WeldForce by Weldclass

WF-140ST INVERTER WELDER

WF-180ST INVERTER WELDER

OPERATING INSTRUCTIONS

Edition 1

☞IMPORTANT!

To qualify for full 36 month warranty, you must register within 30 days of purchase. See inside for details.

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

Congratulations & thank you for choosing WeldForce!

The WeldForce range from Weldclass provides market leading value, features and durability. WeldForce machines have been designed with emphasis on robust construction, with simple and functional operation.

Register Your Warranty Now

Standard warranty without registration is 24 months.
To qualify for an extended full 36 month warranty on your purchase you must register within 30 days of purchase.

Please register your warranty now by going to:

www.weldclass.com.au/weldforcewarranty

You will need;

a) A copy of your purchase invoice / receipt.
b) Your machine serial number which can be found on the technical data plate on the back of the machine, or on the outside of the box that your machine came in.

1 CONTENTS

2 BASIC SPECIFICATIONS

Description	WeldForce WF-140ST	WeldForce WF-180ST
Part Number	WF-06170	WF-06171
Dimensions of Power Source (L x W x H)	250 x 135 x 220mm	290 x 135 x 220mm
Weight of Power Source	4kg	4.5kg
Standard	AS 60974.1	
Power Supply	240V +/- 15% 50hz Single Phase	
Factory Fitting Supply Plug Rating	10A	15A
Effective Input Current (I_{1eff})	10A	15A
Maximum Input Current (I_{1max})	35A	38A
Output Terminals	Dinse™ style 10-25	Dinse™ style 35-50
Protection Class	IP23	
Stick (MMA) Welding		
Welding Current Output	10 – 140A	10 – 180A
Duty Cycle	140A / 25.6V @ 15% 70A / 22.8V @ 60% 55A / 22.2V @ 100%	180A / 27.2V @ 15% 90A / 23.6V % 60% 70A / 22.8V @ 100%
Nominal Open Circuit Voltage	55V	70V
MMA Electrode Size	1.6 – 3.2mm	1.6 – 4.0mm
TIG Welding		
Welding Current Output	10 – 200A	10 -180A
Duty Cycle	140A / 15.6V @ 15% 70A / 12.8V @ 60% 55A / 12.2V @ 100%	180A / 17.2V @ 15% 70A / 12.8V @ 60% 55A / 12.2V @ 100%
Nominal Open Circuit Voltage	55V	70V
TIG Tungsten Size	1.6 – 2.4mm	1.6 – 3.2mm

Table 1

For full machine specifications, refer to technical data plate on back of machine – or go to:
www.Weldclass.com.au/WF-140MST / www.Weldclass.com.au/WF-180MST

3 KNOW YOUR MACHINE

3.1 Machine Front

1. Carry Handle
2. Control panel
3. Positive (+) Welding Power Output Connection Socket
4. Negative (-) Welding Power Output Connection Socket

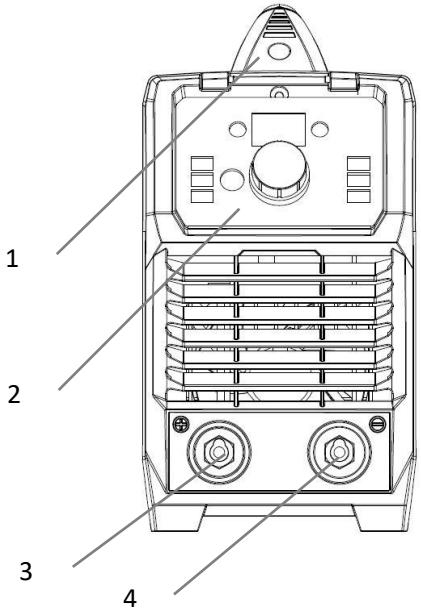

Figure 1

3.2 Machine Rear

5. Mains Power Switch
6. 240V AC Mains Power Input Lead

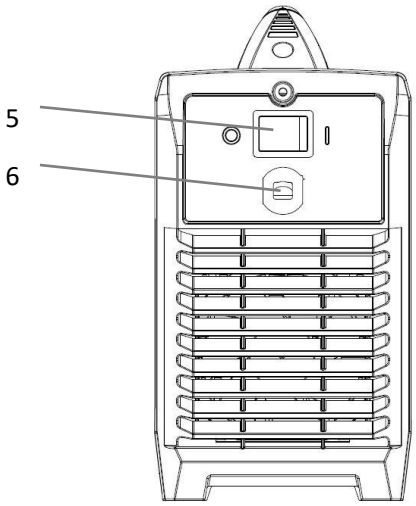

Figure 2

3.3 Control Panel

7. Power On Indicator Light
8. Stick (MMA) Process Indicator Light
9. VRD Active Indicator Light
10. Process Selection Button (Process)
11. Lift TIG Process Indicator Light
12. Selection Knob
13. Arc Force Setting Indicator Light
14. Hot Start Setting Indicator Light
15. Amps Setting Indictor Light
16. Error/Over Temperature Indicator Light
17. LCD Readout

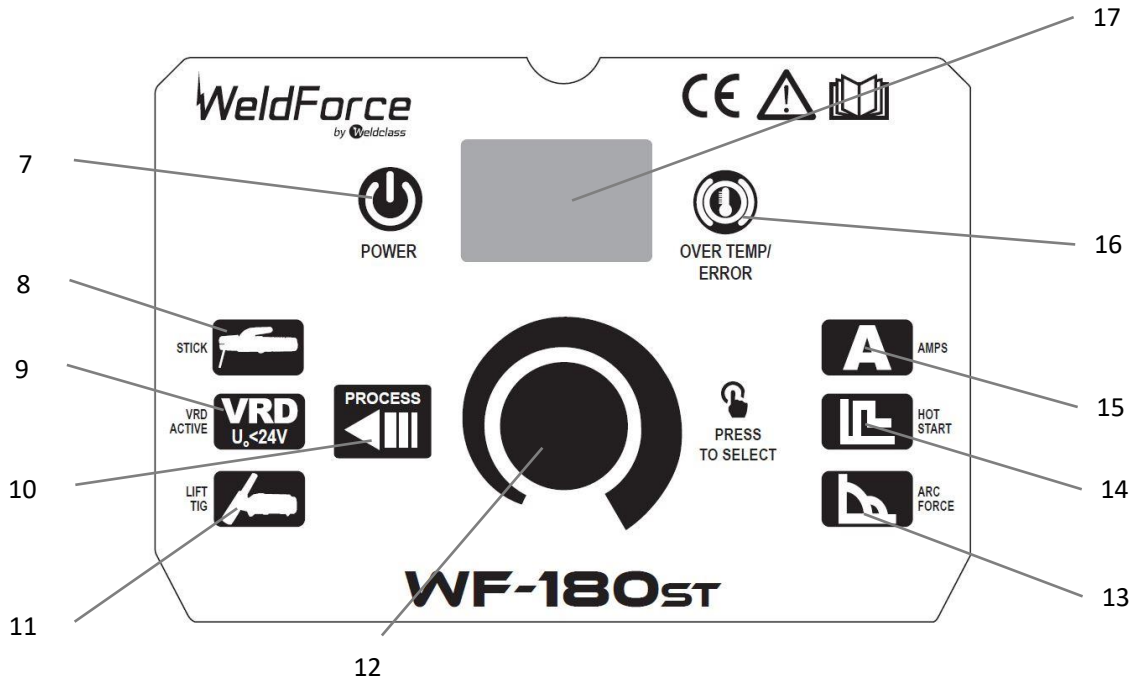

Figure 3

3.4 Symbols chart

I	Power On
O	Power Off
	Power On Indication
	Fault Indication
	Caution / Hazard
	Read Instruction Manual
VRD U_o<24V	VRD Active
	TIG Function
	Stick/MMA Function
	Hot Start
	Arc Force
	Amperage (current) output
	Voltage output
	Increase/Decrease

	Single phase Inverter power source DC
	Stick/MMA (SMAW) Function
	TIG (GTAW) Function
	Power Supply Connection
1 ~	Single Phase
	Direct Current (DC)
–	Negative
+	Positive
Hz	Hertz (cycles/sec)
X	Duty Cycle
A	Amperage (Current)
V	Voltage

Table 2

4 CONTROLS EXPLAINED

4.1 Weld Process Selection

1. Press ‘Process’ button (10) until the desired Welding Process Indicator Light (8 or 11) is lit.

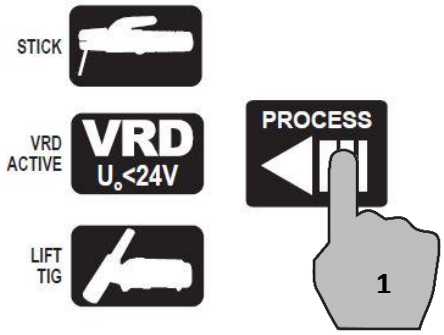

Figure 4

4.2 Setting Selection

1. Press the Selection Knob (12) down until the desired Setting Indicator Light is illuminated (13, 14 or 15)
2. Rotate the Selection Knob (12) to adjust parameter for the chosen Setting

Figure 5

4.2.1 Amps

This is the output welding amperage.

4.2.2 Hot Start Adjustment (Stick)

Hot Start setting is adjustable from 0 – 10. Hot start provides extra power when the weld starts to counteract the high resistance of the electrode and workpiece as the arc is started. It makes igniting the electrode easier and prevents it from sticking when cold. 0 is Hot-Start off, 10 is maximum Arc Force (around 20-30A higher than the set welding current/amps).

4.2.3 Arc Force Adjustment (Stick)

Arc Force setting is adjustable from 0 – 10. (Sometimes called 'Dig' or 'Arc Control'). A Stick welder is designed to produce constant output current (CC). This means with different types of electrode and arc length; the welding voltage varies to keep the current constant. This can cause instability in some welding conditions as Stick welding electrodes will have a minimum voltage they can operate with and still have a stable arc.

Arc Force control boosts the welding power if its senses the welding voltage is getting too low. The higher the arc force adjustment, the higher the minimum voltage that the power source will allow. This effect will also cause the welding current to increase. 0 is Arc Force off, 10 is maximum Arc Force (around 20-30A higher than the set welding current/amps). This is practically useful for electrode types that have a higher operating voltage requirement or joint types that require a short arc length such as out of position welds.

4.3 Error/Over Temperature Indicator Light

Error/Over Temperature Indicator Light (16) illuminates when duty cycle is exceeded and thermal protection is activated. When thermal protection is activated, welding output will be disabled until machines cools sufficiently and overload indicator lamp goes out.

This may also activate if there are electronic circuit failure issues.

Figure 6

4.4 Optional VRD Function

This function is disabled by default. To have this feature enabled please contact your WeldForce distributor.

When enabled VRD function reduces the welding machines' open circuit voltage (OCV, or no-load voltage) to a much safer level of U_0<24V. OCV is the voltage measured across the positive and negative terminals when welding is <u>not</u> in progress.

The VRD function will turn on full welding power/voltage when the resistance between the electrode and work piece is less than 200 Ohms (i.e. metal to metal contact).

When the VRD function is active, the VRD Active Indicator Light (9) is illuminated.

Figure 7

5 POWER SUPPLY

5.1 Electrical Connection

WF-140ST
The WF-140ST is designed to operate on a 10A 240V AC power supply.

WF-180ST
The WF-180ST is designed to operate on a 15A 240V AC power supply.

5.2 Extension Leads

If an extension cord must be used, it should be minimum cable core size 2.5mm^2.
Using extension leads of over 50m is not recommended.

5.3 Generator Use

This machine is designed with generator use in mind and incorporates wide voltage tolerance and intelligent voltage sensing technology to provide maximum protection from power fluctuations that can occur with motor generators.

5.3.1 Generator Size

WF-140ST
Generator size should be not less than 7kva. An 7kVa generator may not provide enough power to enable full output and duty of this welder.
To ensure full output and duty cycle of this welder a minimum recommended generator size is minimum 8kVa.

WF-180ST
Generator size should be not less than 8kva. An 8kVa generator will not provide enough power to enable full output and duty of this welder. However, it should provide sufficient power to run a general purpose 3.2mm with reasonable duty cycle.
To enable full output and duty cycle of this welder a minimum recommended generator size is minimum 10kVa.

5.3.2 Generator Quality & Warranty Limitations

Avoid using poor, low quality generators as these have the greatest risk of power spikes etc. A suitable quality generator should have a THD (total harmonic distortion) rating of no more than 6%. Most reputable generator suppliers will be able to specify the THD ratings on their product.
Any damage caused by poor quality generator power supply or incorrect use is not covered under warranty.

5.3.3 3 Golden Rules of Generator use

When running an inverter welder off a generator there are 3 **VERY IMPORTANT** Golden Rules that ***MUST*** be followed:

1. Do **NOT** plug welder into generator until **AFTER** generator has been started up and is running smoothly
2. **UNPLUG** welder from generator **BEFORE** shutting generator down/turning generator off
3. **NEVER** let your generator run out of fuel whilst the welder is plugged in.

Following these Golden Rules will significantly reduce the risk of any damage resulting from generator power supply.

6 OPERATING ENVIRONMENT

6.1 Location

The machine has electrical components and control circuit boards which may be damaged by excessive moisture, dust and dirt, so a clean and dry operating environment is important for reliable product life.

The enclosure design of this power source meets the requirements of IP23S as outlined in AS60529. This provides adequate protection against solid objects (greater than 12mm), and direct protection from vertical drops. Under no circumstances should the unit be operated or connected in a micro environment that will exceed the stated conditions. For further information please refer to AS 60529.

6.2 Ventilation

Adequate ventilation is required to provide proper cooling for the machine. Ensure that the machine is placed on a stable level surface where clean cool air can easily flow through the unit.

7 BASIC OPERATION

7.1 Stick (MMA) Welding Operation

1. Connect the earth cable quick connector to the Negative (-) Welding Power Output Socket (4)
2. Connect the earth clamp to the work piece. Contact with the work piece must be firm contact with clean, bare metal, with no corrosion, paint or scale at the contact point.
3. Insert an electrode into the electrode holder and connect the electrode holder and work lead to the Positive (+) Welding Power Output Socket (3).

NOTE: *This polarity connection configuration is valid for most GP (General Purpose) MMA electrodes. There are variances to this, also many electrodes will run in either polarity setting (electrodes positive or electrode negative, with slight difference in performance. If in doubt, check the electrode specifications or consult the electrode manufacturer.*

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4. Connect the machine to suitable power. Switch the mains power switch (5) to 'on' to power up the machine.
5. Set welding process selector to 'Stick' (refer to 4.1)
6. Select the required output current using the Selection Knob (12). The LCD Readout (17) will display the set amperage output.
7. Adjust special Function settings if required (refer to 4.2)
8. You are now ready to weld!

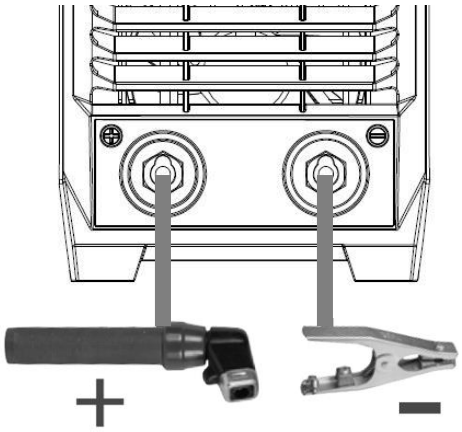


Figure 8

7.2 Lift TIG Operation

NOTE: Lift TIG operation requires an optional manual valved TIG torch, argon gas cylinder & regulator.

NOTE: The WF-140ST / WF-180ST is a DC (Direct Current) output welder only, this means that it is unable to TIG weld reactive metals such as Aluminium alloys and Brass (which require AC output). DC TIG output is suitable for steel, stainless steel and copper.

1. Connect the earth cable to the Positive (+) Welding Power Output Socket (3)
2. Connect the earth clamp to the work piece. Contact with the work piece must be firm contact with clean, bare metal, with no corrosion, paint or scale at the contact point.
3. Insert TIG torch power connection into the Negative (-) Welding Power Output Socket (4)
4. Connect valve TIG torch gas line to the regulator, ensuring all connections are tight.
5. Open gas cylinder valve and adjust regulator. Flow should be between 5-10 l/min depending on application. Re-check regulator flow pressure with torch valve open as static gas flow setting may drop once gas is flowing.
6. Connect the machine to suitable power. Switch the mains power switch (5) to 'I' to power up the machine.
7. Set welding process selector to 'TIG' (refer to 4.1)
8. Select the required output current using the Selection Knob (12). The LCD Digital Readout (17) will display the set amperage output.
9. You are now ready to weld!

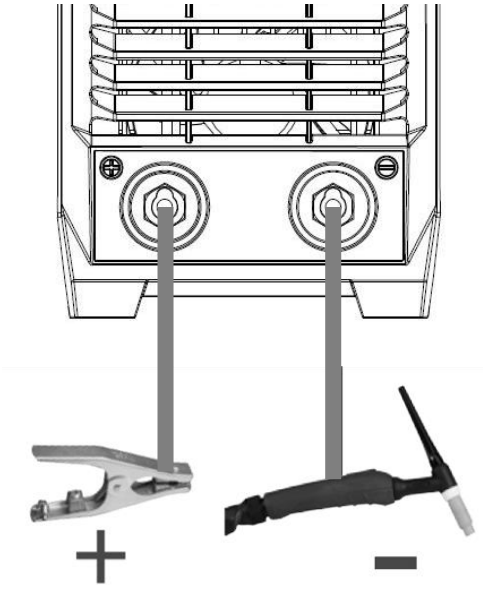


Figure 9

8 ACCESSORIES, SPARE PARTS & CIRCUIT DIAGRAMS

8.1 TIG Torch and Spares (Optional Extra):

The compatible TIG torch for this machine is the Weldclass 3-TTU2917V/4 torch.
To view this torch and parts, go to: www.weldclass.com.au

Part No.	Description
3-TTU2917V/4	Complete TIG Torch – with Valve – 4m
3-TTU2917V/8	Complete TIG Torch – with Valve – 8m
P3-TB17V	Torch Body - 17 Standard (Valved)
P3-TB17FV	Torch Body - 17FV Flexible (Valved)
WC-57Y02P	Back cap – Long Pk2
WC-57Y05P	Back cap – Medium Pk2
WC-57Y04P	Back cap – Short Pk2
P3-10N23	Collet – 1.6mm
P3-10N24	Collet – 2.4mm
P3-10N25	Collet – 3.2mm
P3-10N31	Collect Body – 1.6mm Pk2
P3-10N32	Collect Body – 2.4mm Pk2
P3-10N28	Collect Body – 3.2mm Pk2
P3-10N49	TIG Ceramic Cup - #5 7.9mm Pk2
P3-10N48	TIG Ceramic Cup - #6 9.5mm Pk2
P3-10N47	TIG Ceramic Cup - #7 11.1mm Pk2
P3-10N46	TIG Ceramic Cup - #8 12.7mm Pk2
P3-10N45	TIG Ceramic Cup - #10 15.8mm Pk2
WC-05192	TIG Tungsten RE4 – 1.6mm Pk10
WC-05193	TIG Tungsten RE4 – 2.4mm Pk10
WC-05194	TIG Tungsten RE4 – 3.2mm Pk10

Table 3

Figure 10

8.2 Optional Accessories

Optional Accessories	
Part No.	**Drive Roller**
WC-06235	Welding Trolley
WC-01775	Welding Gloves

Table 4

8.3 Machine Spare Parts:

For machine parts, go to www.weldclass.com.au/machines or contact your Weldclass distributor.

WF-140ST	
Ref.	**Description**
1	Handle
2	Cover
3	Rear panel
4	On/Off switch
5	Power cable clip
6	Cooling fan assembly sheet
7	Cooling fan
8	Support pillar
9	Heatsink
10	Base panel
11	Recovery diode
12	Main PCB
13	Front panel
14	Euro socket
15	Front panel assembly sheet
16	Knob
17	Control PCB
18	Heatsink
19	Heatsink
20	Heatsink
21	Insulation part
22	IGBT
23	Rectifier
24	EMC PCB assembly sheet
25	EMC PCB

Table 5

WF-180ST	
Ref.	**Description**
1	Handle
2	Cover
3	Heatsink
4	Rear panel
5	On/Off switch
6	Power cable clip
7	Cooling fan assembly sheet
8	Cooling fan
9	Heatsink
10	Inductor
11	Base panel
12	Assembly part
13	Recovery diode
14	Heatsink
15	Front panel
16	Euro socket
17	Front panel assembly sheet
18	Knob
19	Control PCB
20	IGBT
21	Insulation part
22	Recovery diode
23	Main PCB
24	Insulation part
25	Rectifier
26	EMC PCB assembly sheet
27	EMC PCB

Table 6

WF-140ST

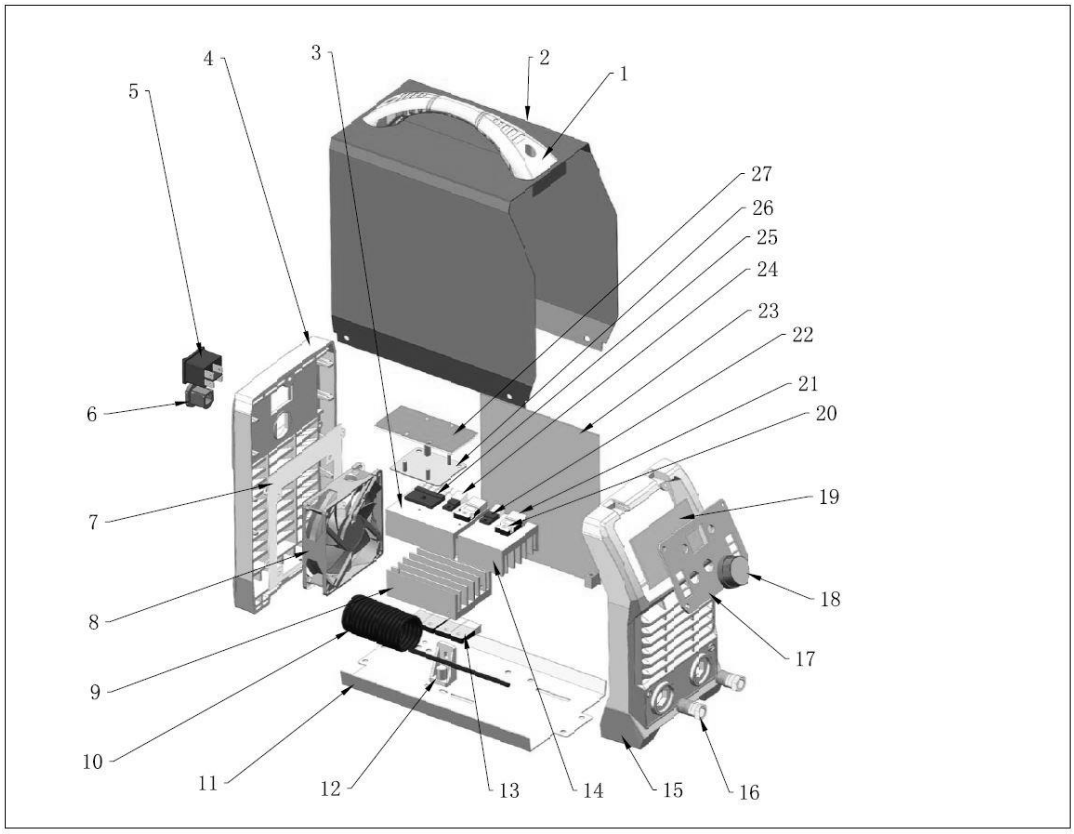


Figure 11

WF-180ST

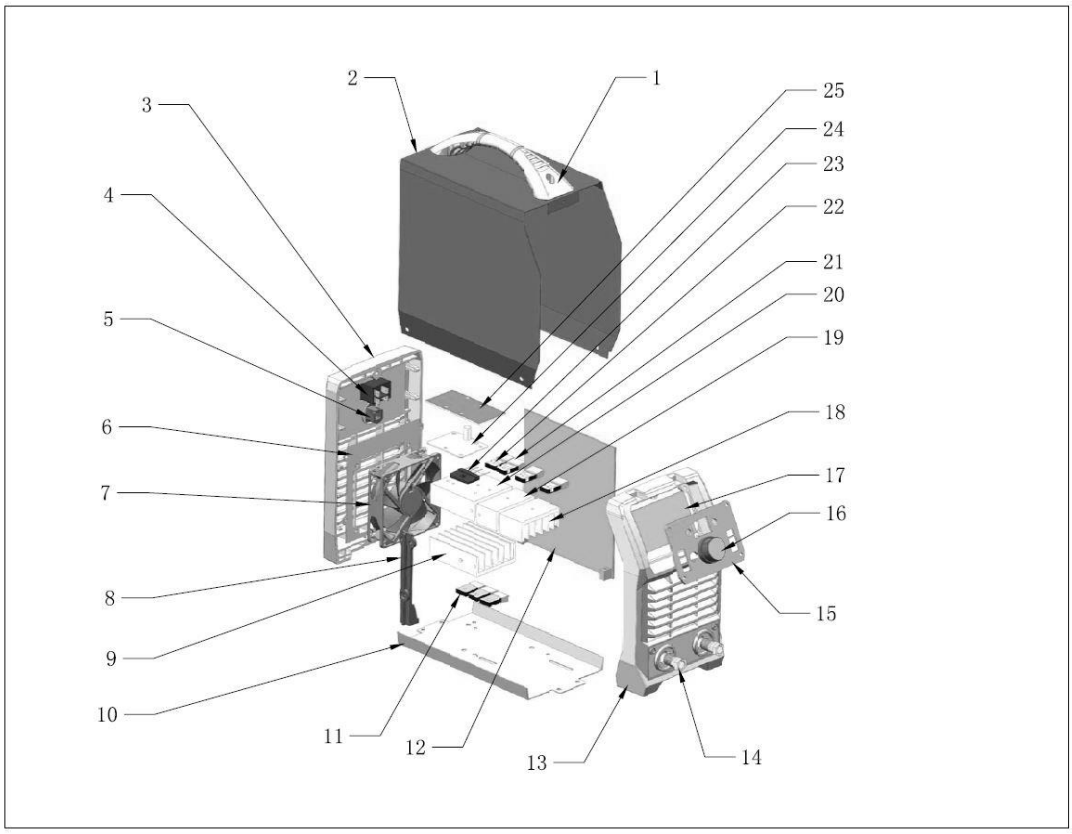


Figure 12

8.4 Primary Schematic Circuit Diagram

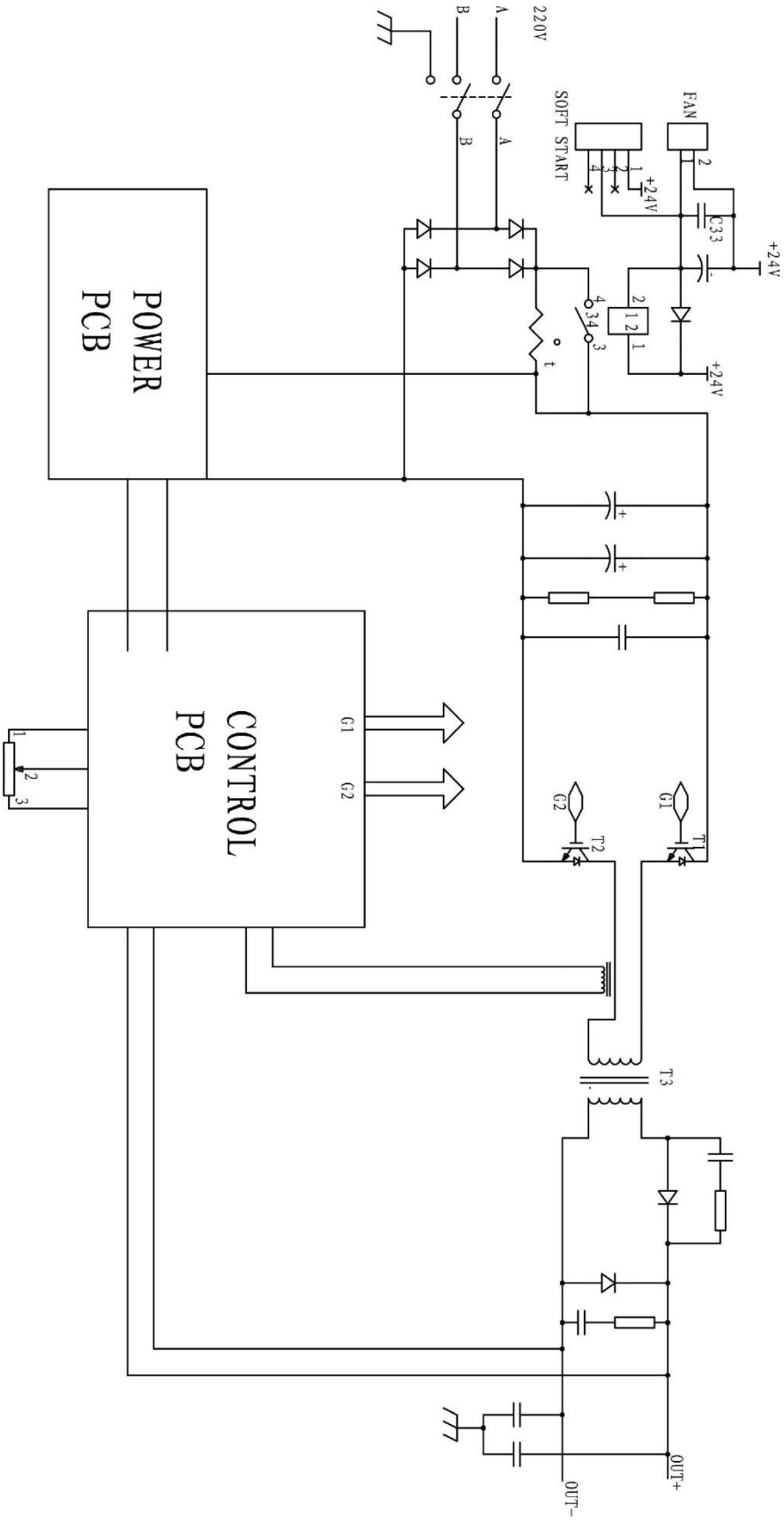


Figure 13

9 CARE & MAINTENANCE

9.1 Keep your Welding Machine in Top Condition

This WeldForce machine does not require any special maintenance, however the user should take care of the machine as follows:

1. Regularly clean the ventilation slots
2. Keep the casing clean
3. Check all cables before use
4. Check electrode holders, work lead/clamps and welding torches before use
5. Replace worn electrode holders and earth clamps, which do not provide a good connection
6. Replace worn torch consumable parts in a timely manner
7. Use a soft cloth or brush to clean electrical components. Do not use liquid cleaning products, water or especially solvents
8. Do not use compressed air to clean electrical components as this can force dirt and dust further into components, causing electrical short circuits
9. Check for damaged parts

WARNING! *Before performing cleaning/maintenance, replacing cables/connections, make sure the welding machine is switched off and disconnected from the power supply.*

If damaged, before further use, the welder must be carefully checked by a qualified person to determine that it will operate properly. Check for breakage of parts, mountings and other conditions that may affect its operation.

Have your welder repaired by an expert. An authorised service centre should properly repair a damaged part.

This appliance is manufactured in accordance with relevant safety standards. Only experts must carry out repairing of electrical appliances, otherwise considerable danger for the user may result.
Use only genuine replacement parts. Do not use modified or non-genuine parts.

9.2 Storing the Welder

When not in use the welder should be stored in the dry, dust-free and frost-free environment.

10 GENERAL GUIDE TO WELDING

10.1 Duty Cycle Rating

WeldForce welding machines are fitted with thermal overload protection which means the machine will cut out when it reaches a certain temperature, to prevent damage to components. The machine will then re-start when it returns to a safe temperature.
Duty cycle is a measure of the percentage of time a machine will operate within a certain time period at a given amperage. For example a duty cycle of 160A @ 25% means that a machine will operate at 160A for 2 ½ minutes in a 10 minute time period. The machine will have to rest for the remaining 7 ½ minutes to enable it to cool down.
The international standard for duty cycle rating is based on an ambient air temperature of 40°C with 50% humidity, over a 10 minute period. In an environment with temperatures exceeding 40°C, the duty cycle will be less than stated. In ambient temperature less than 40°C, duty cycle performance will be higher. There are numerous other factors that can influence actual duty cycle performance.

10.2 Choosing a Welding Process – Stick or TIG?

10.2.1 The Stick (MMA) Process

10.2.1.1 Description

The acronym MMA (or MMAW) stands for Manual Metal Arc Welding. 'Manual' refers to the fact that the MMA process requires the operator to apply filler metal (in contrast to MIG 'semi-automatic' welding where the machine feeds the filler metal into the weld). 'Metal' refers to the fact that the filler metal itself (the stick electrode) is used to conduct the welding current to the job. MMA welding is commonly known as 'stick-electrode' or 'arc' welding.

10.2.1.2 Process

The MMA process involves the electrode being touched on the job to ignite the arc. The electrode is held in the electrode holder and must be continually replaced as it is consumed. The electrode consists of a metal core, which is the filler metal, covered by a flux coating which shields the weld and prevents it from oxidising. During welding the flux forms into a slag covering the weld which is chipped off after the weld has formed.

10.2.1.3 Advantages

MMA welding offers several advantages over alternative welding processes. Primarily it has a greater capacity than MIG welding, or in other words it can weld heavier materials with the same amperage output. For this reason small, portable inverter welders like the WeldForce machines, have the capacity to weld with up to 3.2mm or 4mm electrodes making it suitable for a vast range of applications without the complication of shielding gas or wire feeding. Moreover, MMA welding is typically more 'forgiving' than MIG or TIG when welding rusty or dirty materials (which makes it ideal for maintenance applications).

10.2.1.4 Limitations

Traditionally, welding thin materials whilst avoiding "blow-through" can be tricky with the MMA process. This being said, however, welding thin materials with a WeldForce machine will be noticeably easier because the arc is so stable and the output can be very finely adjusted down to very low amps.

10.2.1.5 Materials

MMA welding can be used with a wide variety of electrodes including general purpose, low hydrogen, stainless steel, iron powder, hard facing & cast iron just to name a few.

10.2.2 The TIG Process

10.2.2.1 Description

The acronym TIG stands for Tungsten Inert Gas. Tungsten refers to the type of conductor (a tungsten electrode) that is used to transfer the welding current to the job and create the arc. Inert Gas refers to the fact that the process relies on an inert gas to prevent weld oxidisation.
Also referred to as Gas Tungsten Arc Welding (GTAW).

10.2.2.2 Process

In simple terms, TIG welding is probably most similar to oxy flame welding. However, instead of a flame it uses an electrical arc to melt the job and filler metal, and instead of a preheat flame it uses inert gas to prevent weld oxidisation. Like oxy flame welding, the filler metal is fed into the weld by hand as required. Due to the fact that the current is not conducted to the job via the filler metal, (as it is in MIG and MMA welding), the arc is much more controllable.

10.2.2.3 Advantages

Very low amperages can be achieved making this process ideal for welding thin materials. Also, due to the independence of the arc and the filler metal application, TIG welding is very controllable and can therefore achieve very high quality welds with excellent appearance. Unlike MIG and MMA welding, TIG welding does not produce spatter so clean up is very minimal. It is typically used where weld appearance is critical (e.g. handrails) or where weld quality is vital (e.g. pressure vessels or pipes).

10.2.2.4 Limitations

Whilst TIG welding is very controllable, it can also be slower and more tedious than MIG or MMA welding and it will generally not operate well on dirty or rusty materials meaning that additional weld preparation is sometimes necessary. It also requires a higher level of skill and experience to achieve a quality result.

10.2.2.5 Materials

This machine incorporates DC TIG function which can be used to weld a variety of materials including mild steels, stainless steels, copper and chrome moly.
Note: TIG welding is often associated with welding of aluminium, however, aluminium TIG welding is only possible with AC/DC TIG welding machines. This machine is DC only and is not designed for TIG welding of aluminium.

10.3 Joint Preparations

In many cases, it will be possible to weld steel sections without any special preparation. For heavier sections and for repair work on castings, etc., it will be necessary to cut or grind an angle between the pieces being joined to ensure proper penetration of the weld metal and to produce sound joints. In general, surfaces being welded should be clean and free of rust, scale, dirt, grease, etc. Slag should be removed from oxy-cut surfaces. Typical joint designs are shown in the following figures.

Open Square Butt Joint

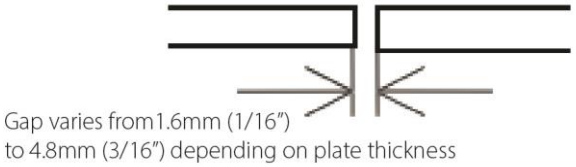


Figure 14

Single Vee Butt Joint

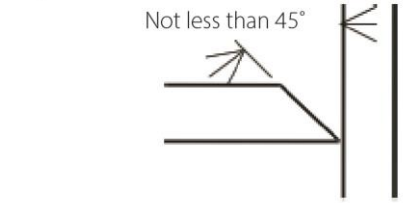


Figure 15

Single Vee Butt Joint

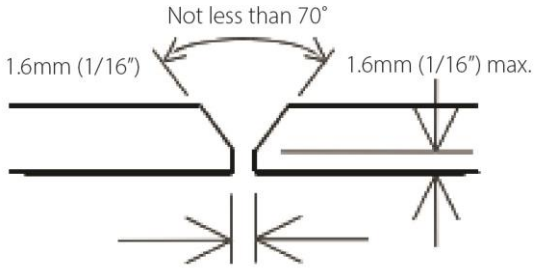


Figure 16

Double Vee Butt Joint

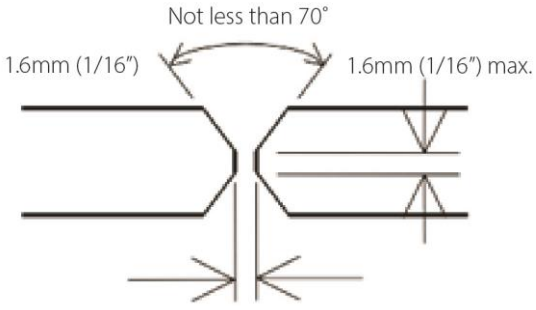


Figure 17

Lap Joint

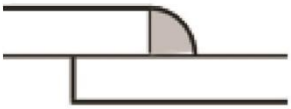


Figure 18

Fillet Joint

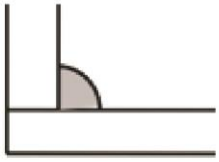


Figure 19

Tee Joints

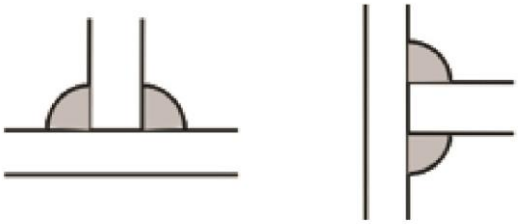


Figure 20

Edge Joint

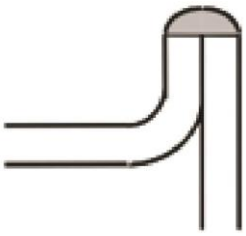


Figure 21

Corner Weld

Figure 22

Plug Welds

Figure 23

11 STICK (MMA) BASIC WELDING GUIDE

11.1 Size of Electrodes

The electrode size is determined by the thickness of metals being joined and can also be governed by the type of welding machine available. Small welding machines will only provide current (amperage) to run smaller sized electrodes. For thin sections, it is necessary to use smaller electrodes otherwise the arc may burn holes through the job. A little practice will soon establish the most suitable electrode for a given application.

11.2 Storage of Electrodes

Always store electrodes in a dry place and in their original containers. If electrodes have been exposed to moisture or moist air then they will need to be dried out using an electrode drying oven.

11.3 Electrode Polarity

Electrodes are generally connected to the electrode holder with the electrode holder connected positive polarity.
The work lead is connected to the negative polarity and is connected to the work piece. If in doubt consult the electrode data sheet.

11.4 Effects of Stick (MMA) Welding on Various Materials

11.4.1 High Tensile and Alloy Steels

The two most prominent effects of welding these steels are the formation of a hardened zone in the weld area, and, if suitable precautions are not taken, the occurrence in this zone of under-bead cracks. Hardened zone and under-bead cracks in the weld area may be reduced by using the correct electrodes, preheating, using higher current settings, using larger electrodes sizes, short runs for larger electrode deposits or tempering in a furnace.

11.4.2 Manganese Steels

The effect on manganese steel of slow cooling from high temperatures causes embrittlement. For this reason it is absolutely essential to keep manganese steel cool during welding by quenching after each weld or skip welding to distribute the heat.

11.4.3 Cast Iron

Most types of cast iron, except white iron, are weldable. White iron, because of its extreme brittleness, generally cracks when attempts are made to weld it. Trouble may also be experienced when welding white-heart malleable, due to the porosity caused by gas held in this type of iron.

11.5 Types of Electrodes

Arc Welding electrodes are classified into a number of groups depending on their applications. There are a great number of electrodes used for specialised industrial purposes which are not of particular interest for everyday general work. These include some low hydrogen types for high tensile steel, cellulose types for welding large diameter pipes, etc. The range of electrodes dealt with in this publication will cover the vast majority of applications likely to be encountered; are all easy to use.

11.5.1 MILD STEEL:

1. **General Purpose "GP" E6013 (Weldclass 12V):** This all-position electrode is used for maintenance and fabrication. Works well on mild steel, galvanized steel, sheet metal, steel tube and RHS. Its soft arc has minimal spatter, moderate penetration and an easy-to-clean slag. Tolerant to dirty / rusty steel & poor fit up. This is the most common type of electrode used for Stick welding.
2. **Hydrogen Controlled E7016 (Weldclass 16XT):** A "low-hydrogen" electrode commonly used for mild or high strength steel, where the joint requires higher strength than regular "GP" electrodes, such as highly restrained joints or components subject to higher load stress. Also used as a buffer layer prior to hard facing. All-Positional (except for vertical down), easy striking & smooth running, with low spatter & easy slag removal..

11.5.2 CAST IRON:

1. **Cast Iron Ni-Cl (NCI):** Suitable for joining all cast irons (Suitable for mehanite, alloy and malleable cast iron) except white cast iron. Weld positions : flat, horizontal.

11.5.3 STAINLESS STEEL:

1. **Stainless Steel 316L:** Used for welding common 300 series stainless steels such as 301, 302, 304, 304L and 316L. All welding positions, excluding vertical down. Very Smooth Running and Easy to use.
2. **Universal 312:** Weld-all style electrodes for welding almost any steel or stainless-steel, including dissimilar metals. Weld metal is very crack resistant. Commonly used for repair and maintenance welding of unknown steels. All welding positions excluding vertical down.

11.6 Suggested Settings for Typical Stick (MMA) Applications

Material	Electrode Type	Electrode Size	Amperage Range
Mild Steel	General Purpose Weldclass E12V (E6013)	2.6mm	60 – 100
		3.2mm	100 – 140
		4.0mm	140 – 190
Mild Steel	Hydrogen Controlled (High Strength) Weldclass 16XT (E7016)	2.5mm	60 – 110
		3.2mm	90 – 140
		4.0mm	130 – 190
Stainless Steel	Stainless Steel 316L	2.6mm	40 – 70
		3.2mm	100 – 150
		4.0mm	135 – 180

Table 7

These settings are a guide only. Actual settings required will depend on plate thickness, operator technique, environment, etc.

11.7 MMA Welding Techniques

11.7.1 A Word for Beginners

For those who have not yet done any welding, the simplest way to commence is to run beads on a piece of scrap plate. Use mild steel plate about 6.0mm thick and a 3.2mm electrode.
Clean any paint, loose scale or grease off the plate and set it firmly on the work bench so that welding can be carried out in the down hand position. Make sure that the Work Lead/Clamp is making good electrical contact with the work, either directly or through the work table. For light gauge material, always clamp the work lead directly to the job, otherwise a poor circuit will probably result.

11.7.2 The Welder

Place yourself in a comfortable position before beginning to weld. Get a seat of suitable height and do as much work as possible sitting down. Don't hold your body tense. A taut attitude of mind and a tensed body will soon make you feel tired. Relax and you will find that the job becomes much easier. You can add much to your peace of mind by wearing a leather apron and gauntlets. You won't be worrying then about being burnt or sparks setting alight to your clothes.
Place the work so that the direction of welding is across, rather than to or from, your body. The electrode holder lead should be clear of any obstruction so that you can move your arm freely along as the electrode burns down. If the lead is slung over your shoulder, it allows greater freedom of movement and takes a lot of weight off your hand. Be sure the insulation on your cable and electrode holder is not faulty; otherwise you are risking an electric shock.

11.7.3 Striking the Arc

Practice this on a piece of scrap plate before going on to more exacting work.
You may at first experience difficulty due to the tip of the electrode "sticking" to the work piece. This is caused by making too heavy a contact with the work and failing to withdraw the electrode quickly enough. A low amperage will accentuate it. This freezing on of the tip may be overcome by scratching the electrode along the plate surface in the same way as a match is struck.
Another difficulty you may meet is the tendency, after the arc is struck, to withdraw the electrode so far that the arc is broken again. A little practice will soon remedy both of these faults.

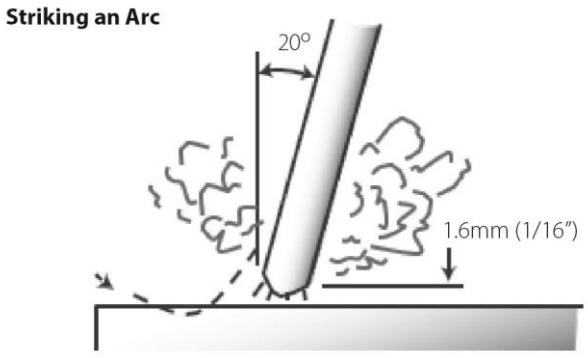


Figure 24

11.7.4 Arc Length

As soon as the arc is established, maintain a 1.6mm to 3.2mm gap between the burning electrode end and the parent metal. Draw the electrode slowly along as it melts down. The securing of an arc length necessary to produce a neat weld soon becomes almost automatic. You will find that a long arc produces more heat.
A very long arc produces a crackling or spluttering noise and the weld metal comes across in large, irregular blobs. The weld bead is flattened and spatter increases. A short arc is essential if a high quality weld is to be obtained although if it is too short there is the danger of it being blanketed by slag and the electrode tip being solidified in. If this should happen, give the electrode a quick twist back over the weld to detach it.

11.7.5 Rate of Travel

After the arc is struck, your next concern is to maintain it, and this requires moving the electrode tip towards the molten pool at the same rate as it is melting away. At the same time, the electrode has to move along the plate to form a bead.
The electrode is directed at the weld pool at about 20º from the vertical. The rate of travel has to be adjusted so that a well-formed bead is produced.
If the travel is too fast, the bead will be narrow and strung out and may even be broken up into individual globules. If the travel is too slow, the weld metal piles up and the bead will be too large.

11.8 Making Welded Joints

Having attained some skill in the handling of an electrode, you will be ready to go on to make up welded joints.

11.8.1 Butt Welds

Set up two plates with their edges parallel, as shown in Figure 25, allowing 1.6mm to 2.4mm gap between them and tack weld at both ends. This is to prevent contraction stresses from the cooling weld metal pulling the plates out of alignment.
Plates thicker than 6.0mm should have their mating edges beveled to form a 70º to 90º included angle. This allows full penetration of the weld metal to the root. Using a 3.2mm Weldclass 12V Stick electrode at 100 amps, deposit a run of weld metal on the bottom of the joint.
Do not weave the electrode, but maintain a steady rate of travel along the joint sufficient to produce a well-formed bead. At first you may notice a tendency for undercut to form, but keeping the arc length short, the angle of the electrode at about 20º from vertical, and the rate of travel not too fast, will help eliminate this.
The electrode needs to be moved along fast enough to prevent the slag pool from getting ahead of the arc. To complete the joint in thin plate, turn the job over, clean the slag out of the back and deposit a similar weld.
Heavy plate will require several runs to complete the joint. After completing the first run, chip the slag out and clean the weld with a wire brush. It is important to do this to prevent slag being trapped by the second run. Subsequent runs are then deposited using either a weave technique or single beads laid down in the sequence shown in Figure 26. The width of weave should not be more than three times the core wire diameter of the electrode.
When the joint is completely filled, the back is either machined, ground or gouged out to remove slag which may be trapped in the root, and to prepare a suitable joint for depositing the backing run. If a backing bar is used, it is not usually necessary to remove this, since it serves a similar purpose to the backing run in securing proper fusion at the root of the weld.

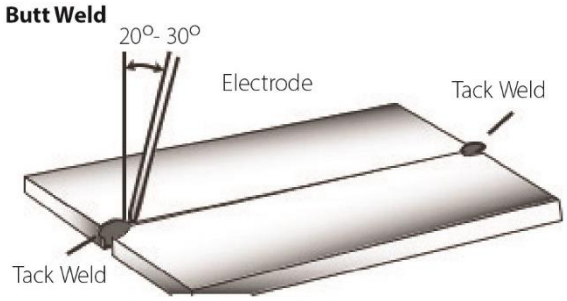


Figure 25

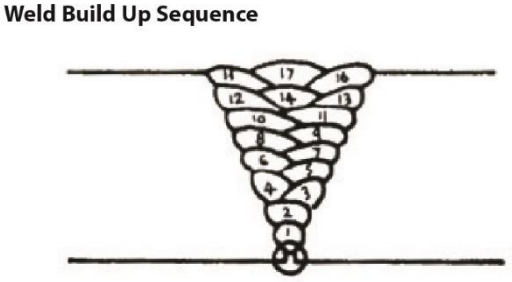


Figure 26

11.8.2 Fillet Welds

These are welds of approximately triangular cross-section made by depositing metal in the corner of two faces meeting at right angles. Refer Figure 27 and Figure 28.
A piece of angle iron is a suitable specimen with which to begin, or two lengths of strip steel may be tacked together at right angles. Using a 3.2mm Weldclass 12V Stick electrode at 100 amps, position angle iron with one leg horizontal and the other vertical. This is known as a horizontal-vertical (HV) fillet. Strike the arc and immediately bring the electrode to a position perpendicular to the line of the fillet and about 45º from the vertical. Some electrodes require being sloped about 20º away from the perpendicular position to prevent slag from running ahead of the weld. Refer to Figure 27.
Do not attempt to build up much larger than 6.4mm width with a 3.2mm electrode, otherwise the weld metal tends to sag towards the base, and undercut forms on the vertical leg. Multi-runs can be made as shown in Figure below. Weaving in HV fillet welds is undesirable.

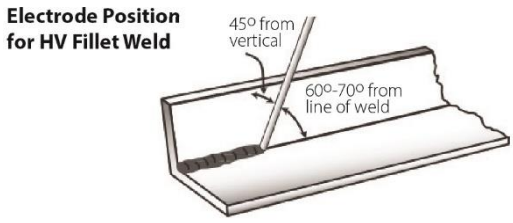


Figure 27

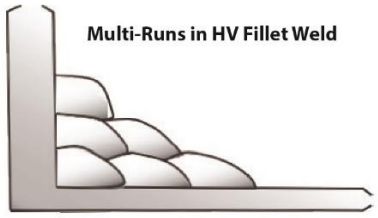


Figure 28

11.8.3 Vertical Welds

11.8.3.1 Vertical Up

Tack weld a three feet length of angle iron to your work bench in an upright position. Use a 3.2mm Weldclass 12V Stick electrode and set the current at 100 amps. Make yourself comfortable on a seat in front of the job and strike the arc in the corner of the fillet. The electrode needs to be about 10º from the horizontal to enable a good bead to be deposited.
Refer Figure 29.

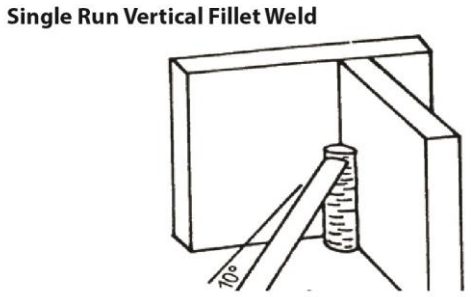


Figure 29

Use a short arc, and do not attempt to weave on the first run. When the first run has been completed deslag the weld deposit and begin the second run at the bottom. This time a slight weaving motion is necessary to cover the first run and obtain good fusion at the edges.
At the completion of each side motion, pause for a moment to allow weld metal to build up at the edges, otherwise undercut will form and too much metal will accumulate in the centre of the weld. Figure 30 illustrates multi-run technique and Figure 31 shows the effects of pausing at the edge of weave and of weaving too rapidly.

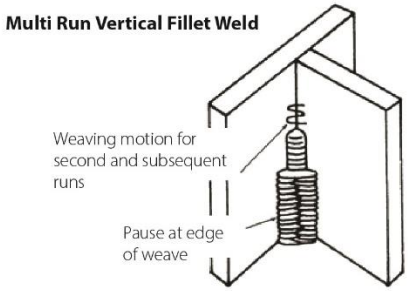


Figure 30

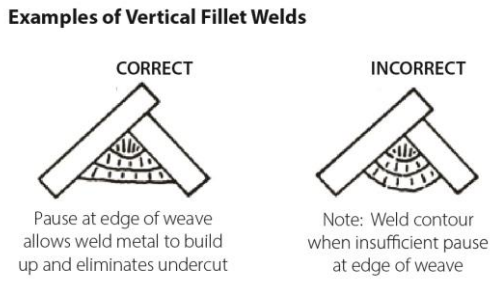


Figure 31

11.8.3.2 Vertical Down

The Weldclass 12V Stick electrode makes welding in this position particularly easy. Use a 3.2mm electrode at 100 amps. The tip of the electrode is held in light contact with the work and the speed of downward travel is regulated so that the tip of the electrode just keeps ahead of the slag. The electrode should point upwards at an angle of about 45º.

11.8.4 Overhead Welds

Apart from the rather awkward position necessary, overhead welding is not much more difficult that down hand welding. Set up a specimen for overhead welding by first tacking a length of angle iron at right angles to another piece of waste pipe. Then tack this to the work bench or hold in a vice so that the specimen is positioned in the overhead position as shown in the sketch.
The electrode is held at 45º to the horizontal and tilted 10º in the line of travel (Figure 32). The tip of the electrode may be touched lightly on the metal, which helps to give a steady run. A weave technique is not advisable for overhead fillet welds.
Use a 3.2mm Weldclass 12V Stick electrode at 100 amps, and deposit the first run by simply drawing the electrode along at a steady rate. You will notice that the weld deposit is rather convex, due to the effect of gravity before the metal freezes.

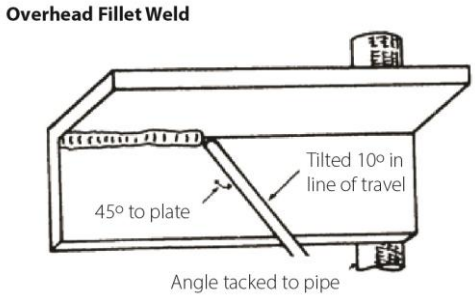
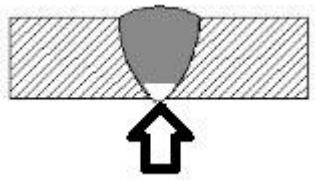
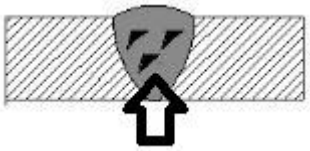
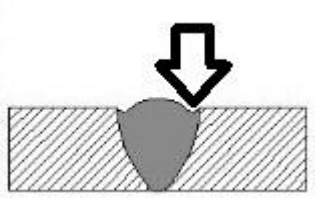


Figure 32

11.9 MMA (Stick) Troubleshooting

Fault	Cause	Remedy
A gap is left by failure of the weld metal to fill the root of the weld.  *Figure 33*	Welding current too low.	Increase welding current.
	Electrode too large for joint.	Use smaller diameter electrode.
	Insufficient gap.	Allow wider gap.
Non-metallic particles are trapped in the weld metal.  *Figure 34*	Non-metallic particles may be trapped in undercut from previous run.	If a bad undercut is present clean slag bout and cover with a run from a smaller gauge electrode.
	Joint preparation too restricted.	Allow for adequate penetration and room for cleaning out the slag.
	Irregular deposits allow slag to be trapped.	If very bad, chip or grind out irregularities.
	Lack of penetrations with slag trapped beneath weld bead.	Use smaller electrode with sufficient current to give adequate penetrations. Use suitable tools to remove all slag from comers.
	Rust or mill scale or preventing full fusion.	Clean joint before welding.
	Wrong electrode for position in which welding is done.	Use electrodes designed for position in which welding is done, otherwise proper control of slag is difficult.
A groove has been formed in the base metal adjacent to the top of a weld and has not been filled by the weld metal (undercut).  *Figure 35*	Welding current is too high.	Reduce welding current.
	Welding arc is too long.	Reduce the length of the welding arc.
	Angle of the electrode is incorrect.	Electrode should not be inclined less than 45° to the vertical face.
	Joint preparation does not allow correct electrode angle.	Allow more room for joint for manipulation of the electrode.
	Electrode too large for joint.	Use smaller gauge electrode.
	Insufficient deposit time at edge of weave.	Pause for a moment at edge of weave to allow weld metal build-up.

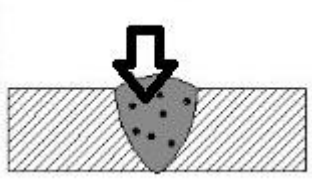
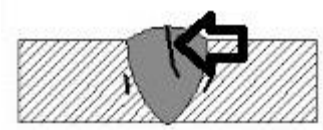
Fault	Cause	Remedy
Portions of the weld run do not fuse to the surface of the metal or edge of the joint.  *Figure 36*	Small electrodes used on heavy cold plate.	Use larger electrodes and preheat the plate.
	Welding current is too low.	Increase welding current.
	Wrong electrode angle.	Adjust angle so the welding arc is directed more into the base metal.
	Travel speed of electrode is too high.	Reduce travel speed of electrode.
	Scale or dirt on joint surface.	Clean surface before welding.
Gas pockets or voids in weld metal (porosity)  *Figure 37*	High levels of Sulphur in steel.	Use an electrode that is designed for high Sulphur steels.
	Electrodes are damp.	Dry electrodes before use.
	Welding current is too high.	Reduce welding current.
	Surface impurities such as oil, grease, paint, etc.	Clean joint before welding.
	Welding in a windy environment.	Shield the weld area from the wind.
	Electrode damaged i.e. flux coating incomplete.	Discard damaged electrodes and only use electrodes with a complete flux coating.
Crack occurring in weld metal soon after solidification commences  *Figure 38*	Rigidity of joint.	Redesign to relieve weld joint of severe or use crack resistance electrodes.
	Insufficient throat thickness.	Travel slightly slower to allow greater build up in throat.
	Weld current is too high.	Decrease welding current.

Table 8

12 TIG BASIC WELDING GUIDE

TIG Welding is a fusion procedure that uses an electric ARC created between an infusible tungsten electrode and base material to be welded. For TIG welding an inert gas must be used (Argon) which protects the welding bead. If filling material is used, it is made up of rods suitable to the material to be welded (steel, stainless steel, copper etc.).

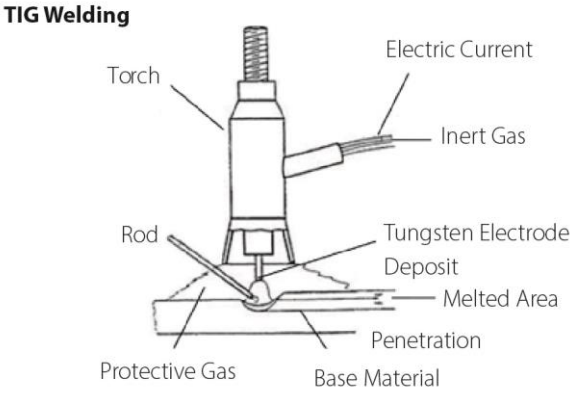


Figure 39

In TIG mode, welding is possible in all positions: flat, angle, on the edge, vertical and overhead. Furthermore, with respect to other types of welding, the welding joint has greater mechanical resistance, greater corrosion resistance and limited heating in the welded area which limits distortion. Welding can be done even without weld material, guaranteeing a smooth, shiny weld with no impurities or slag.

12.1 TIG Electrode Selection and Preparation

12.1.1 Electrode Polarity

Connect the TIG torch to the negative (-) torch terminal and the work lead to the positive (+) work terminal for direct current straight polarity. Direct current straight polarity is the most widely used polarity for DC TIG welding. It allows limited wear of the electrode since 70% of the heat is concentrated at the work piece.

Tungsten Electrode Types			
Electrode Type	**Application**	**Features**	**Colour Code**
Rare-Earth (Weldclass RE4)	All metals*	High-Performance, suitable for both DC (Steel, Stainless steel etc.) and AC (Aluminium)* TIG welding. Maintains tip shape, reliable arc striking, low burn off rate, long service life and smooth/stable arc.	Purple

Table 9

* Note that the WeldForce WF-140ST & WF-180ST machines are only capable of DC TIG welding. It cannot perform AC TIG welding required to weld Aluminium.

Tungsten Electrode Current Ranges	
Electrode Diameter	**DC Current (Amps)**
1.6mm (1/16”)	60 – 115
2.4mm (3/32”)	100 – 165
3.2mm (1/8”)	135 – 200

Table 10

Guide For Selecting Filler Wire Diameter	
Filler Electrode Diameter	**DC Current (Amps)**
1.6mm (1/16”)	20 – 90
2.4mm (3/32”)	65 – 115
3.2mm (1/8”)	100 – 165

Table 11

12.1.2 Preparing Tungsten for DC Electrode Negative (DCEN) Welding

The electrode should be pointed (tapered) according to the welding current.
Grind end of tungsten on fine grit, hard abrasive wheel before welding. Do not use wheel for other jobs or tungsten can become contaminated causing lower weld quality.
Rule of thumb is that the taper section should be 2.5 times the Electrode Diameter.

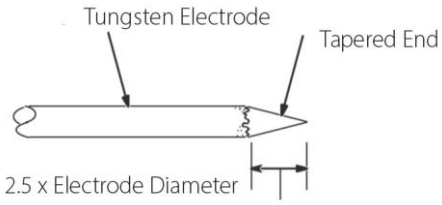


Figure 40

Ideal Tungsten Preparation = Stable ARC
Diameter of the flat left on the end of the Electrode determines amperage capacity.

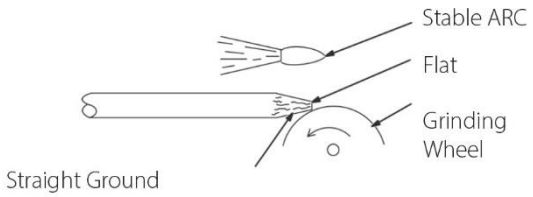


Figure 41

Wrong Tungsten Preparation = Wandering ARC

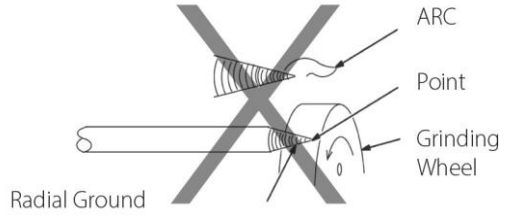


Figure 42

Pointing the Tungsten Electrode
The electrode should be pointed according to the welding current.

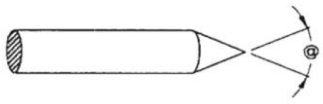


Figure 43

Electrode Angles	
Angle @	**Range of Current (Amps)**
30°	0 – 30
60-90°	30 -120
90-120°	120 - 250
120°	≥250

Table 12

12.1.3 Shielding Gas for TIG Welding

Shielding Gas Selection	
Alloy	**Shielding Gas**
Carbon Steel	100% Argon
Stainless Steel	
Nickel Alloy	
Copper	
Titanium	

Table 13

12.1.4 Typical TIG Welding Settings

TIG Welding Settings For Steel						
Metal Thickness	**DC Current (Amps)**		**Tungsten Electrode Diameter**	**Filler Rod Diameter (if required)**	**Argon Gas Flow Rate L/min**	**Joint Type**
	Mild Steel	**Stainless Steel**				
1.2mm (0.045”)	45-55	30-45	1.0mm (0.040”)	1.6mm (1/16”)	5-10	Butt/ Corner
	50-60	35-50				Lap / Fillet
1.6mm (1/16”)	60-70	40-60	1.6mm (1/16”)	1.6mm (1/16”)	10-15	Butt/ Corner
	70-90	50-70				Lap / Fillet
3.2mm (1/8”)	80-100	65-85	1.6mm (1/16”)	2.4mm (3/32”)	10-15	Butt/ Corner
	90-115	90-110				Lap / Fillet

Table 14

12.2 TIG Welding Troubleshooting

Troubleshooting – TIG Weld quality		
Fault	**Cause**	**Remedy**
Excessive bead build up or poor penetration or poor fusion at edges of weld	Welding current is too low.	Increase weld current and/or faulty joint preparation
Weld bead too wide and flat or undercut at edges of weld or excessive burn through	Welding current is too high.	Decrease weld current.
Weld bead too small or insufficient penetration or ripples in bead are widely spaced apart.	Travel speed too fast.	Decrease weld current.
Weld bead too wide or excessive bead build up or excessive penetration in butt joint.	Travel speed too fast.	Increase travel speed.
Uneven leg length in fillet joint	Wrong placement of filler rod.	Re-position rod.
Electrode melts or oxidises when an arc in struck	Torch lead connected to positive welding terminal.	Connect torch lead to negative welding terminal.
	No gas flowing to welding region.	Check the gas lines for kinks or breaks and gas cylinder contents.
	Torch is clogged with dust or dirt.	Clean torch.
	Gas hose is cut.	Replace gas hose.
	Gas passage contains impurities.	Disconnect gas hose from the rear of Power Source then raise gas pressure and blow out impurities.
	Gas regulator turned off.	Turn on.
	Torch electrode is too small for the welding current.	Increase electrode diameter or reduce the welding current.
Dirty weld pool	Electrode contaminated by contact with work piece or filler rod material.	Clean the electrode by grinding off any contaminates.
	Work piece surface has foreign material on it.	Clean surface.
	Gas contaminated with air.	Check gas lines for cuts and loose fitting or change gas cylinder.
Poor weld pool	Inadequate shielding gas.	Increase gas flow or check gas line for gas flow problems.
Arc start is not smooth.	Tungsten electrode is too large for the welding current.	Select the right size electrode.
	The wrong electrode is being used for the welding job.	Select the right electrode type.
	Gas flow rate is too high.	Select the right rate for the welding job.
	Incorrect shielding gas is being used.	Select the right shielding gas.
	Poor Work Lead/Clamp connection to work piece.	Improve connection to work piece.
Arc flutters during TIG welding.	Tungsten electrode is too large for the welding current.	Select the right size electrode.

Table 15

13 KNOWLEDGE & RESOURCES

Please refer to Weldclass website www.weldclass.com.au for more information.

14 SAFETY

14.1 Store and Retain this Manual

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

14.2 Important Safety Information

Failure to follow the warnings and instructions may result in electric shock, fire, serious injury and/ or death. Save all warnings and instructions for future reference.
This is the safety alert symbol to alert you to potential personal injury hazards:

Obey all safety messages that follow this symbol to avoid possible injury or death.

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

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

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

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

CAUTION, without the safety alert symbol, is used to address practices not related to personal injury.

14.3 Welding Operation

1. **Maintain labels and nameplates on the welder.** These carry important information. If unreadable or missing, contact Weldclass for a replacement.
2. **Avoid unintentional starting.** Make sure the welder is setup correctly and you are prepared to begin work before turning on the welder.
3. **Unplug before performing maintenance.** Always unplug the welder from its electrical outlet before performing any inspection, maintenance, or cleaning procedures.

4. **Never leave the welder unattended while energised.** Turn power off before leaving the welder unattended.
5. **Do not touch live electrical parts.** Wear dry, insulating gloves. Do not touch the electrode or the conductor tong with bare hands. Do not wear wet or damaged gloves.
6. **Protect yourself from electric shock.** Do not use the welder outdoors. Insulate yourself from the work piece and the ground. Use non-flammable, dry insulating material if possible, or use dry rubber mats, dry wood or plywood, or other dry insulating material large enough to cover the area of contact with the work or the ground.
7. **Avoid inhaling fume.** Some fume created by welding contain chemicals known to cause cancer, birth defects or other harm. Your risk from these exposures varies, depending on how often you do this type of work. To reduce your exposure to these chemicals, work in a well-ventilated area, and work with approved safety equipment, such as dust masks that are specially designed to filter out microscopic particles.
8. **People with pacemakers should consult their physician(s) before using this machine.**

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

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

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

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

CAUTION! *Disconnect input power conductors from de-energized supply line before moving the welding power source.*

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11. **Exercise good work practices.** The warnings, precautions, and instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be considered by the operator.
12. **Do not use this machine for pipe thawing.** This machine was not designed for pipe thawing and will be a significant electrical & heat hazard if attempt is made to use for thawing pipe.

14.4 Welding Safety Instructions & Warnings

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

If an operator does not strictly observe all safety rules and take precautionary actions, welding products and welding processes can cause serious injury or death, or damage to other equipment or property.

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

Safe practices are outlined in the Australian Standard AS 1674.2 entitled: Safety in Welding and European Standard EN60974-1 entitled: Safety in welding and allied processes.

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

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

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

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

14.4.1 Personal Safety

CAUTION! *Keep the work area well lit. Make sure there is adequate space surrounding the work area. Always keep the work area free of obstructions, grease, oil, trash, and other debris. Do not use equipment in areas near flammable chemicals, dust, and vapours. Do not use this product in a damp or wet location.*

1. **Stay alert, watch what you are doing and use common sense when operating equipment.** Do not use a tool while you are tired or under the influence of drugs, alcohol or medication. A moment of distraction when operating equipment may result in serious personal injury.

2. **Do not overreach.** Keep proper footing and balance at all times. This enables better control of the power tool in unexpected situations.

14.4.2 Arc Rays can Burn Eyes and Skin

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

1. Use a Welding Helmet or Welding Face Shield fitted with a proper shade filter (refer AS 60974-1, AS/NZS 1337.1 and AS/NZS 1338.1 Safety Standards) to protect your face and eyes when welding or watching. (See Filter Table on Page17).

2. Wear approved safety glasses. Side shields are recommended.

3. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.

4. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot safety protection.

5. Never wear contact lenses while welding.

14.4.3 Noise Can Damage Hearing

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

14.4.4 Work Environment Safety

DANGER! *Remove any combustible material from the work area.*

1. When possible, move the work to a location well away from combustible materials. If relocation is not possible, protect the combustibles with a cover made of fire resistant material.
2. Remove or make safe all combustible materials for a radius of 10 metres around the work area. Use a fire resistant material to cover or block all doorways, windows, cracks, and other openings.
3. Enclose the work area with portable fire resistant screens. Protect combustible walls, ceilings, floors, etc., from sparks and heat with fire resistant covers.
4. If working on a metal wall, ceiling, etc., prevent ignition of combustibles on the other side by moving the combustibles to a safe location. If relocation of combustibles is not possible, designate someone to serve as a fire watch, equipped with a fire extinguisher, during the welding process and well after the welding is completed.
5. Do not weld or cut on materials having a combustible coating or combustible internal structure, as in walls or ceilings, without an approved method for eliminating the hazard.
6. After welding, make a thorough examination for evidence of fire. Be aware that visible smoke or flame may not be present for some time after the fire has started. Do not weld or cut in atmospheres containing dangerously reactive or flammable gases, vapours, liquids, and dust. Provide adequate ventilation in work areas to prevent accumulation of flammable gases, vapours, and dust.
7. Do not apply heat to a container that has held an unknown substance or a combustible material whose contents, when heated, can produce flammable or explosive vapours. Clean and purge containers before applying heat. Vent closed containers, including castings, before preheating, welding, or cutting.

14.4.5 Electricity Can Kill

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

The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from the work and the ground using dry insulating mats or covers.
4. Disconnect input power before installing or servicing this equipment. Lock input power, disconnect switch open, or remove line fuses so power cannot be turned on accidentally.

5. Properly install and ground this equipment according to national, state, and local codes.
6. Turn off all equipment when not in use. Disconnect power to equipment if it will be left unattended or out of service.
7. Use fully insulated electrode holders. Never dip the holder in water to cool it or lay it down on the ground or the work surface. Do not touch holders connected to two welding machines at the same time or touch other people with the holder or electrode.
8. Do not use worn, damaged, undersized, or poorly spliced cables.
9. Do not wrap cables around your body.
10. Connect work piece to a good electrical ground.
11. Do not touch the electrode while in contact with the work (ground) circuit.
12. Use only well-maintained equipment. Repair or replace damaged parts as soon as practical.
13. In confined spaces or damp locations, do not use a welder with AC output unless equipped with a voltage reducer.

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

Recommended Protection Fillers For Electric Welding		
Welding Process / Application	**Approximate Range of Welding Current in Amps**	**Minimum Shade Number of Filter Lens**
Stick (MMA)	Up to 100	8
	100 to 200	10
TIG	Up to 100	10
	100 to 200	11

Table 16

14.4.6 Fumes And Gases

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

1. Keep your head out of the fumes. Do not breathe the fumes.
2. If inside, ventilate the area and/or use an exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved supplied-air respirator (PAPR).
4. Read the Safety Data Sheets (SDS) and the manufacturer's instruction for the metals, consumables, coatings, and cleaners.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Shielding gases used for welding can displace air causing injury or death. Be sure the breathing air is safe.
6. Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapours to form highly toxic and irritating gases.
7. Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air- supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

14.4.7 Fire & Explosive Risks

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

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

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

14.4.8 Sparks & Hot Metal

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

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

14.4.9 Gas Cylinders

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

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

15 WARRANTY

15.1 Warranty period

Without product registration: 24 months
If product has been registered online: 36 months

This machine is warranted against faulty components and manufacturing defects for the warranty periods shown above.

The warranty period begins on the date of purchase by the end user. Warranty is not transferable and only claimable by the original purchaser.

If warranty registration has not taken place, it is the sole responsibility of the purchaser to retain proof of purchase (i.e. a copy of the invoice made out by the distributor or reseller to the owner of the machine clearly showing the purchase date). Proof of purchase must be provided in the event of any warranty claim.

15.2 Warranty Includes and Covers

Manufacturing faults and/or faulty materials that do not allow the machine to perform the functions for which it was designed, within the warranty period.

15.3 Warranty Excludes / Does Not Cover

1. Warranty claims made without proof of purchase, or warranty claims made with proof of purchase that is deemed by Weldclass Welding Products to be false, misleading, incomplete or insufficient.
2. Defects or damage resulting from: misuse, accidents, neglect, improper maintenance, alteration/modification, use of the product contrary to the applications for which it was designed, or failure to heed any of the instructions, warnings or guidelines issued with the machine, spare parts or accessories that are not genuine.
3. Damage incurred in transport.
4. Operator error, misunderstanding or use contrary to the intended purpose.
5. Parts that are subject to wear and tear from usage or failure caused by the untimely replacement of such parts.
6. Warranty claims made where the owner/operator of the machine is not willing or not able to provide any information required by Weldclass Welding Products to process the warranty claim.
7. The cost of freight, transport or travel. It is the responsibility of the purchaser to deliver the product under warranty to the nearest relevant service agent or distributor.
8. Cost for repairs carried out by a party not approved by Weldclass to carry out repairs.
9. Accessories and attachments such as leads and torches.

15.4 Warranty Conditions

This is a repair and/or replacement warranty only and does not allow for a refund. Weldclass reserves the right to replace faulty product or parts covered under warranty with alternative / equivalent product or parts should the original unit become obsolete or unavailable. No other warranty is expressed or implied. This warranty is exclusive and in lieu of all others, including, but not limited to any warranty of merchantability or fitness for any particular purpose. Weldclass shall not under any circumstances be liable for special, indirect or consequential damages. No employee, agent, representative, distributor or agent of Weldclass is authorised to change this warranty in any way or grant any other warranty. Notwithstanding the foregoing, in no event shall the warranty period extend more than the stated warranty period plus 6 months from the date Weldclass delivered the product to the authorised distributor. Warranty is always dated from original date of purchase - if warranty repairs are made or if warranty replacements are given this does not extend the warranty period. Any decision regarding any warranty claim is made at the sole jurisdiction of Weldclass. This warranty policy does not affect the legal rights of any purchaser, distributor or service agent.

NOTES:


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by Weldclass