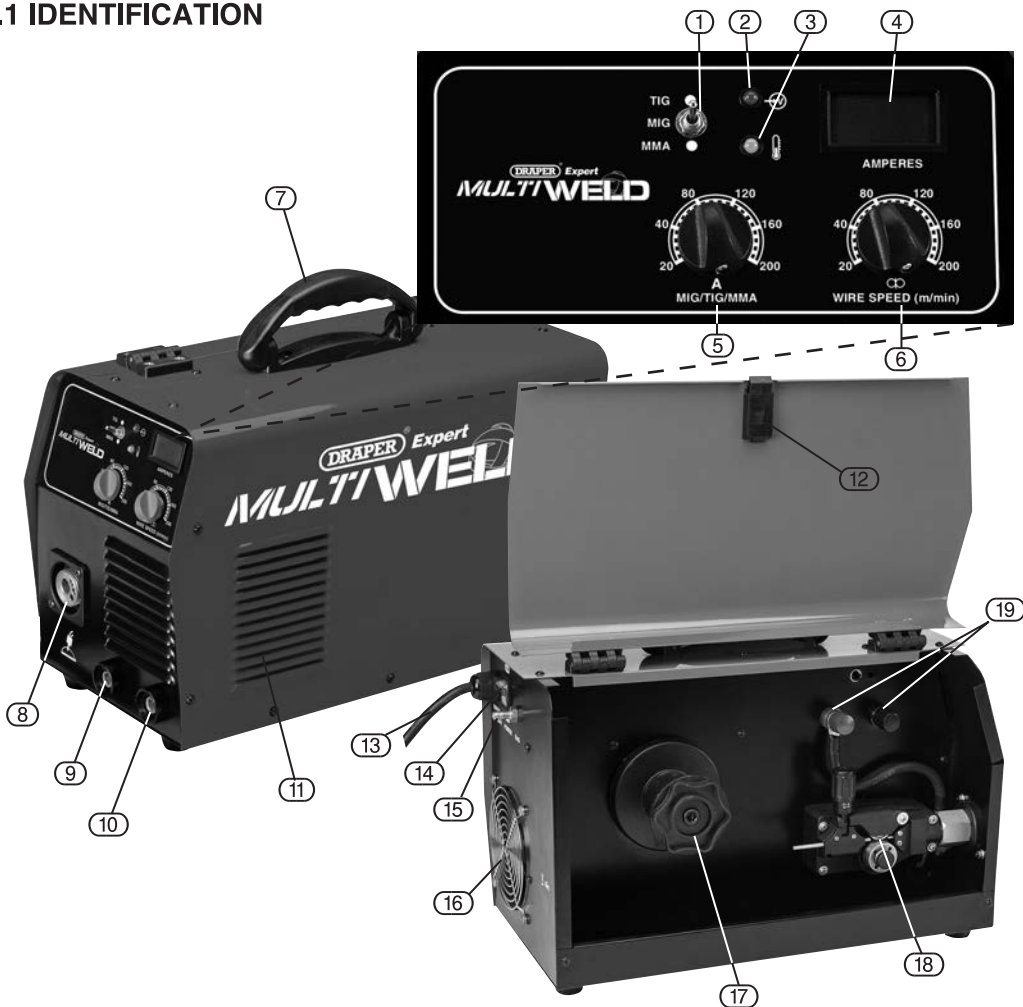
Because it is constructed mostly of metal parts, it is a Class 1 machine; meaning, it must have an earth connection in the power supply. This is to prevent electrocution in the event of a failure.

DRAPER[®] Expert		DRAPER TOOLS Ltd. Hursley Road, Chandlers Ford, Eastleigh, Hants SO53. 1YF. UK.			
MPW200		Serial No.:-			
		EN60974-1:2012 EN60974-10:2007			
	---	40A/16V to 200A/24V			
		X	25%	60%	100%
S	U₀=63V	I ₂	---	200	155
		U ₂	---	24	26.2
	---	30A/21.2V to 180A/27.2V			
		X	25%	60%	100%
S	U₀=65V	I ₂	---	180	155
		U ₂	---	27.2	26.2
	---	30A/11.2V to 180A/17.2V			
		X	25%	60%	100%
S	U₀=65V	I ₂	---	---	180
		U ₂	---	---	17.2
	U₁ = 230V	I _{1max}	33.6A 34.3A 21.7A	I _{1eff}	26.0A 26.6A 21.7A
1~50-60Hz					
IP21S					



6. TECHNICAL DESCRIPTION

6.1 IDENTIFICATION



- ① Welding process selection + TIG, MIG, MMA.
- ② Power light indicator.
- ③ Overload protection.
- ④ Amperage display.
- ⑤ MIG, TIG & MMA output current adjusting.
- ⑥ MIG wire feed speed.
- ⑦ Transport handle.
- ⑧ MIG torch euro connection.
- ⑨ MIG earth (with gas) coupling.
MMA torch coupling.
TIG earth coupling.
- ⑩ MIG earth (no gas) coupling.
MMA earth coupling.
TIG torch coupling.
- ⑪ Ventilation grille.
- ⑫ Side flap catches.
- ⑬ Power cable.
- ⑭ On/Off switch.
- ⑮ MIG gas hose connection
- ⑯ Cooling fan.
- ⑰ Spool hub.
- ⑱ Mig wire tension rollers.
- ⑲ MIG earth terminals (gas/no gas).

7. UNPACKING AND CHECKING

7.1 PACKAGING

Carefully remove the machine from the packaging and examine it for any sign of damage that may have happened during shipping. Lay the contents out and check them against the parts shown below. If any part is damaged or missing; please contact the Draper Helpline (the telephone number appears on the Title page) and do not attempt to use the machine.

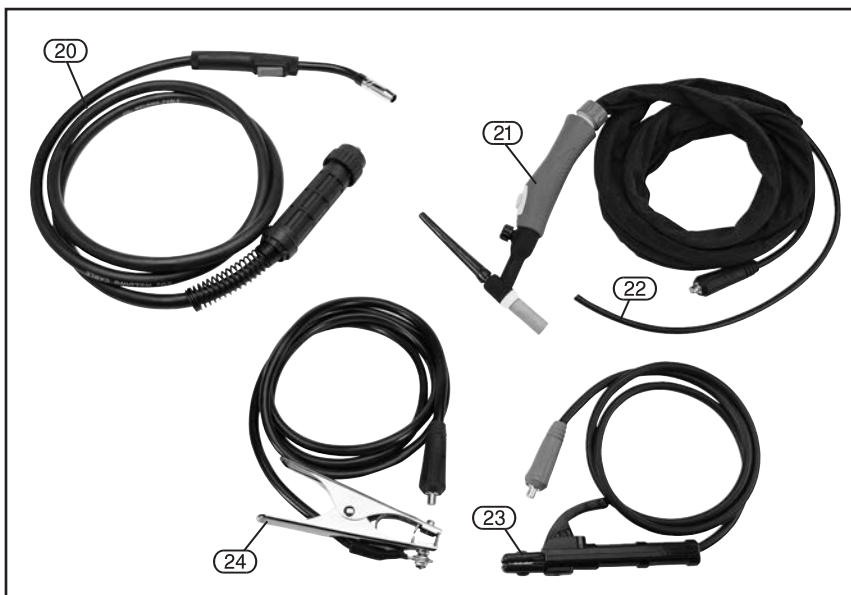
The packaging material should be retained at least during the guarantee period: in case the machine needs to be returned for repair.

Warning! Some of the packaging materials used may be harmful to children. Do not leave any of these materials in the reach of children.

If any of the packaging is to be thrown away, make sure they are disposed of correctly; according to local regulations.

7.2 WHAT'S IN THE BOX?

As well as the welder; there are several parts not fitted or attached to it.



(20) MIG welding torch.

(21) TIG welding torch.

(22) Tig gas feed tube.

(23) MMA welding electrode holder.

(24) Earth clamp.

8. PREPARING THE WELDER

8.1 GENERAL

This medium weight, portable welder requires no special lifting instructions, however it contains dedicated circuitry and must be handled with care. The welder is designed to weld with coated consumable electrodes (MMA), by means of lift arc start with manually fed filler wire (TIG) and by means of a filler wire feed through the torch (MIG).

NOTE: Although the tungsten electrode is classed as a non-consumable compared to the filler rod it will be consumed by the TIG process and require re-sharpening and eventually replacing.

8.2 LOCATION

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

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.

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.

8.3 TIG (TUNGSTEN INERT GAS)- FIGS. 1 - 2

A suitable gas supply pressure regulator will be required to connect the hose from the TIG torch (22).

To attach the TIG torch (21) to the front panel coupling (10), plug in and twist clockwise to lock.

Attach the earth clamp (24) into the '+' coupling (9).

CAUTION: For shield gas always use Argon/Argon CO² mix.



FIG.1

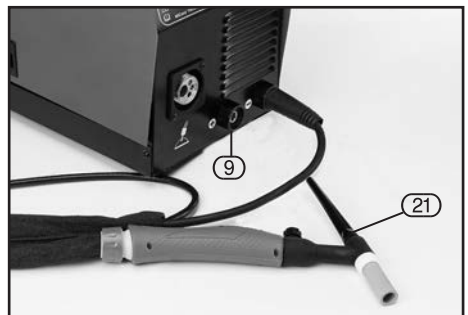


FIG.2

8. PREPARING THE WELDER

8.4 MMA (MANUAL METAL ARC) - FIG. 3

To attach the electrode holder (23) to the front panel, insert the plug into coupling (9) and twist clockwise to lock.

Attach the earth clamp (24) to the coupling (10) and twist clockwise to lock.

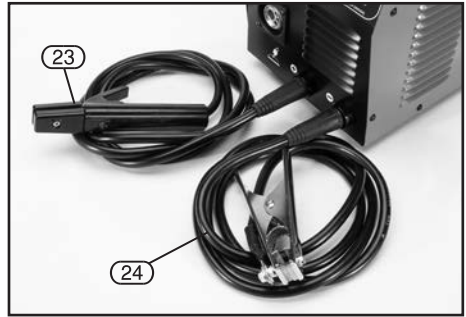


FIG.3

8.5 INSTALLING THE FILLER WIRE (MIG WELDER) - FIGS. 4 - 12

The welding machine is designed to accept the standard size drums of wire (5kg).

The welding wire can be either of the flux cored type this provides a means of shielding the weld pool from the atmosphere.

Or non flux wire with the gas hose connected to the back of the machine.

Do not let the filler wire become uncoiled or tangled as this will lead to problems with delivery to the welding torch.

Select the filler wire suitable for the parent metal and with a gauge to match the welder specification.

Note: If the welding machine is not regularly used, remove the wire which is prone to rusting and will cause feed problems next time.

1. Lift the catch on the side panel and swing open the cover up onto the top.

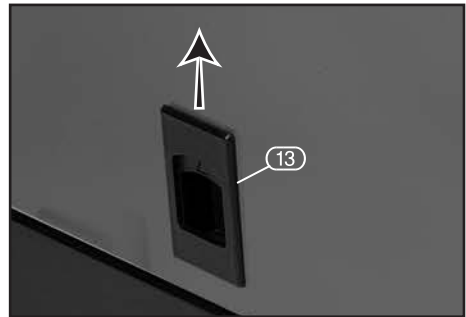


FIG.4

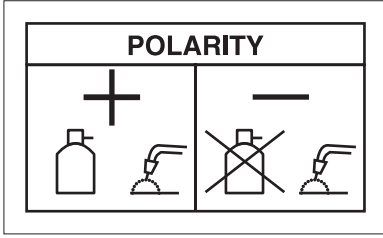
2. Unscrew the large plastic ring (17) (turning it clockwise). Sit the reel on to the hub and make sure the peg locates in the back of the reel. Refit the large plastic ring (17).
3. Fit the wire spool so that it feeds off the base of the reel towards the wire drive unit.



FIG.5

8. PREPARING THE WELDER

4. Change the polarity to suit the welding polarity label (gas or gas-less).



5. Pull tensioner (18.1) forward off the tension arm (18.2), the tension arm (18.2) will spring up out of the way.

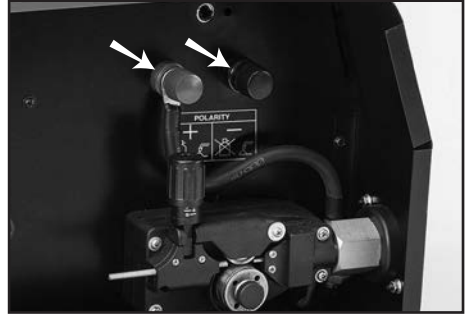


FIG.6

6. Note: The wire must sit in the appropriate groove for the wire gauge. The groove size is etched on the side of the roller (0.6 or 0.8mm). Remove nut to see the groove size that is NOT in use. The drive roller can be removed from shaft, to change the groove size for appropriate wire gauge. Unscrew and remove the retaining cap.

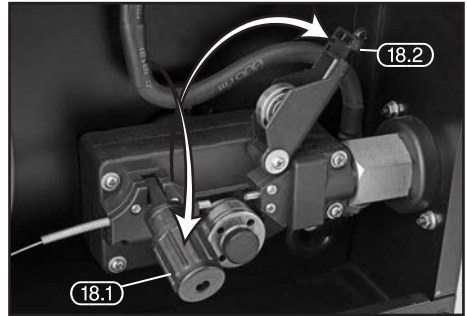


FIG.7

7. Pass the filler wire through the guide (18.3) and over the top of the drive roller, make sure the wire is well inside the torch liner before closing the arm (18.2) and tensioner (18.1).
8. Connect the welding machine to the power supply.



FIG.8

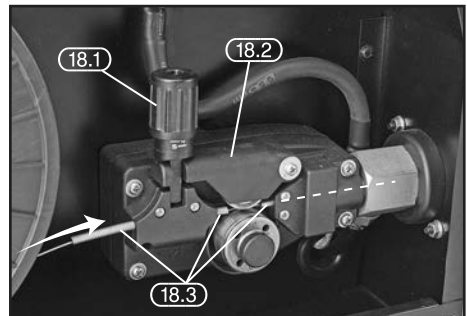


FIG.9

8. PREPARING THE WELDER

9. Attach the Earth cable to the machine opposite polarity to the inside. e.g. if the polarity inside is connected (for gas-less) negative, then the earth clamp needs to be attached to the positive terminal on the front; and vice-versa.



FIG.10

10. Remove the gas shroud (20.1) and with a small spanner unscrew and remove the tip (20.2). Press the feed trigger on gun and observe the wire feed mechanism. If the wire is being fed correctly it will come out of the swan neck. Pass the tip over the wire and secure back onto the swan neck. Do not over tighten. Resecure the gas shroud and trim the wire back as required. Note: Ensure the tip size matches the wire size prior to installing.

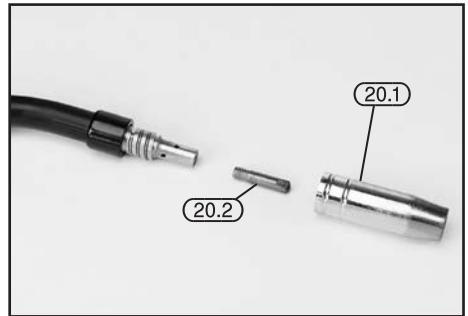


FIG.11

11. If bottled gas is required for weld it will be fitted via the bayonet (15) on the back.



FIG.12

8.6 NO GAS WELDING PRINCIPLE

For a successful weld joint, the molten metal must be protected from contaminating gases found in the air. This is achieved by using a flux cored filler wire. The flux is produced as the wire melts. The flux creates a coating over the weld and once cooled will need to be removed by chipping it off.

If allowed to cool naturally some areas of the flux may ping off of the weld by themselves due to thermal contraction for this reason it is recommended that eye protection is worn.

9. BASIC WELDING OPERATION

NOTE: Although this machine is medium weight and portable take care with additional items i.e. gas bottles etc. Do not manoeuvre over people's heads.

9.1 WELDING TYPE SELECTION- SWITCH - FIG.13

- TIG (GTAW) Gas Tungsten Arc Welding.
- MIG (GMAW) Gas Metal Arc Welding.
- MMA ARC welding, stick welding, or (SMAW) Shielded Metal Arc Welding.

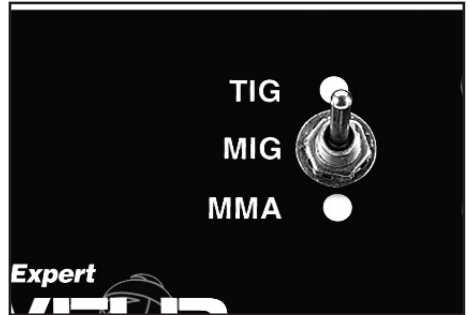


FIG.13

Note: Welding is a mix of science and art and due to the complex principles and vast differences in parameters (ie. Material type, position, condition etc.) That information is well beyond the scope of this manual.

Draper Tools suggest training be obtained from a third party or refer to a suitable reference book on the subject additionally; nothing can beat practice using the welder on scrap material to get a better understanding.

9. BASIC WELDING OPERATION

9.2 MIG WIRE SPEED ADJUSTMENT- FIG. 14

Wire speed is dependent on material thickness and welding current. Being able to judge the correct wire speed based on the sound and quality of the weld will only come from practice.

- Too fast will result in holes blowing in the weld or the wire hitting the metal will force the torch backward.
- Too slow will result in the wire burning back to the torch into a ball and clogging the tip.

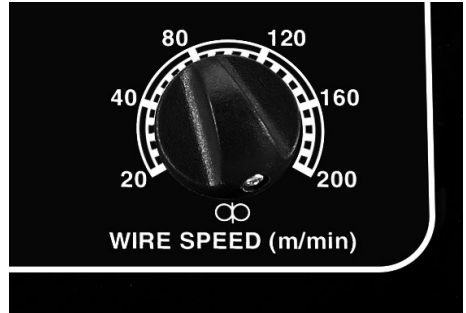


FIG.14

9.3 MIG WELDING PRINCIPLES FIG. 15

The Mig welding process allows two similar materials to be fused together without altering the properties of the material. The electric arc created between the electrode (the welding wire) and the work piece produces the required heat for turning the metal into a molten state. The gas creates a shield around the arc and the molten metal.

The area to be welded and the earth point must be clean of grease, dirt, paint and rust. Clean with a wire brush as necessary. Position the earth clamp as close as possible to the working area and ensure a tight grip is achieved.

Select the welding current based on the thickness of the material. A thick piece will require a high current, however due to the duty cycle this will effect the welding time by significantly reducing it. A thin piece will only require minimal heat and so the current can be less. This will allow a longer period of welding. The position of the torch is critical to the arc and end results.

The position of the welding torch is important to achieve a good quality bead. Position the torch at approximately 35° vertically and 75° horizontally and up to 20mm* distance from the join. 20mm is the maximum that can be achieved on the maximum setting. Ensure the gas shroud remains clean of spatter. Likewise and more importantly the wire feed tip must be kept clean to avoid the wire becoming blocked or restricted.

Use of an anti-spatter spray (Draper Stock No.05709) will help keep the end result more tidy.

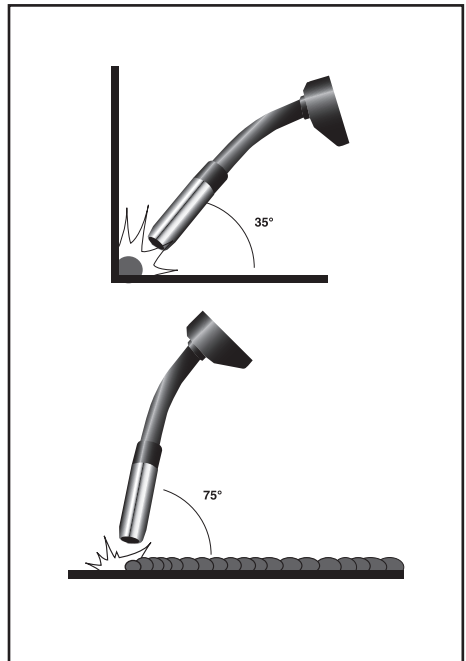


FIG.15

9. BASIC WELDING OPERATION

9.4 TIG WELDER, TUNGSTEN ELECTRODES - SELECTION & PREPARATION - FIGS. 16 - 18

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 or cerium oxide tungsten electrode will suffice.

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 underlined:

<u>Colour Code Band</u>	<u>Content</u>	<u>Composition</u>	<u>Comments</u>
White	0.7-0.9%	Zirconium Oxide contamination resistance.	Predominantly AC with a high
Red	1.8-2.2%	Thorium Oxide	Long life DC welding tungsten alloy providing improved ignition properties and a stable arc. See HSE guidelines.
Grey	1.8-2.2%	Cerium Oxide	Capable of AC/DC welding with reduced slag deposits.

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

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

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.

Note: For DC welding the tip should be ground into a point to help produce a stable arc.

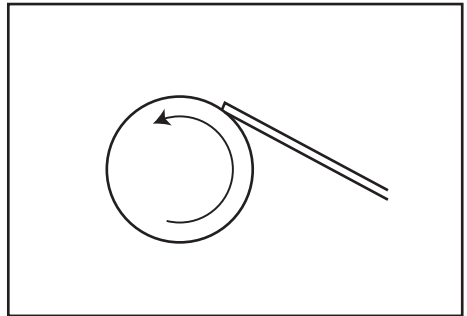


FIG.16

9. BASIC WELDING OPERATION

The general rule is to grind the point's length to match the electrodes diameter (Fig.18). However for low amperage/smaller diameter electrodes the points length should be double the electrodes diameter (Fig.19).

NOTE: During the grinding process thorium alloy tungsten can release alpha (α) dust particles and in some instances beta (β) and gamma (γ) particles. Avoid inhalation as they act as a carcinogen.

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.

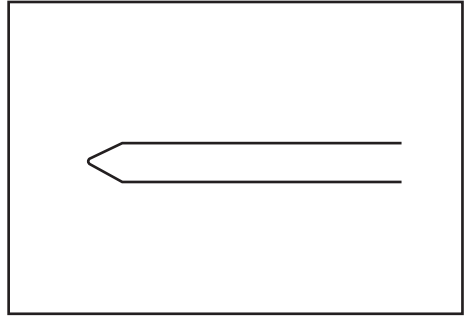


FIG.17

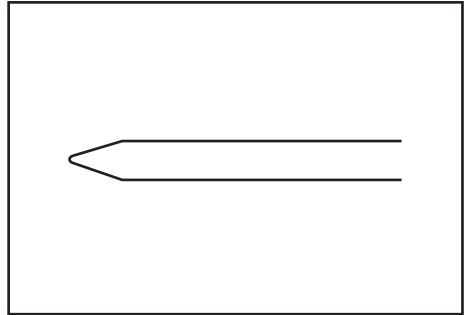


FIG.18

9.5 MACHINE OPERATION

No tig filler wire is supplied with this machine, however a list of accessories are displayed in the optional accessories. Alternatively, consult your local Draper stockist for further information.

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 (2) 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 (where fitted).

Lower the electrode down toward the parent metal. Allow the tip of the tungsten to touch the workpiece and carefully lift again, the arc will be established and welding can commence.

9. BASIC WELDING OPERATION

9.6 ARC WELDING, FILLER ROD (ELECTRODE) SELECTION - FIG. 19

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

With 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.

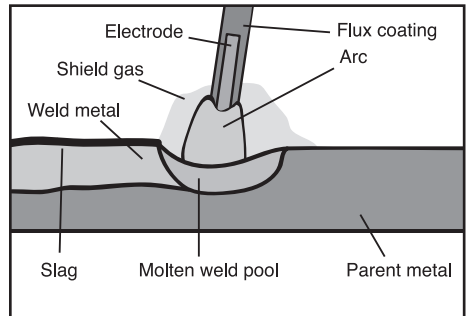


FIG.19

9.7 MMA/ARC MACHINE OPERATION - FIG. 20

Prepare the joint(s) to be welded.

Select the electrode suitable for the application and insert into the electrode holder (23) while pressing lever (23.1).

With the earth clamp and electrode holder connected according to page 11 connect the machine to the power supply. The power indicator (2) 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.

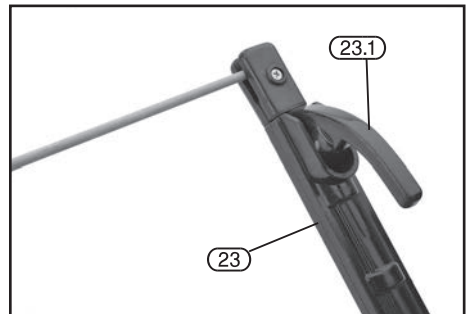


FIG.20

9. BASIC WELDING OPERATION

9.8 DIRECTION OF WELD - FIG. 21

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 to 1.5 times the diameter of the electrode for a stable arc. This machine is equipped with two additional features 'Arc Force' and 'Anti-Stick' to ensure smooth welding and reduce the instances of the electrode becoming stuck to the parent metal.

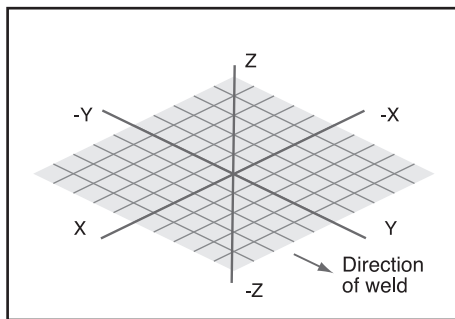


FIG.21

Definition:

ARC FORCE

The machine will automatically create a specific overpower when the electrode is too near, forcing it back to help avoid the risk of sticking.

Definition:

ANTI-STICK

The machine will automatically reduce the intensity of the current in order to aid quick and simple separation of the electrode and parent metal.

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 welding book 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. This welding power source has a maximum material thickness capability of 5mm.

9.9 THERMAL CUT-OUT INDICATOR - FIG. 22

If welding for extended periods the thermal cut-out will activate prohibiting use of the machine until sufficiently cool. The thermal cut-out indicator (3) will illuminate while the machine is disabled.

ATTENTION: 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.22

9. BASIC WELDING OPERATION

9.10 DEFINITION:

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

Definition:

ARC WELDING:

Fusion welding in which heat for welding is obtained from an electric arc.

Definition:

MANUAL METAL ARC (MMA welding):

Also known as SMAW (Shielded metal arc welding).

Metal-arc welding† with straight covered electrodes of a suitable length and applied by the operator without automatic or semi-automatic means of replacement. No protection in the form of gas from a separate source is applied to the arc or molten pool during welding.

†Arc welding using a consumable electrode.

Definition:

TUNGSTEN INERT-GAS (TIG welding)

Also known as GTAW (Gas tungsten arc welding)

Gas-shielded arc welding using a non-consumable pure or activated tungsten electrode where the shielding is provided by a shroud of inert gas.

NOTE: Although the tungsten electrode is classed as a non-consumable compared to the filler rod type electrode it will be consumed by the TIG process and require re-sharpening and eventually replacing.

Definition:

METAL INERT-GAS (MIG welding)

Also known as GMAW (Gas metal arc welding)

A welding process in which an electric arc forms between a consumable wire electrode and the workpiece metal(s), which heats the workpiece metal(s), causing them to melt, and join. Along with the wire electrode, a shielding gas feeds through the welding gun, which shields the process from contaminants in the air.

10. OPTIONAL ACCESSORIES

10.1 OPTIONAL ACCESSORIES

Please contact your local Draper dealer for a current and complete list of accessories.

Stock No.	Part No.	Description
09582	W420R	2.0mm General Purpose Rutile Electrode (8pcs)
09583	W420R	2.5mm General Purpose Rutile Electrode (6pcs)
09584	W420R	3.2mm General Purpose Rutile Electrode (5pcs)
09585	W420R	4.0mm General Purpose Rutile Electrode (4pcs)
77167	WSIF25	2.5mm General Purpose Rutile Electrode (265pcs, 5.0kg)
77168	WSIF32	3.2mm General Purpose Rutile Electrode (170pcs, 5.0kg)
77169	WSIF40	4.0mm General Purpose Rutile Electrode (115pcs, 5.0kg)
10957	LWG	Leather Welding Gauntlets
57553	W627	1.6mm Thorium Alloy Tungsten Electrode (Red)
61498	W630	1.6mm Zirconium Oxide Tungsten Electrode (White)
61526	W632	1.6mm Cerium Oxide Tungsten Electrode (Grey)
09699	LAPR	Leather welding apron.

11. TROUBLESHOOTING





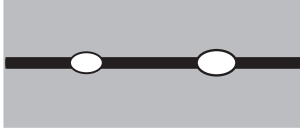
11.1 TROUBLESHOOTING

WARNING: For your own safety, turn the switch off and remove the plug from the power supply socket.

PROBLEM	POSSIBLE CAUSE	REQUIRED ACTION
<ul style="list-style-type: none">• Wire not feeding despite wire feed pulley turning.	<ul style="list-style-type: none">• Dirty current nozzle (torch tip).• Wire feed pulley set too tight.• Too low clamping pressure of the wire feed pulley.	<ul style="list-style-type: none">• Clean.• Loosen.• Increase the clamping pressure.
<ul style="list-style-type: none">• Interrupted or disruptive wire supply.	<ul style="list-style-type: none">• Damaged current nozzle.• Burnt current nozzle.• Dirty driving gear nozzle.• Cut on worn driving gear.	<ul style="list-style-type: none">• Replace.• Replace.• Clean.• Replace.
<ul style="list-style-type: none">• Electric arc turned off.	<ul style="list-style-type: none">• Poor contact between earth clamp and part to be welded• Short circuit between current nozzle and gas supply pipe.• Too loose current nozzle.	<ul style="list-style-type: none">• Tighten the pliers and check them, remove paint and rust.• Clean or replace the current and gas nozzle, remove dirt, paint and rust.• Tighten the current nozzle firmly.
<ul style="list-style-type: none">• Porous welded joint.	<ul style="list-style-type: none">• No gas, too little gas or wrong gas.	<ul style="list-style-type: none">• Secure or replace the gas supply (higher volume).
<ul style="list-style-type: none">• Welder suddenly stops working after longer operation.	<ul style="list-style-type: none">• Welder has overheated due to too long use and the thermal protection has activated.	<ul style="list-style-type: none">• Let the welder cool down.

IMPORTANT: Please note all repairs/service should be carried out by a qualified person.

11. TROUBLESHOOTING

Example	Term	Cause
 A cross-sectional diagram of a butt joint weld. The weld metal is dark grey, and the base metal is light grey. The weld metal does not fill the root of the joint, leaving a significant gap between the two pieces of metal.	Insufficient penetration	<ul style="list-style-type: none">- Incorrect arc distance- Welding current too low- Wire speed too low- Welding line not central to butt
 A cross-sectional diagram of a butt joint weld. The weld metal is dark grey, and the base metal is light grey. The weld metal is applied to the surface of both pieces of metal but does not fuse to each other or the base metal, creating a layered appearance.	Overlap	<ul style="list-style-type: none">- Wire size too large for application- Torch speed too slow
 A cross-sectional diagram of a butt joint weld. The weld metal is dark grey, and the base metal is light grey. The weld metal contains numerous small, dark, irregular spots representing pits.	Pitting	<ul style="list-style-type: none">- Contamination in the metal (eg rust)- Flux shield breakdown- Incorrect arc distance- Area cooling down too fast
 A cross-sectional diagram of a butt joint weld. The weld metal is dark grey, and the base metal is light grey. The weld metal has a wavy, irregular surface, indicating poor quality.	Untidy weld	<ul style="list-style-type: none">- Unsteady torch movement- Worn wire tip
 A cross-sectional diagram of a butt joint weld. The weld metal is dark grey, and the base metal is light grey. The weld metal has two distinct circular holes (burn through) that pass completely through the base metal.	Burn through	<ul style="list-style-type: none">- Current too high for material thickness- Torch speed too slow

12. MAINTENANCE

12.1 MAINTENANCE

Warning: Remove the plug from the power supply. Periodically the welder must be checked as detailed below.

- Check the torch cable and ground cable connections.
- Clean the contact tip and the gas shroud with an iron brush. Replace if worn.
- Clean the outside of the welder with a damp cloth.
- Every time the wire spool is replaced:
- Check the alignment, cleanliness and state of wear of the wire roll.
- Remove any metal powder deposited on the wire feeder mechanism and then dry with compressed air.
- Occasionally test to ensure the thermal cut-out device is operating correctly, i.e. weld for an extended period or on a maximum duty cycle.
- Check the condition of the warning labels.
- Replace any worn parts.
- If the replacement of the supply cord is necessary, this has to be done by the manufacturer or his agent in order to avoid a safety hazard.

13. EXPLANATION OF SYMBOLS

13.1 EXPLANATION OF SYMBOLS



Wear personal protective equipment.



Single-phase alternating current with rated frequency of 50Hz.



Welding mask to be used!



Protect against humidity.



Special welding gloves to be worn at all times.



This side up.



Wear safety cut through resistant shoes with safety sole and steel toe!



Caution - hot surface!



Protective apron to be used.



Warning against toxic fumes! Not to be used in enclosed spaces.



Before carrying out any work on the machine, disconnect the plug from the socket.



Protect against humidity. Never expose tool to rain.



Pressure bottle to be secured by chain.



Prohibition for persons with a pacemaker!



Warning against dangerous voltage.



Keep bystanders away.



Risk of explosion.

13. EXPLANATION OF SYMBOLS

Letter Symbols:

X	Duty Cycle
I_1	Rated Supply Current
U_1	Rated Supply Voltage
I_2	Conventional Welding Current
U_2	Conventional Welding Voltage

Pictogram Symbols:



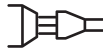
Transformer.†



Direct Current (DC) delivery.†



Inverter†
Frequency conversion stage.



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

† Symbols can be combined
for example:



Single Phase Static Frequency
Converter/Transformer Rectifier.



Semiconductor diode rectifier.†



Read instruction manuals before
operating and servicing this
equipment.



Warning.



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



Suitable for welding operations in
hazardous situations. No-load
voltage below 48V rms AC or
113V peak DC.



MIG welding (Metal Inert Gas) or
GMAW (Gas Metal Arc Welding)



ARC welding (stick), MMA (Manual Metal Arc) or
SMAW (Shielded Metal Arc Welding)



TIG welding (Tungsten Inert Gas) or
GTAW (Gas Tungsten Arc Welding)

14. DISPOSAL

14.1 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 abandon in the environment.
- Do not dispose of WEEE* as unsorted municipal waste.



* Waste Electrical & Electronic Equipment.

CONTACTS

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Service/Warranty Repair Agent:

For aftersales servicing or warranty repairs, please contact the Draper Tools Helpline for details of an agent in your local area.

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RDCM0620

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