



INSTRUCTIONS FOR 160A AC/DC PULSE TIG Welder

Stock No.51499 Part No.ACDC160P

IMPORTANT: PLEASE READ THESE INSTRUCTIONS CAREFULLY TO ENSURE THE SAFE AND EFFECTIVE USE OF THIS PRODUCT.



CE



GENERAL INFORMATION

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:

160A AC/DC PULSE TIG WELDER

Stock no. 51499.

Part no. ACDC160P.

1.2 REVISIONS:

Date first published June 2014

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

Downloads are available from: <http://www.drapertools.com/b2c/b2cmanuals.pgm>

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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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3. GUARANTEE

3.1 GUARANTEE

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 Helpline (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 guarantee period covering parts/labour is 12 months from the date of purchase except where tools are hired out when the guarantee period is ninety days from the date of purchase. The guarantee is extended to 24 months for parts only. This guarantee does not apply to 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 guarantee applies in lieu of any other guarantee expressed or implied and variations of its terms are not authorised.

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

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

Draper Tools Limited.

4. INTRODUCTION

4.1 SCOPE

This TIG/MMA welding machine is designed to weld (DC output) mild, alloy and carbon steel, non ferrous metals and weld (AC output) aluminium and alloy aluminium.

The inverter technology produces a stable current while reducing the weight and volume of the overall machine. It is aimed at the more advanced hobbyist/amateur. Any other application is considered misuse.

4.2 SPECIFICATION

Stock no	51499
Part no	ACDC160P
Input:	
Voltage U ₁	220V~
Phase	1
Frequency	50/60Hz
Rated Maximum Supply Current I _{1MAX}	19A
Rated Effective Supply Current I _{1EFF}	14.9A
Output:	
No-Load Voltage U ₀	56V
Range:	
Welding Current	10-160A
Welding Voltage	10.4-16.4V
Rated Power	
Duty Factor	60%.....100%
Conventional Welding Current I ₂	160A.....124A
Conventional Welding Voltage U ₂	16.4V.....15V
Electrode Size	1.6-2.0mm
Power Cable†	2.5mm²x3
Welding Cable	16mm²
Coupling Device	Type 1 10-25mm²
Degree of Protection	IP21S
Insulation Class	B
Cooling	Air (Fan)
Max. Working Temperature	40°
Dimensions (L x W x H)	550x330x380mm
Weight	21kg

† No plug fitted.

Recommended power supply current 32A. 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

This machine should be stored in a dry location and in its box. Avoid storing this machine in areas prone to damp or humidity.

When handling this machine never pick up or carry this machine by the electrode holder, earth clamp or power supply cable. Always use the transport handles provided.

5. HEALTH & SAFETY INFORMATION

5.1 GENERAL SAFETY INSTRUCTIONS FOR WELDING

WARNING: 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 working environment, equipment, cables and clothing free from grease, oil, moisture and dirt.
- Ensure welding machine has been correctly earthed and all panels are fitted securely.
- The operator must be insulated from the floor and work bench 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 accident.
- Never change electrodes with bare hands or damp gloves.
- Keep welding cables away from power cables.
- Regularly inspect the condition of the welding, earth, and power cables for signs of damage.
- Do leave machine unattended and remove plug from socket when not in use.
- Do not use welding cables unsuitable for the amperage.
- Ensure earth clamp is adjacent to 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 work piece 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. 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 hat, flame-proof apron, woollen clothing, gloves, long sleeve tops with closed neck, trousers (without turn-ups) to cover non-slip boots.

5. HEALTH & SAFETY INFORMATION

- 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 area's.
- Cylinders must be in an upright position at all times during use and storage.
- The gas cylinder must never come in to 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:


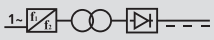



- Do not use for;
 - operations in severe conditions (e.g. extreme climates, freezer applications, strong magnetic fields etc).
 - operations subject to special rules (e.g. potentially explosive atmospheres, mines etc).
 - operations that require ingress protection greater than IPX0, e.g. in rain or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

5. HEALTH & SAFETY INFORMATION

- 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.

51499 ACDC160P		 DRAPER TOOLS LTD <small>Hursley Road, Chandler's Ford, Eastleigh, Hants, SO53 1YE U.K.</small>			
					EN 60974-1
		10A/10.4V-160A/16.4V			
		U ₀ =56V	~U ₀ =56V	I ₂	U ₂
				I ₂	U ₂
				60 %	100 %
				160A	124A
				16.4V	15V
 1-(50-60Hz)		U ₁ =220V		I _{1max} =19A	
				I _{1eff} =14.9A	
Power Factor: 0.93		Insulation Class: B		Enclosure Class: IP21S	
				Gas Cool	

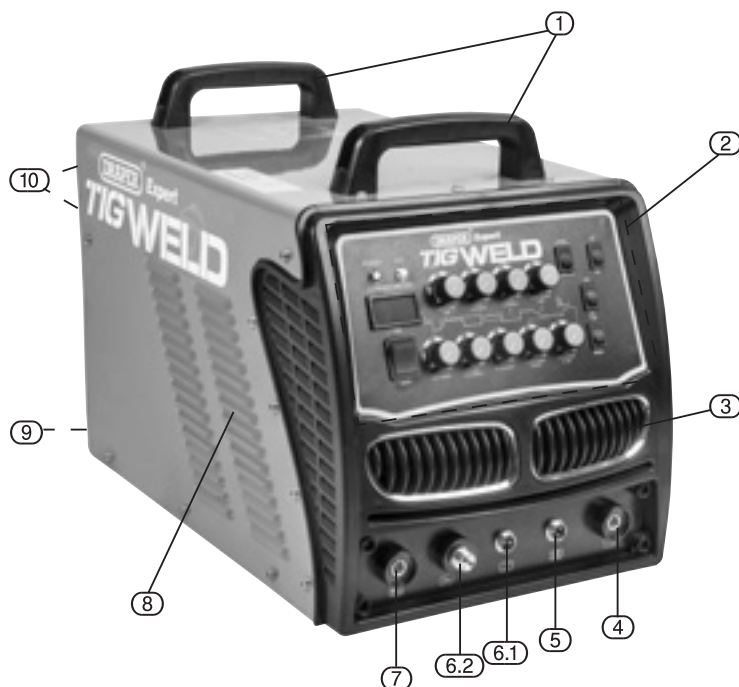
5.2 CONNECTION TO THE POWER SUPPLY

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

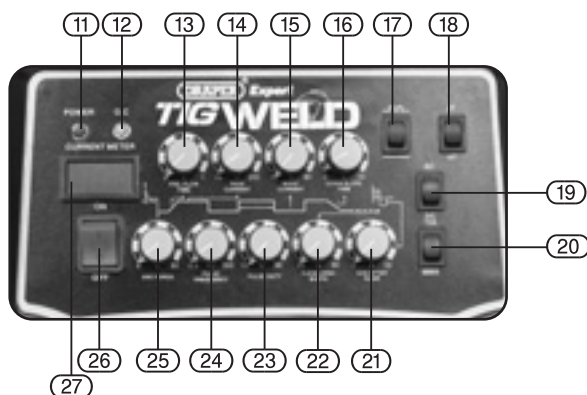
This machine is supplied without a plug. It is designed for connection to a 32A power supply rated at 230V AC using a 32A site plug. Connection of the plug should be carried out by a qualified electrician.

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.

6. TECHNICAL DESCRIPTION



- ① Transport handles
- ② Control panel
- ③ Ventilation grille
- ④ Earth clamp female coupling (Type 1)
- ⑤ 3 pin connector for remote foot switch
- ⑥.1 2 Pin connector for TIG torch (switch)
- ⑥.2 Threaded connector for TIG torch (shield gas)
- ⑦ MMA electrode holder female coupling (Type 1)
- ⑧ Ventilation grille
- ⑨ Gas pipe connection (input)
- ⑩ Twin cooling fans



- ⑪ Power indicator light
- ⑫ Over current indicator light
- ⑬ Pre flow time dial
- ⑭ Peak current dial (pulse welding)
- ⑮ Basic current dial (pulse welding)
- ⑯ Downslope time dial
- ⑰ Constant or pulse current selector (DC only)
- ⑱ TIG torch trigger switch mode

- ⑲ Output selection switch (AC/DC)
- ⑳ Welding type selection switch (TIG/MMA)
- ㉑ Post gas dial.
- ㉒ Balance dial
- ㉓ Pulse duty dial (pulse welding)
- ㉔ Pulse frequency dial (pulse welding)

- ㉕ Arc force dial
- ㉖ ON/OFF switch
- ㉗ Am meter

7. UNPACKING & 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.

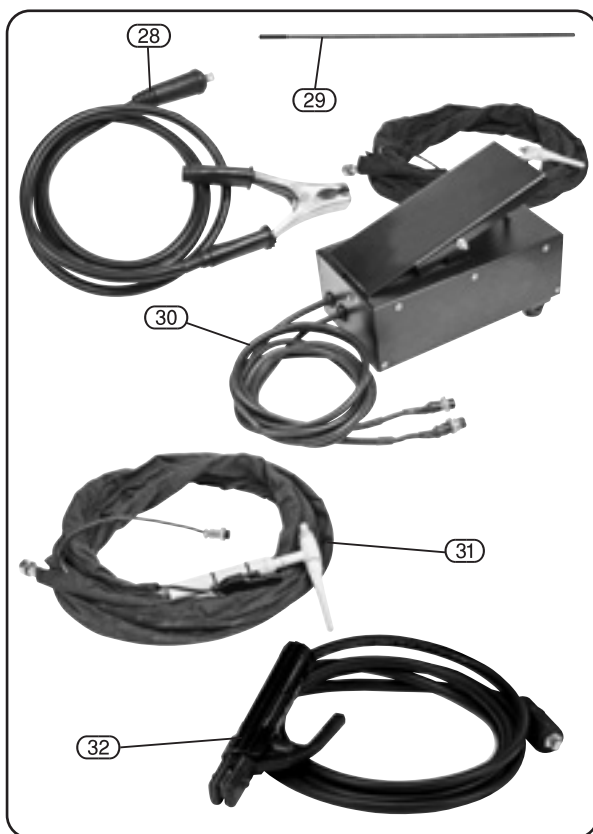
The packaging material should be retained at least during the guarantee period: in case the machine needs to be returned for repair.

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.



- (28) Earth clamp
- (29) Tungsten electrode
- (30) Foot switch
- (31) TIG torch assembly
- (32) MMA electrode holder*

*Image is representative only.

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) and by means of high frequency start with non-consumable electrode (TIG).

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 is one cooling fan 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 and connection hose will be required.

To attach the TIG torch (32) to the front panel, plug in the 2 pin plug (32.1) to the socket (6.1) and screw the gas hose connection (32.2) to the connection (6.2). Securely tighten with a 19mm spanner.

Attach the earth clamp (28) to the coupling (4) and twist to lock.

[optional]

To attach the foot switch (30). Remove the TIG torch 2 pin plug (32.1) and replace it with (30.2). Attach the 3 pin plug (30.1) to the socket (5).

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

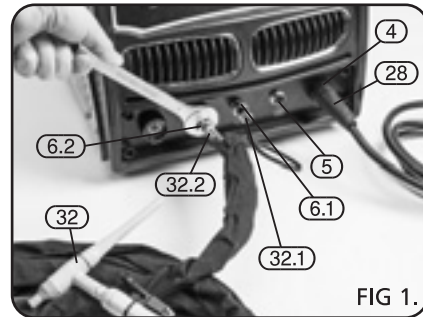


FIG 1.

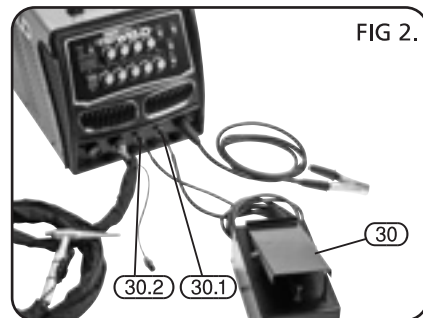


FIG 2.

8. PREPARING THE WELDER

8.4 MMA (MANUAL METAL ARC) - FIG. 3

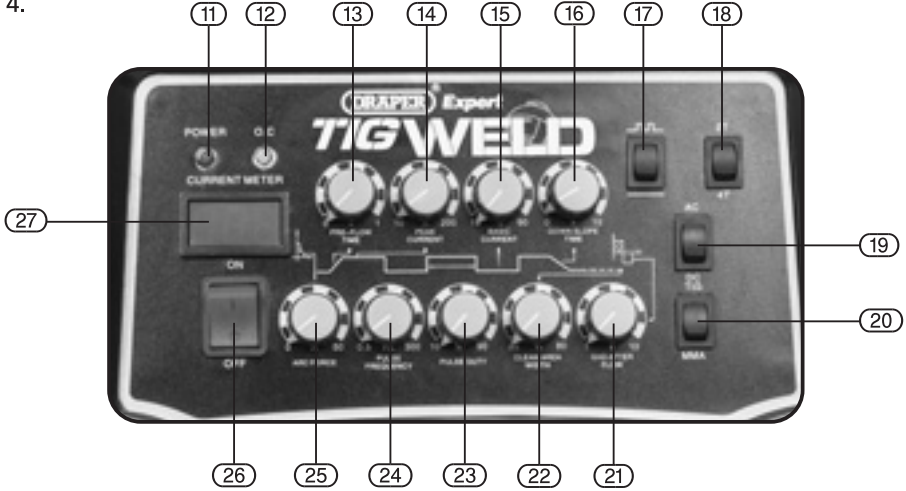
To attach the electrode holder (29) to the front panel, insert the plug into coupling (8) and twist to lock.

Attach the earth clamp (28) to the coupling (5) and twist to lock.



9. BASIC WELDING OPERATION

FIG 4.



NOTE: Although this machine is light 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 (20)

Select either MMA for stick arc welding (SMAW) or TIG for tungsten arc welding (GTAW).

9.2 OUTPUT SELECTION SWITCH (19)

Selecting either AC for welding aluminium and its alloys or DC for TIG welding steel types and when stick welding (SWAW).

9.3 TIG TORCH SWITCH MODE (18)

Select 2T when making short weld runs and 4T for longer runs to help avoid fatigue.

In 2T mode; to begin welding press the torch trigger and upon completion (allowing for downslope) release the trigger.

In 4T mode; To begin welding press and hold the torch trigger. Once the basic current has reached the peak current release the trigger to continue welding. To complete the weld, press and hold the torch trigger again to initiate the downslope before releasing the trigger completely.

9.4 CONSTANT OR PULSE CURRENT (17)

This applies to DC TIG welding only.

When operating in pulse mode the welding machine alternates the output from high to low amperages (as per the setup), which continually allows the weld pool to start solidifying. This can allow welding on thinner materials by avoiding burn through and can reduce distortion.

9. BASIC WELDING OPERATION

9.5 PRE-FLOW TIME (0 - 1 SECS) - FIG. 5

Adjust the pre-flow time dial (13) to regulate the flow of shield gas before welding begins. This will help purge the weld area of air before the ARC is struck.

9.6 PEAK CURRENT (10 - 160 AMPS)

When operating the pulse frequency mode for TIG welding; Adjust the peak current dial (14) to set the upper limit of each pulse.

When not operating the pulse frequency the peak current dial (14) adjusts the output current.

9.7 BASIC CURRENT (10 - 90%)

When operating the pulse frequency mode for TIG welding; Adjust the basic current dial (15) to set the lower limit of each pulse. It is a % of the peak current.

9.8 DOWNSLOPE TIME (0 - 10SECS)

To help prevent burn through at the end of a weld joint the current will reduce slowly over a period of 0 - 10 seconds.

Adjust the downslope time dial (16) appropriately for the situation and material.

9.9 ARC FORCE (0 - 50AMPS)

When MMA welding the ARC force dial (25) can be adjusted to change the characteristic of the ARC. When set higher the ARC will "dig" further into the weld pool. It can help avoid the rod becoming stuck due to a drop in amperage, however it can have some drawbacks for example over melting the base metal.

9.10 PULSE FREQUENCY (0.5 - 300HZ)

When operating the pulse frequency mode for the TIG welding; adjust the pulse frequency dial (24) to set the change from low to high per second.

CAUTION: Certain settings can produce a type of strobe effect. Lower pulse frequencies are preferable for thinner metals.

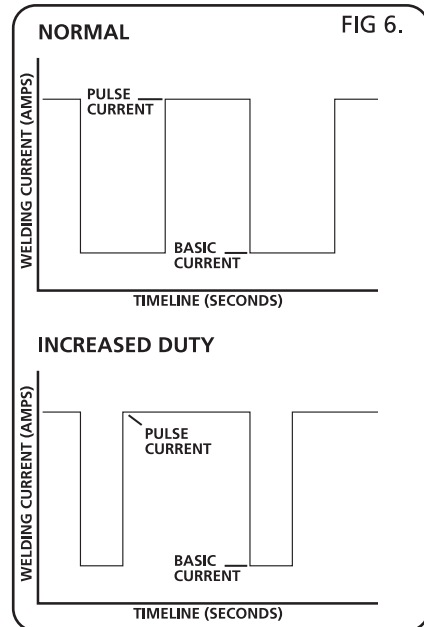
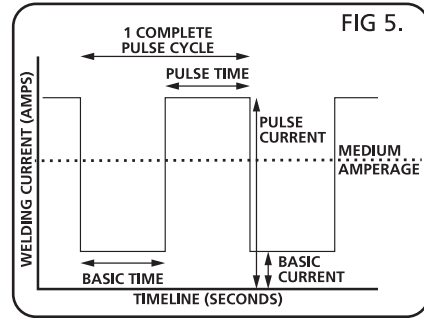
Also, slower pulses make it easier to produce a neater weld as the filler can be added in time with a pulse.

9.11 PULSE DUTY (0 – 90%) - FIG. 6

When operating the pulse frequency mode for the TIG welding; adjust the pulse duty dial (23) to set the balance between high and low amperage. Increasing the pulse duty extends the time the amperage is at pulse current and reduces the basic current time.

9.12 CLEAN AREA WIDTH (20 – 80%)

Sometimes referred to as balance control; adjusting the clean area width dial (22) will alter the shape of the arc and the weld pool. Similar to the pulse duty it alters the balance of high and low amperage.



9. BASIC WELDING OPERATION

9.13 GAS AFTER FLOW (1 – 10SECS)

Similar to the pre-flow; the gas after flow dial (21) regulates the length of time shield gas continues to flow after the trigger is released. Holding the torch over the weld pool while the post gas is flowing will protect in from contamination while it solidifies. It also is used in conjunction with downslope time.

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

9.14 TUNGSTEN ELECTRODES - SELECTION & PREPARATION - FIGS. 8 - 10

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.

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).

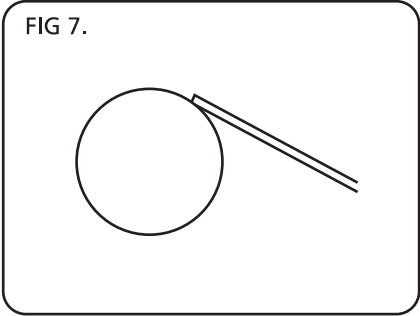
There are a variety of different tungsten electrodes available with the most common categories underlined:

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

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%.

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.



9. BASIC WELDING OPERATION

The general rule is to grind the point's length to match the electrodes diameter (Fig.8).

However for low amperage/smaller diameter electrodes the points length should be double the electrodes diameter (Fig.9).

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.

NOTE: When the output is AC the tip should be rounded.

FIG 8.

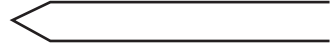


FIG 9.



FIG 10.



9.15 MACHINE OPERATION

No tig filler wire is supplied with this machine, however a list of accessories are displayed in the optional accessories on page 19. 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 (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.

9. BASIC WELDING OPERATION

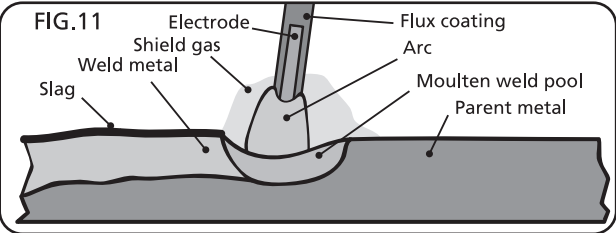
9.16 FILLER ROD (ELECTRODE) SELECTION - FIG. 11

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.

9.17 MACHINE OPERATION - FIGS. 12

Prepare the joint(s) to be welded.

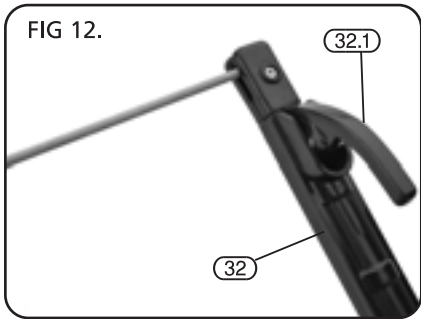
Select the electrode suitable for the application and insert into the electrode holder (32) while pressing lever (32.1).

With the earth clamp and electrode holder connected according to page 10 connect the machine to the power supply. The power indicator (11) 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.



9. BASIC WELDING OPERATION

9.18 DIRECTION OF WELD - FIG. 13

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' both to ensure smooth welding.

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.

When operating outdoors, measures to create a wind break may be necessary to avoid the shield gas breaking down resulting in a poor weld.

The position of the electrode is critical to the arc and the end result. Achieving a good weld will take practice.

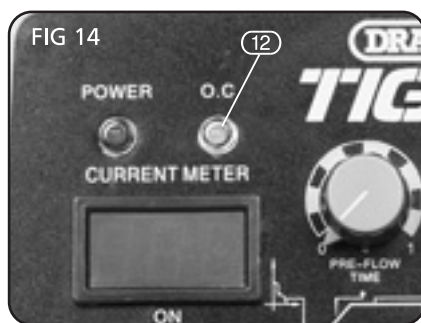
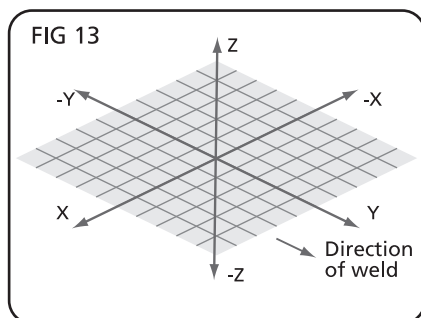
For more detailed information refer to a welding book and/or seek training on the subject.

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.

9.19 THERMAL CUT-OUT INDICATOR - FIG. 14

If welding with a high duty cycle or for extended periods with a low duty cycle the thermal cut-out will activate prohibiting use of the machine until sufficiently cool. The thermal cut-out indicator (12) 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.



9. BASIC WELDING OPERATION

9.20 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.

10. 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
32112	W482	900cc Argon Gas Bottle (12 pcs)
57553	W627	1.6mm Thorium Alloy Tungsten Electrode (Red)

11. MAINTENANCE

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

Regularly inspect the machine, especially the cables and electrode holders, for signs of wear and tear.

Do not allow dust to accumulate in and around the machine. Vacuum out regularly.

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.

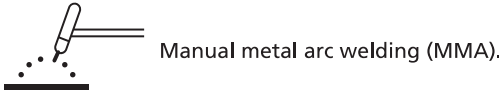
If the replacement of the supply cord is necessary, this has to be done by the manufacturer or his agent in order to avoid a safety hazard.

11. EXPLANATION OF SYMBOLS

11.1 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



Semiconductor diode rectifier.[†]

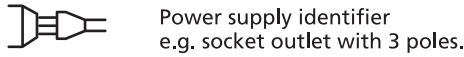


Warning.

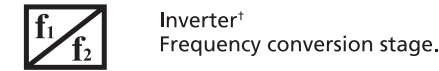


Read instruction manuals before operating and servicing this equipment.

Pictogram Symbols:



Do not dispose of WEEE*
as unsorted municipal waste.



[†] Symbols can be combined
for example:



Single Phase Static Frequency
Converter/Transformer Rectifier.

* Waste Electrical & Electronic Equipment.

12. DISPOSAL

12.1 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.



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- **General Enquiries:** (023) 8026 6355
- **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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