BOSSWELD

MST190

MULTI-PROCESS MIG WELDER

2+1* YEAR LIMITED WARRANTY

INSTRUCTION MANUAL

Thank you for choosing a BOSSWELD inverter welder.

In this manual you will find instructions on how to set up your welder along with general welding information safety information and helpful tips. We encourage you to go online to our website for more tips and troubleshooting as well as many welding resources.

We truly hope you enjoy using your welder!

Please ensure you read and understand the instructions before installation and operation of this machinery.

CONTENTS

SPECIFICATIONS

Primary Input Power	**1 Phase 240V 50-60 HZ +/-10%**		
Function	MIG	Lift TIG	MMA
Duty Cycle @ 40˚C 10min	**7%@180A 60%@60A 100%@50A**	**17%@160A 60%@85A 100%@65A**	**8%@160A 60%@60A 100%@45A**
Welding Current Range (A)	30 – 180	10 – 160	10 – 160
I Max (A)	36.0	23.5	35.5
I eff (A)	9.5	9.7	10.0
Wire Diameter Range	0.6 – 1.0 mm		
Electrode Diameter Range	2.5 – 5.0 mm		
Protection	IP21S		
Insulation Class	S		
Thermal Overload	Yes		
Dimensions / Weight	470 x 190 x 330 mm		
Weight	9.3 kg		
Part Number	**611050**		

BOX CONTENTS

1. MST190 Inverter Welder 240V
2. BZ15 Style MIG Torch
3. Electrode Holder
4. Earth Clamp
5. Regulator & Gas Hose
6. 0.8/0.9 mm V Groove Drive Roller (Fitted)
   0.8/0.9 mm Knurled Drive Roller (Spare)
7. MIG Spares

WARNING

The device and packaging material are not toys! Children must not be allowed to play with the machine and its accessories. Plastic parts and packaging are choking risks for children.
- Open the packaging and remove the welder carefully.
- Check that the delivery is complete.
- If possible, store the packaging until the warranty period has expired.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

GLOVES AND PROTECTIVE CLOTHING
Use protective gloves and fire resistant protective clothing when welding.
Avoid exposing skin to ultraviolet rays produced by the arc.

WELDING HELMET
Under no circumstances should the welder be operated unless the operator is wearing a welding helmet to protect the eyes and face. There is serious risk of eye damage if a helmet is not used. The sparks and metal projectiles can cause serious damage to the eyes and face. The light radiation produced by the arc can cause damage to eyesight, and burns to skin.
Never remove the welding helmet whilst welding.

SAFETY GLASSES
After welding use appropriate safety glasses when brushing, chipping or grinding the slag from the weld.

OTHER PERSONS
Ensure that other persons are screened from the welding arc and are at least 15 metres away from the work piece. Always ensure that the welding arc is screened from onlookers, or people just passing by. Use screens if necessary, or non-reflecting welding curtain. Do not let children or animals have access to the welding equipment or to the work area.

SWITCHING OFF
When the operator has finished welding they must switch the welder off.
DO NOT put the electrode holder down with the welder switched ON.
When leaving the welder unattended, move the ON/OFF switch to the OFF position and disconnect the welder from the electrical mains supply.
Do not leave hot material unattended after welding.

FUMES &GASES ARE DANGEROUS
Smoke and gas generated whilst welding or cutting can be harmful to people's health. Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.
- Do not breathe the smoke and gas generated whilst welding or cutting, keep your head out of the fumes.
- Keep the working area well ventilated, use fume extraction or ventilation to remove welding fumes and gases.
- In confined or heavy fume environments always wear an approved air-supplied respirator.
- Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near de-greasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapours to form highly toxic and irritating gases.
- Materials such as galvanized, lead, or cadmium plated steel, containing elements that can give off toxic fumes when welded. Do not weld these materials unless the area is very well ventilated, and or wearing an air supplied respirator.

MACHINE CARE / SAFETY

Keep the welding cables, earth clamp and electrode holder in good condition. Failure to do this can result in poor welding quality, which could be dangerous in structural situations.

Prior to use, check for breakage of parts and any other conditions that may affect operation of the welder.

Any part of the welder that is damaged should be carefully checked to determine whether it will perform its intended function whilst being safe for the operator. Any part that is damaged should be properly repaired, or replaced by an authorised service centre.

IMPROPER USE
It is hazardous to use the welding machine for any work other than that for which it was designed e.g. do not use welder for thawing pipes.

HANDLING
Ensure the handle is correctly fitted. As welding machines can be heavy, always use safe lifting practices when lifting.

POSITION AND HANDLING
To reduce risk of the machine being unstable / danger of overturning, position the welding machine on a horizontal surface that is able to support the machine weight. Operators MUST NOT BE ALLOWED to weld in raised positions unless safety platforms are used.

SAFETY INSTRUCTIONS

WARNING
The user of this welder is responsible for their own safety and the safety of others. It is important to read, understand and respect the contents of this user guide. When using this welder, basic safety precautions, including those in the following sections must be followed to reduce the risk of fire, electric shock and personal injury. Ensure that you have read and understood all of these instructions before using this welder.
Persons who are not familiar with this user guide should not use this welder. Keep this booklet in a safe place for future reference.

TRAINING
The operator should be properly trained to use the welding machine safely and should be informed about the risks relating to arc welding procedures. This user guide does not attempt to cover welding technique. Training should be sought from qualified / experienced personnel on this aspect, especially for any welds requiring a high level of integrity for safety.

SERIOUS FIRE RISK
The welding process produces sparks, droplets of fused metal, metal projectiles and fumes. This constitutes a serious fire risk. Ensure that the area in which welding will be undertaken is clear of all inflammable materials. It is also advisable to have a fire extinguisher, and a welding blanket on hand to protect work surfaces.

WORK AREA

- Ensure a clear, well lit work area with unrestricted movement for the operator.
- The work area should be well ventilated, as welding emits fumes which can be dangerous.
- Always maintain easy access to the ON/OFF switch of the welder, and the electrical mains supply.
- Do not expose the welder to rain and do not operate in damp or wet locations

Where welding must be undertaken in environments with increased risk of electric shock, confined spaces or in the presence of flammable or explosive materials, it is important that the environment be evaluated in advance by an “expert supervisor”. It is also recommended that welding in these circumstances be carried out in the presence of persons trained to intervene in emergencies.

AVOID ELECTRICAL CONTACT
Use adequate electrical insulation with regard to the electrode, the work piece and any accessible earthed metal parts in the vicinity. Avoid direct contact with the welding circuit. The no load voltage between the earth clamp and the electrode can be dangerous under certain circumstances. Note: For additional protection from electric shock. It is recommended that this welder be used in conjunction with a residual current device (RCD) with rated residual current of 30MA or less. In general the use of extension leads should be avoided. If used however, ensure that the extension lead is used with the welder is of a suitable current rating and heavy duty in nature that MUST have an earth connection. If using the welder outdoors, ensure that the extension lead is suitable for outdoor use. Always keep extension leads away from the welding zone, moisture and any hot materials.

WELDING SURFACES
Do not weld containers or pipes that hold, or have held, flammable liquids or combustible gases or pressure. Do not weld on coated, painted or varnished surfaces as the coatings may ignite, or can give off dangerous fumes.

WORK PIECE
When welding, the work piece will remain at high temperature for a relatively long period. The operator must not touch the weld or the work piece unless wearing welding gloves. Always use pliers or tongs. Never touch the welded material with bare hands until it has completely cooled.

VOLTAGE BETWEEN ELECTRODE HOLDERS OR TORCHES
Working with more than one welding machine on a single work piece, or on work pieces that are connected, may generate a dangerous accumulation of no-load voltage between two different electrode holders or torches, the value of which may reach double the allowed limit.

MAINTENANCE

WARNING
Before starting any cleaning, or maintenance procedures on the welding machine, make sure that it is switched OFF and disconnected from the mains supply. There are no user serviceable parts inside the welder. Refer to a qualified service personnel if any internal maintenance is required. After use, wipe the welder down with a clean soft dry cloth.

Regular inspection of the supply cord is required and if damaged is suspected, it must be immediately replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid a hazard

STORAGE/ TRANSPORT
Store the welder and accessories out of children's reach in a dry place. If possible store the welder in the original packaging. The appliance must unconditionally be secured against falling or rolling over during transport.

DISPOSAL

DISPOSING OF THE PACKAGING
Recycling packaging reduces the need for landfill and raw materials. Reuse of the recycled material decreases pollution in the environment. Please recycle packaging where facilities exist. Check with your local council authority for recycling advice.

DISPOSING OF THE WELDER
Welders that are no longer usable should not be disposed of with household waste but in an environmentally friendly way. Please recycle where facilities exist. Check with your local council authority for recycling advice.

GAS BOTTLE

ATTENTION! - CHECK FOR GAS LEAKS
At initial set up and at regular intervals we recommend to check for gas leakage
Recommended procedure is as follows:

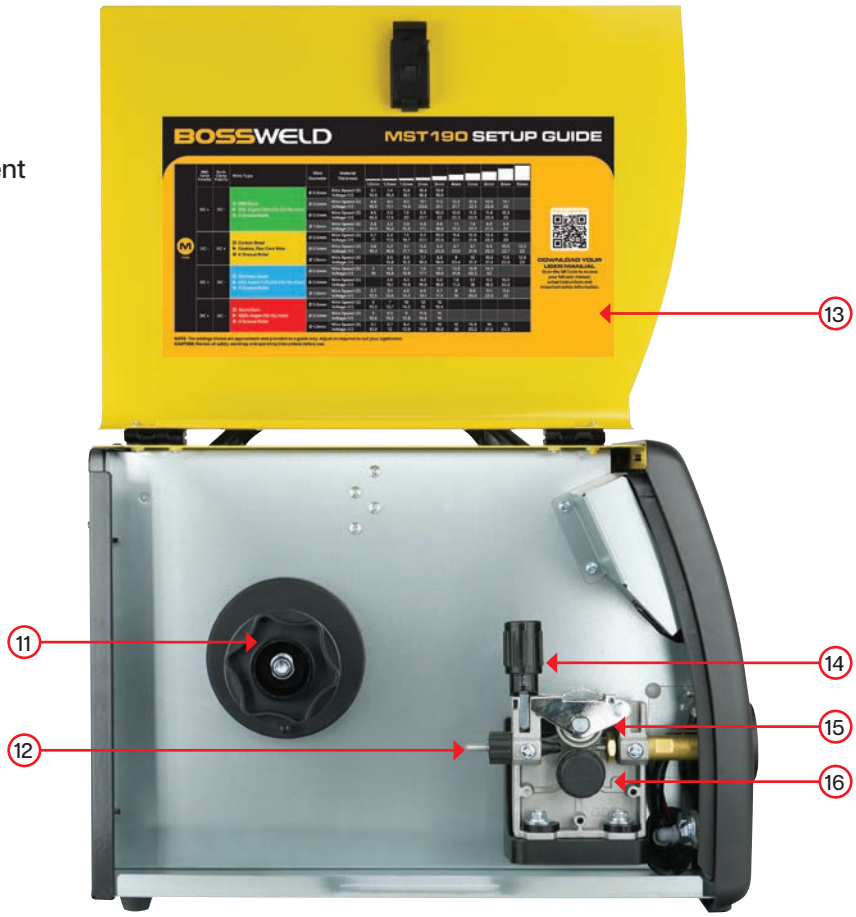
1. Connect the regulator and gas hose assembly and tighten all connectors and clamps.
2. Slowly open the cylinder valve.
3. Set the flow rate on the regulator to approximately 10-15 l/min.
4. Close the cylinder valve and pay attention to the needle indicator of the contents pressure gauge on the regulator, if the needle drops away towards zero there is a gas leak. Sometimes a gas leak can be slow and to identify it will require leaving the gas pressure in the regulator and line for an extended time period. In this situation it is recommended to open the cylinder valve, set the flow rate to 8-10 l/min, close the cylinder valve and check after a minimum of 15 minutes. Ensuring adequate ventilation fore small spaces.
5. If there is a gas loss then check all connectors and clamps for leakage by brushing or spraying with / soapy water, bubbles will appear at the leakage point.
6. Tighten clamps or fittings to eliminate gas leakage.

IMPORTANT! - We strongly recommend that you check for gas leakage prior to operation of your machine. We recommend that you close the cylinder valve when the machine is not in use. BOSSWELD, authorised representatives or agents of BOSSWELD will not be liable or responsible for the loss of any gas.

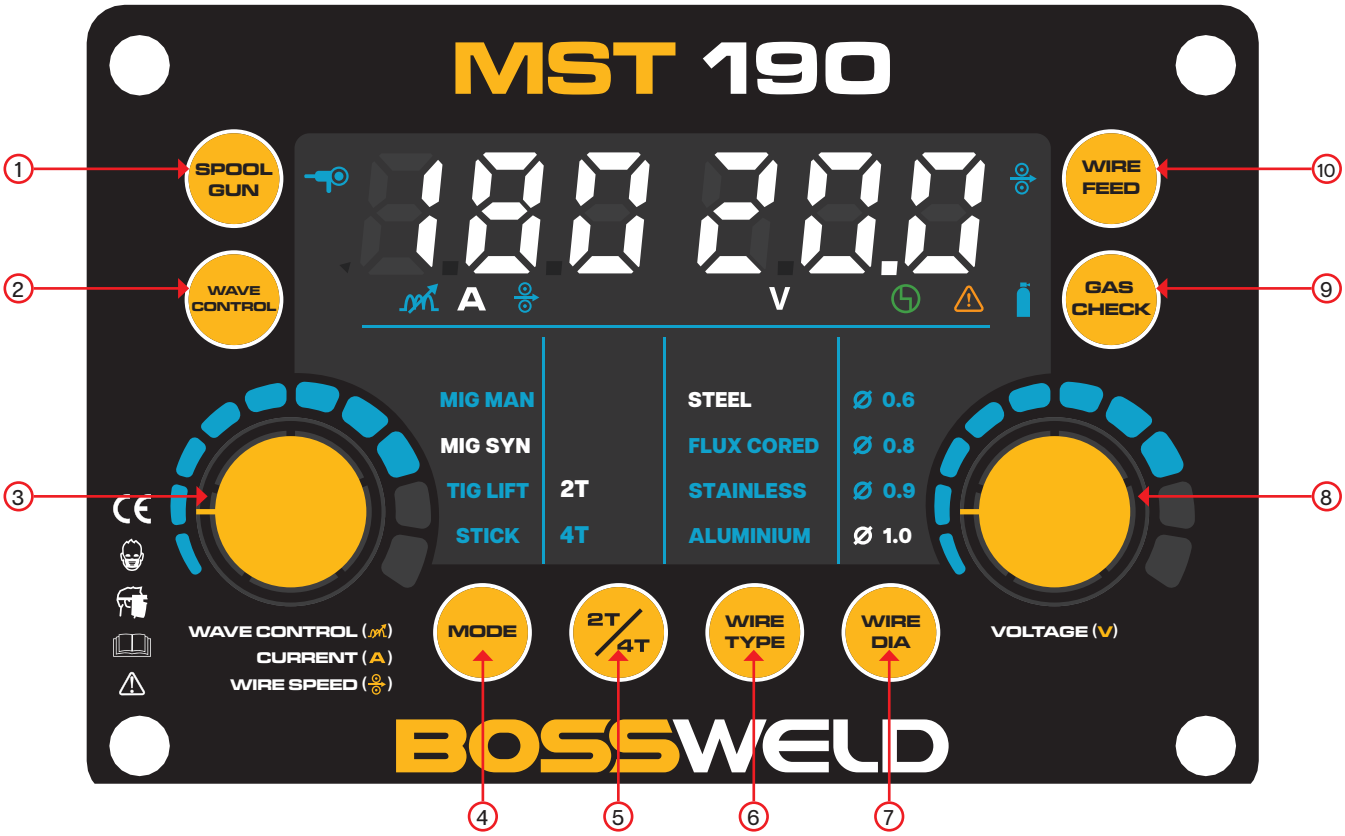
MACHINE PANEL

1. MIG torch euro connector
2. Positive (+) welding power output connection socket
3. Polarity change power connection
4. Gas Outpout (for TIG process)
5. 9 pin control socket for spool gun and TIG torch
6. Negative (-) welding power output connection socket
7. Input power cable
8. Gas inlet connector
9. Power switch
10. Cooling fan

11. Spool holder
12. Wire feeder inlet guide
13. Setup Guide
14. Wire feed tension adjustment
15. Wire feed tension arm
16. Wire drive roller



CONTROL PANEL



1. **Spool gun button**: Press to select spool gun in MIG Manual welding mode.
2. **Wave Control Button**: Setting that fine-tunes the "inductance" of the welding (0–10).
   Low Inductance: Faster current rise = harsher arc, more spatter, narrower bead, better for thinner materials.
   High Inductance: Slower current rise = softer arc, less spatter, wider bead, better for thicker materials.
3. **L Parameter knob**: Rotate to adjust the welding current, the progress bar will light up.
   In MIG Manual welding mode, rotate to adjust the wire speed.
4. **Welding Mode button**: Press to select welding modes: MIG Manual / MIG Synergic / TIG Lift / Stick
5. **Trigger mode button**: Press to select 2T or 4T trigger mode. (2T requires you to hold the trigger down to keep the arc on, while 4T allows you to press the trigger to start, then press it again to stop, even if the torch is not being held.)
6. **Wire Type button**: Press to select wire material: Steel, Flux Cored, Stainless, Aluminium
7. **Wire Diameter button**: Press to select MIG wire diameter: 0.6, 0.8, 0.9mm
8. **R Parameter knob**: Rotate to adjust the welding values in MIG, the progress bar will light up.
9. **Gas check button**: Press it to check whether the machine has gas-connected or set gas flow rate.
10. **Manual wire feed button**: Manually feed the welding wire through the gun without starting a welding arc.

* Denotes more detailed explanation of function to follow.

ICON DISPLAY	
Wave Control	**Welding Voltage**
Welding Current	**Working**
Wire Feed	**Alarm**

DUTY CYCLE

SPECIAL NOTE:
If this welders duty cycle is exceeded the welder will enter "thermal overload" which will automatically stop the welding output in order to protect, both the user and the welder. You will know the welder has gone into thermal overload when the overload error signal show on screen.

The welder should not be welding for 10~15 minutes to cool down with the fan running. When operating the machine again, the welding output current or the duty cycle should be reduced. Please note. Exceeding the machine's duty cycle, cannot be considered grounds for warranty or return.

The term duty cycle indicates the percentage welding time available at the output current for each 10 min period over 4 hours, The specification plate on the machine list three given ratings at a given current and voltage.

NOTE MIG SETTINGS SHOW BELOW:
Amps refer to the Current setting

7%	60%	100%
180 - Amps	60-Amps	50-Amps
23.0 Volts	17.0 Volts	16.5 Volts

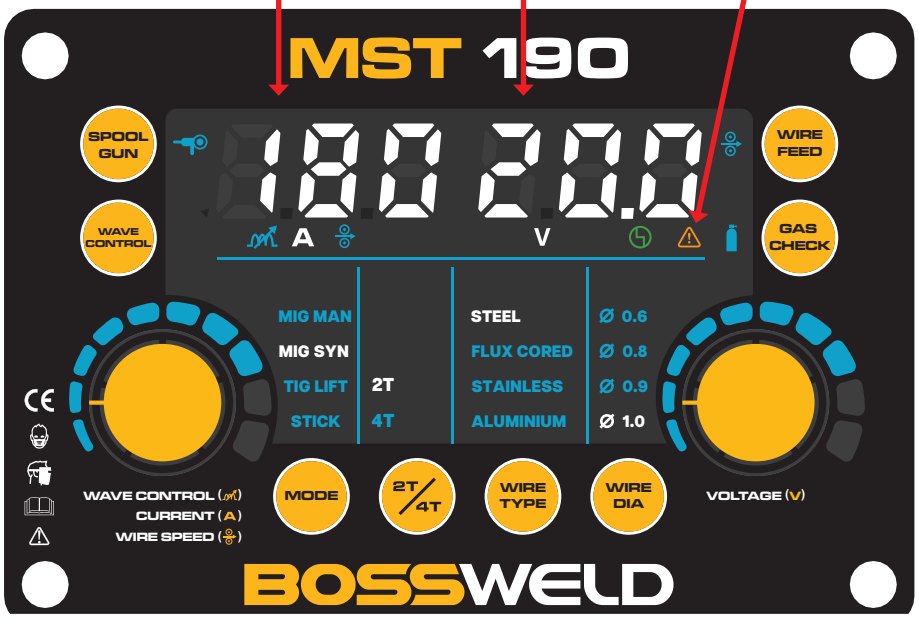
For example this means when the machine is set at is highest current of 180 Amps it can weld for 1 minute in a Ten minute period. The power source is protected by a built in temperature protection device, This will activate if the machine is operated in excess of its amperage and duty cycle rating.

BOSSWELD
MST 190
INVERTER DC MIG WELDER

PART NO.	611060				
STANDARD	EN 60974-1:2022				
1~ f_1/f_2					
		30A/15.5V-180A/23V			
		X	7%	60%	100% ← Duty Cycle
	U_0=73V	I_2	180A	60A	50A ← Amperage/Current
		U_2	23V	17V	16.5V ← Voltage
U_1=240V		I_{1max}=36.0A		I_{1eff}=9.5A	
		10A/10.4V-160A/16.4V			
		X	17%	60%	100%
	U_0=73V	I_2	160A	85A	65A
		U_2	16.4V	13.4V	12.6V
U_1=240V		I_{1max}=23.5A		I_{1eff}=9.7A	
		10A/20.4V-160A/26.4V			
		X	8%	60%	100%
	U_0=73V	I_2	160A	60A	45A
		U_2	26.4V	22.4V	21.8V
U_1=240V		I_{1max}=35.5A		I_{1eff}=10.0A	
1~50/60Hz	IP21S	S		9.3kg	

Amperage and Voltage display

The Overload Error Indicator light indicates Over temperature / Duty cycle exceeded



WARRANTY

This warranty is in addition to the statutory warranty provided under Australian Consumer Law, but does not include damage resulting from transport, misuse, neglect or if the product has been tampered with.
The product must be maintained as per this manual, and installed and used according to these instructions on an appropriate power supply. The product must be used in accordance with industry standards and acceptable practice.
This warranty covers the materials used to manufacture the machine and the workmanship used to produce the item. This Warranty does not cover damage caused by:

1. Normal wear and tear due to usage
2. Misuse /abuse or Neglect of the item
3. Transport / handling breakages
4. Lack of maintenance, care and cleaning
5. Environmental factors, such as usage in temperatures exceeding 40 degrees, above 1000mt sea level, rain, water, excessive damp, cold or humid conditions.
6. Improper setup or installation
7. Use on Incorrect voltage or non authorised electrical connections and plugs
8. Use of non standard parts
9. Repair, case opening, tampering with, modifications to any part of the item by non authorised BOSSWELD repairers.

This warranty covers the machine only and does not include Torches, Leads, Earth Clamps, Electrode holders, Plasma Torches, Tig Torches and any of the parts on those items unless there is a manufacturing fault.

1. REGISTRATION
Purchasers are encouraged to register for warranty on our website. www.bossweld.com.au/warranty

2. TIME PERIOD - 2 Years
A warranty claim must be made within 2 years from the date of purchase of this product. Any claim must include proof of purchase.

3. HOW TO MAKE A CLAIM - NEED SOME HELP?

- Visit our website www.dynaweld.com.au for many helpful tips and guides to assist with the setup and usage of your new machine. Still stuck....?
- Call the BOSSWELD Helpdesk on 1300 899 710 for over the phone assistance.
- If the machine is not operational then return the item to the place of purchase.

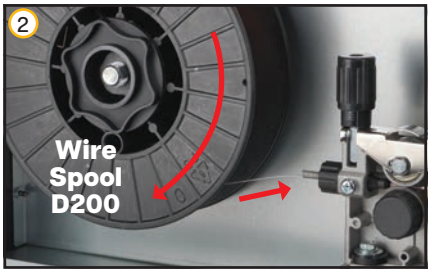
Note:
If this welders duty cycle is exceeded the welder will enter "thermal overload" which will automatically stop the welding output in order to protect, both the user and the welder. You will know the welder has gone into thermal overload when the overload error indicator light is illuminated. The welder will then cool itself down, and once the overload error indicator light is no longer illuminated, welding can then re-commence. Please note. Exceeding the machine's duty cycle, cannot be considered grounds for warranty or return.

BOSSWELD MAKES NO OTHER WARRANTY, EXPRESS 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.

SETUP WIRE SPOOL & WIRE FEEDER UNIT

FITTING WIRE SPOOL

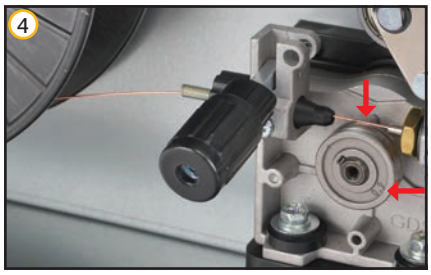
Open the side door of the machine. Remove spool hub nut and place a 5kg (D200) spool of wire on spool hub.



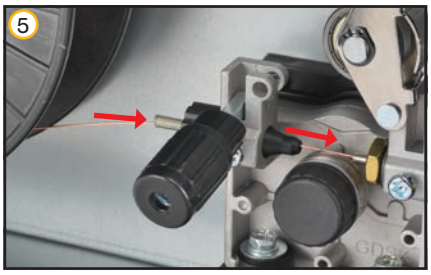
Reinstall spool retaining nut and tighten. Do not overtighten. Make sure the spool can rotate smoothly.
Note: Wire to roll from under spool into wire feeder.

For 1kg (D100) spool, remove spool hub to place D100 spool of wire. Then reinstall washer, spring wire and wing nut.

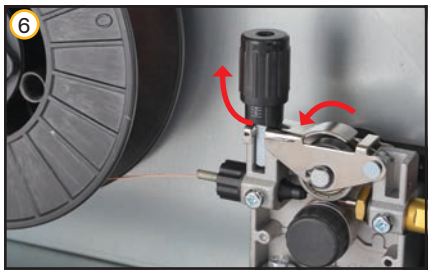
THREADING AND TENSIONING WIRE



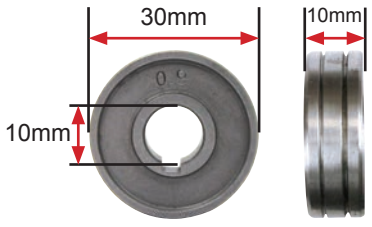
Check drive roller is matched to the wire size used.
U Groove = Aluminium
V Groove = Steel
Knurled Groove = Flux Cored Wire / Gasless Flux Cored Wire



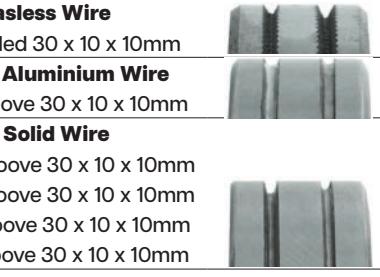
Carefully feed wire through the inlet guide tube on to the drive roller and into the outlet guide tube until it passes through the inlet tube, and into the torch.
Note: Hold wire to prevent the spool uncoiling.



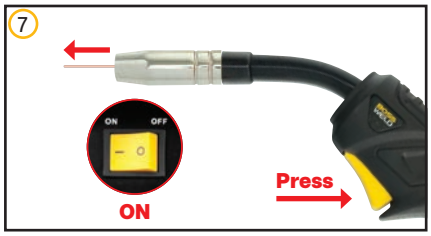
Put down Wire Tensioning Arm so it locks into position, and turn the Wire Feed Tensioning Knob to gently tighten. Do not overtighten.



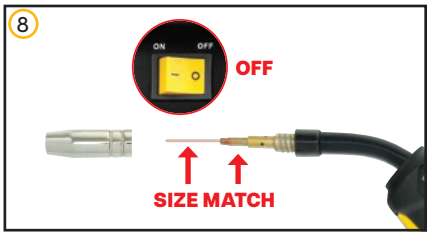
PART NO.	DESCRIPTION
	Knurled Drive Roller For Gasless Wire
RK301010.08.09	Drive Roller 0.8/0.9mm Knurled 30 x 10 x 10mm
	U Grooved Drive Roller For Aluminium Wire
RU301010.09.12	Drive Roller 0.9/1.2mm U Groove 30 x 10 x 10mm
	V Grooved Drive Roller For Solid Wire
RV301010.06.08	Drive Roller 0.6/0.8mm V Groove 30 x 10 x 10mm
RV301010.08.09	Drive Roller 0.8/0.9mm V Groove 30 x 10 x 10mm
RV301010.08.10	Drive Roller 0.8/1.0mm V Groove 30 x 10 x 10mm
RV301010.09.12	Drive Roller 0.9/1.2mm V Groove 30 x 10 x 10mm



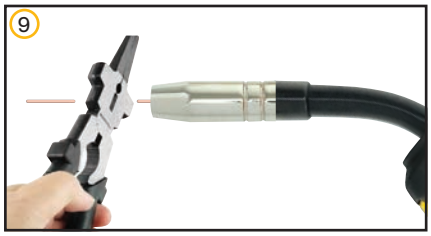
SETUP MIG TORCH



Plug the machine input power lead into the wall socket, and switch **POWER ON**. Press and hold the trigger on the MIG Torch. This will feed the wire through the torch. Release trigger when wire appears at the end of the torch.

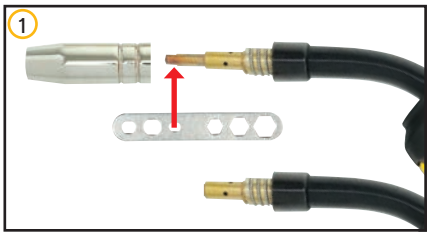


Switch machine **POWER OFF**. Remove nozzle to ensure contact tip size matches the size of the wire being used. Do not overtighten.

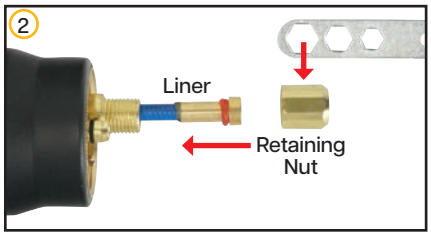


Reinstall nozzle. Trim wire to the end of the nozzle.

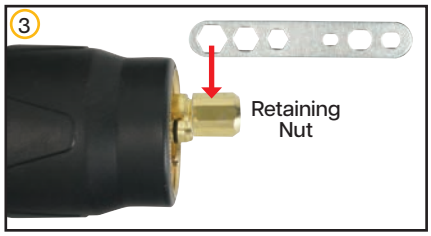
MIG TORCH LINER INSTALLATION / REPLACEMENT



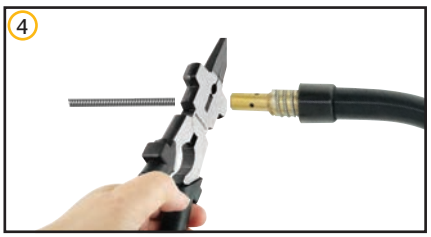
Lay the MIG torch out straight and flat on the ground and remove the nozzle and contact tip.



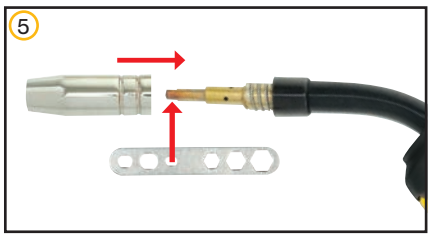
Remove the liner retaining nut from the euro torch end to install liner into the torch lead all the way out the end of the torch



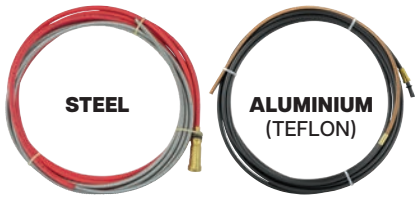
Reinstall retaining nut back and slightly tighten. After snip the steel liner @ step 4, use spanner to tighten all the way.



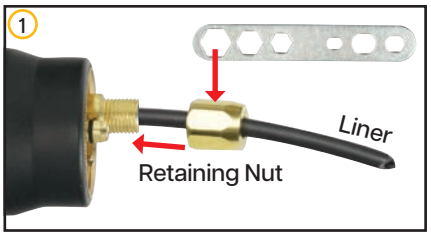
Snip the Steel liner 3mm past the end of the torch neck.



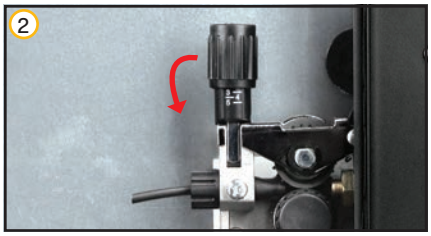
Reinstall back the contact tip and nozzle. Do not over tighten, or you may damage the tip holder.



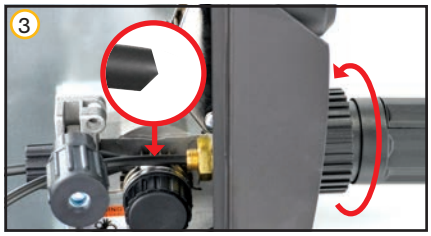
TEFLON/GRAPHITE LINER



Lay the MIG torch out straight and flat on the ground and remove the nozzle and contact tip. Remove the liner retaining nut from the euro torch end to install liner into the torch lead all the way out the end of the torch then reinstall retaining nut back and use spanner to tighten it.



Open side door of the machine. Release the Wire Feed Tension Adjustment Knob by pulling it outwards.



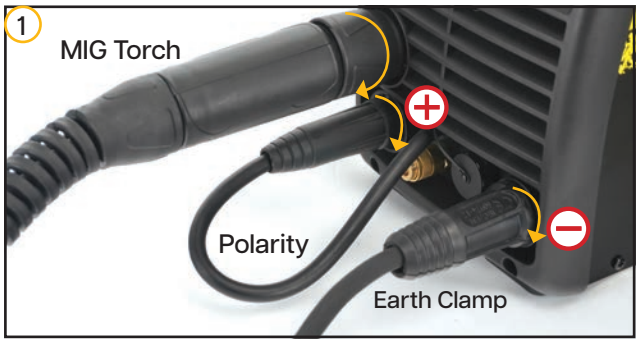
Install Euro connect MIG torch over the protruding wire, line up and screw the Euro connector nut up firmly. Use knife to make a mark on the teflon liner. Uninstall the MIG torch to knife cut the teflon liner 45° top and bottom (> Cut). Reinstall MIG torch.

Steel Liners

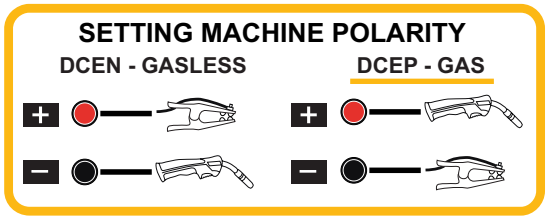
Teflon Liners for Aluminium

PART NO.	DESCRIPTION
92.04.B3	Blue steel liner 0.6 - 0.8mm 3mt
92.04.B4	Blue steel liner 0.6 - 0.8mm 4mt
92.04.B5	Blue steel liner 0.6 - 0.8mm 5mt
92.04.R3	Red steel liner 0.9 - 1.2mm 3mt
92.04.R4	Red steel liner 0.9 - 1.2mm 4mt
92.04.R5	Red steel liner 0.9 - 1.2mm 5mt
92.04.BT3	Blue teflon liner 0.6 - 0.9mm 3mt
92.04.BT4	Blue teflon liner 0.6 - 0.9mm 4mt
92.04.RT3	Red teflon liner0.9 - 1.2mm 3mt
92.04.RT4	Red teflon liner0.9 - 1.2mm 4mt
92.04.RT5	Red teflon liner0.9 - 1.2mm 5mt

MIG WELDING MACHINE SETUP (GAS)



1. Plug **MIG Torch** into the Euro Connection terminal. Twist to ensure a good connection.
2. Plug **Earth Clamp** into the **Negative** terminal.
3. Plug **Polarity** Change Power Connection into the **Positive** terminal and tighten.

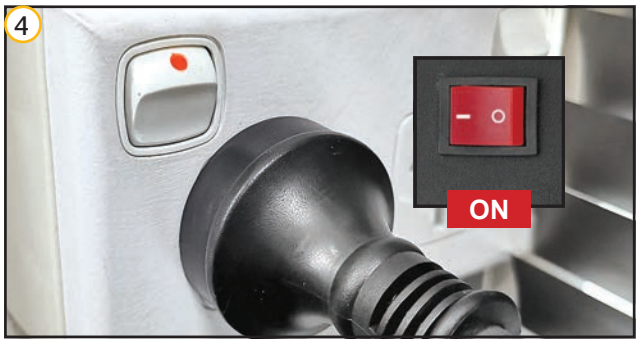


Connect earth clamp firmly to work-piece ensuring that the clamp makes good contact with bare metal.

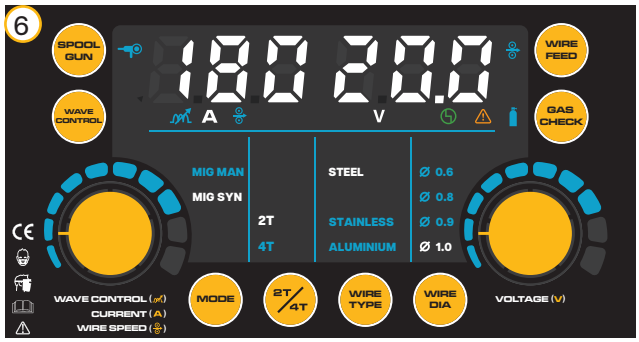
Fit gas regulator to the gas bottle and install gas hose to the gas inlet on the back panel of welder. Turn on regulator and set gas flow to between **10-15 L/min** depending on your welding environment.

Use this table as a guide for welding gas selection:

METAL TYPE	RECOMMENDED GAS
Mild Steel / Galvinised	Ar-CO^2-O^2
Stainless Steel	Ar-CO^2-O^2
Aluminium	Ar



Plug the machine 10Amp input power lead into the wall socket, ensuring that the power switch on the machine is in the **ON** position. The front displays will light up and the cooling fan will start.



Press **MODE** button to select **MIG SYNERGIC** function. **MIG Synergic** welding is a control system like wire feed speed and voltage are automatically adjusted.

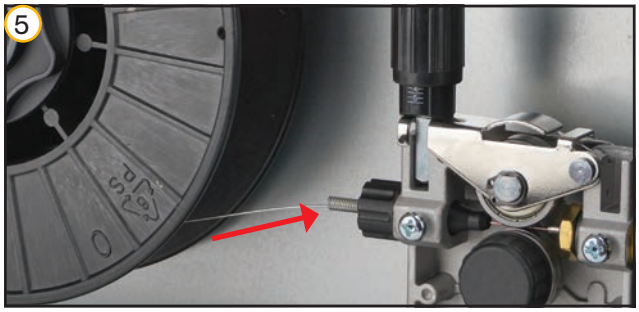
Press **WIRE TYPE** button to select Steel, Stainless or Aluminium.

Press **WIRE DIA.** button to select wire size.

Rotate **Left knob** to adjust the Welding Current.
Rotate **Right knob** to trim the Welding Voltage.

Press **MODE** button to select **MIG MANUAL** function.

Rotate **Left knob** to adjust the Wire Speed.
Rotate **Right knob** to adjust the Welding Voltage.

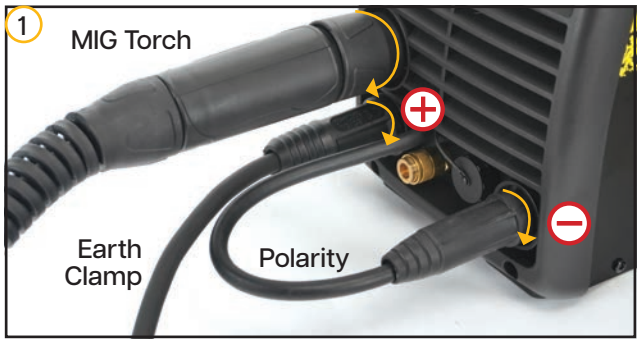


Open machine side panel and install **Solid/GAS wire** into machine ensuring the drive roller is matched to the wire size and type. Wire to roll from under spool into the wire guide inlet tube.

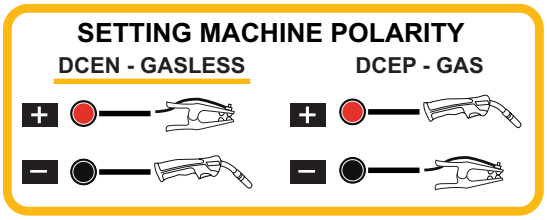
Check page 12 for drive roller guide, wire spool setup, wire feeder unit setup, MIG Torch setup

Note: It is advisable to run a few test welds using scrap or offcut materials, in order to tune the machine to the correct settings prior to welding the job. Pictures may vary from your machine model. **IMPORTANT!** - We strongly recommend that you check for gas leakage prior to operation of your machine. We recommend that you close the cylinder valve when the machine is not in use. BOSSWELD authorised representatives or agents of BOSSWELD will not be liable or responsible for the loss of any gas.

MIG WELDING MACHINE SETUP (GASLESS)

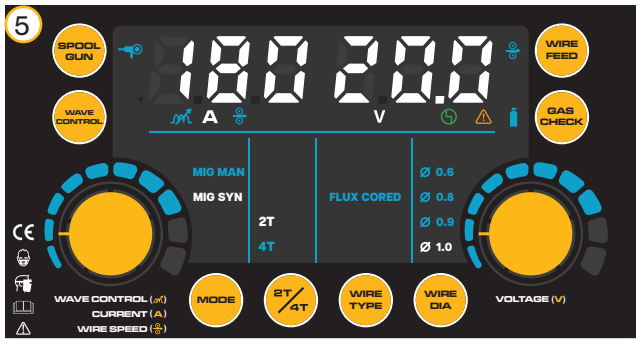


1. Plug **MIG Torch** into the Euro Connection terminal. Twist to ensure a good connection.
2. Plug **Earth Clamp** into the **Positive** terminal.
3. Plug **Polarity** Change Power Connection into the **Negative** terminal and tighten.



Connect earth clamp firmly to work-piece ensuring that the clamp makes good contact with bare metal.

Plug the machine 10Amp input power lead into the wall socket, ensuring that the power switch on the machine is in the **ON** position. The front displays will light up and the cooling fan will start.



Press **MODE** button to select **MIG SYNERGIC** function. **MIG Synergic** welding is a control system like wire feed speed and voltage are automatically adjusted.

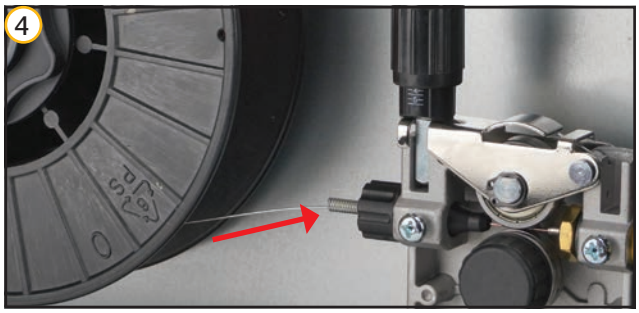
Press **WIRE TYPE** button to select Flux Cored.

Press **WIRE DIA.** button to select wire size.

Rotate **Left knob** to adjust the Welding Current.
Rotate **Right knob** to trim the Welding Voltage.

Press **MODE** button to select **MIG MANUAL** function.

Rotate **Left knob** to adjust the Wire Speed.
Rotate **Right knob** to adjust the Welding Voltage.



Open wire feed side panel and install **GASLESS wire** into machine ensuring the drive roller is matched to the wire size and type. Wire to roll from under spool into the wire guide inlet tube.

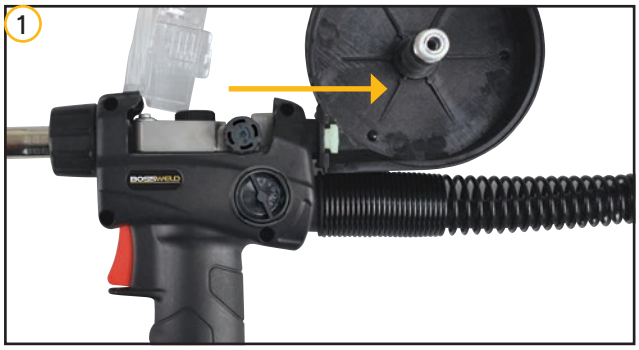
Check page 12 for drive roller guide, wire spool setup, wire feeder unit setup, MIG Torch setup

Note: It is advisable to run a few test welds using scrap or offcut materials, in order to tune the machine to the correct settings prior to welding the job. Pictures may vary from your machine model.

SPOOL GUN MIG WELDING MACHINE SETUP

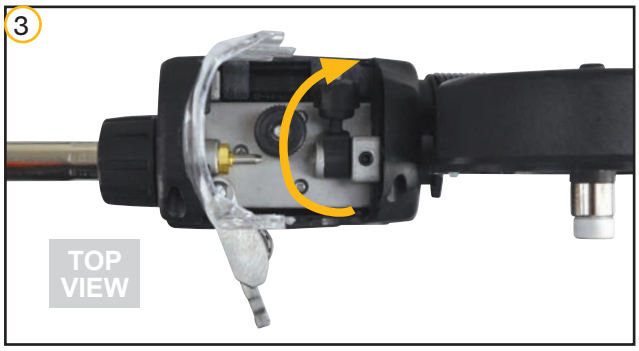
NOTE: SPOOL GUN OPTION SHOWN ARE NOT SUPPLIED WITH THE MACHINE

Spool Gun
SPX15 9 Pin Plug
Part Number:
4Mt: 97.SPX15.4.9 (4 meter)
8Mt: 97.SPX15.8.9 (8 meter)



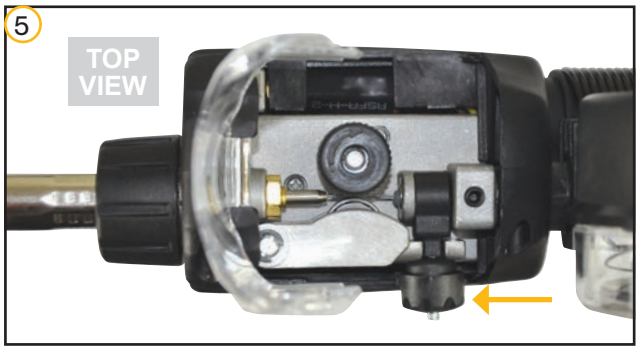
Open wire cover panel by loosening the retaining nut and removing the cover

Remove the spool cover and lift wire drive cover



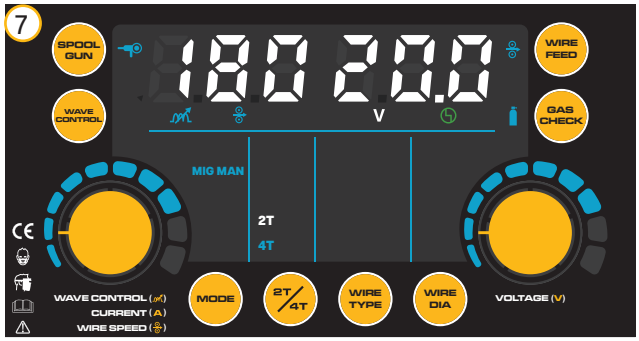
Release the wire tensioning arm, and check the correct drive roller size matches the wire being used

Feed the wire over the drive roller and into the inlet guide, make sure you hold the spool to stop it unraveling.



Re-latch the tensioning arm, making sure you still hold the spool to stop it unraveling. Screw in to increase tension.

Replace the spool cover and close the wire drive cover



Press **MODE** button to select **MIG Manual** function then press **SPOOL GUN** button to continue.

Rotate **Left knob** to adjust the Wire Speed.
Rotate **Right knob** to adjust the Welding Voltage.

Continue from MIG gas welding machine setup at page 14, gasless at page 15.

Note: It is advisable to run a few test welds using scrap or offcut materials, in order to tune the machine to the correct settings prior to welding the job. Pictures may vary from your machine model. **IMPORTANT!** - We strongly recommend that you check for gas leakage prior to operation of your machine. We recommend that you close the cylinder valve when the machine is not in use. BOSSWELD authorised representatives or agents of BOSSWELD will not be liable or responsible for the loss of any gas.

MIG SETTING GUIDE

MIG Torch Polarity	Earth Clamp Polarity	Wire Type	Wire Dia. (mm)	Material Thickness	1.0mm	1.2mm	1.6mm	2mm	3mm	4mm	5mm	6mm	8mm	10mm
DC +	DC -	□ Mild Steel ▶ 80% Argon / 20% CO_2 (10-15L/min) ○ V Groove Roller	Ø 0.6	Wire Speed (S) Voltage (V)	6.1 14.9	7.4 15.4	11.3 18.1	12.4 18.8	13.6 19.6					
			Ø 0.8	Wire Speed (S) Voltage (V)	4.6 15.9	6.1 17.1	9.2 19.3	11.1 20.8	11.6 21.1	12.2 21.7	12.9 22.1	13.5 22.6	14.1 23	
			Ø 0.9	Wire Speed (S) Voltage (V)	4.5 16.8	5.6 17.4	7.9 20	9.9 21.7	10.3 22	10.6 22.3	11.2 22.5	11.8 22.9	12.3 23	
			Ø 1.0	Wire Speed (S) Voltage (V)	2.8 14.9	3.2 15.6	3.8 16.6	4.6 17.1	6.6 18.8	7.1 19.2	7.9 20.1	8.6 21.6	9.4 23	
DC -	DC +	□ Carbon Steel ▶ Gasless, Flux Core Wire ○ K Groove Roller	Ø 0.8	Wire Speed (S) Voltage (V)	5.7 17	6.4 17.5	7.5 18.7	9.2 20.1	10.3 20.5	11.4 21.1	12.6 21.9	13.4 22.3	14 23	
			Ø 0.9	Wire Speed (S) Voltage (V)	3.9 16.3	4.2 16.6	5.1 17.7	5.8 18.3	8.2 20.5	8.7 20.9	9.1 21.6	9.9 22.3	10.5 22.7	12.5 23
			Ø 1.0	Wire Speed (S) Voltage (V)		3.5 15.8	5.9 18.2	7.7 19.5	8.3 19.9	9 20.4	10 21.2	10.8 21.8	11.9 22.6	12.6 23
DC +	DC -	□ Stainless Steel ▶ 98% Argon / 2% CO_2 (10-15L/min) ○ V Groove Roller	Ø 0.8	Wire Speed (S) Voltage (V)	4 15	4.8 15.6	6.4 16.9	7.8 17.7	11.1 19.9	13.3 21.9	13.8 22.3	14.3 23		
			Ø 0.9	Wire Speed (S) Voltage (V)		3.6 15.1	4.3 15.6	4.8 15.9	6.5 16.6	7.6 17.3	8.1 18	9.3 18.9	10.2 20.3	
			Ø 1.0	Wire Speed (S) Voltage (V)	2.7 13.5	3.1 13.6	4.2 14.2	4.9 15.1	6.7 17.4	8 19	9.6 20.8	11.1 22.6	11.8 23	
DC +	DC -	□ Aluminium ▶ 100% Argon (10-15L/min) ○ U Groove Roller	Ø 0.8	Wire Speed (S) Voltage (V)	6 13.2	7 13.7	10 14.2	13 15	15 15.4					
			Ø 0.9	Wire Speed (S) Voltage (V)	5 12.8	6.5 13.2	9 13.8	11.5 14.8	15 16					
			Ø 1.0	Wire Speed (S) Voltage (V)	2.1 10.9	3.7 12	6.4 13.9	7.9 14.5	10 16.8	12 19	13.5 20.2	15 21.5	15 22.6	

Note:

1. The above amperage range is to be used as a starting guide only
2. Welding travel speed will affect the end weld result
3. For additional information on gas selection, consult your distributor

WIRE SIZE SELECTION

The choice of wire size in conjunction with shielding gas used depends on:

- Thickness of the metal to be welded.
- Type of joint configuration
- Capacity of the wire feed unit and power supply.
- The amount of penetration required.
- The deposition rate required.
- The bead profile desired
- The position of welding and cost of the wire.
- Location of welding

WELDING CURRENT

Welding current level is determined by the size of mig wire - the normal operating range and current are recommended by manufacturers. Typical operating ranges for a selection of mig wire diameters are illustrated in the table. It is important to match the machine to the job.

AVERAGE METAL THICKNESS	MIG WIRE DIAMETER
1 – 2 mm	0.6 – 0.8 mm
2 – 5 mm	0.8 – 1.0 mm
5 – 10 mm	1.0 – 1.2 mm

AMPERAGE SELECTION GUIDE	
MIG WIRE DIAMETER	**WELDING CURRENT**
0.6 – 0.8 mm	30 – 70 Amps
0.8 – 1.0 mm	70 – 110 Amps
1.0 – 1.2 mm	110 – 150 Amps
1.2 – 1.6 mm	150 – 190 Amps

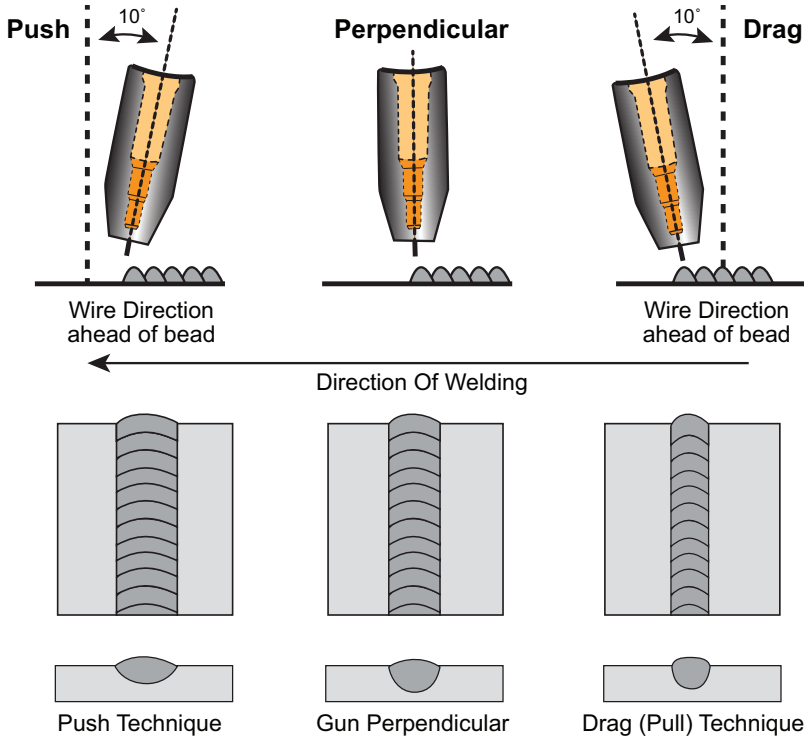
MIG WELDING OPERATION

The welding power supply has two control settings that have to balance. These are voltage control switches and the wire speed control. The welding amperage is determined by the voltage settings, the wire diameter, gas selection and the wire feed speed. The amperage will increase with higher voltage selection on the machine and higher wire feed speed. This is typically used for welding thick sections of steel. When welding thin sections of steel, a lower voltage selection and lower wire feed speed is required.

- When changing to a different wire diameter different control settings are required. A thinner wire needs more wire speed to achieve the same current level.
- A satisfactory weld cannot be obtained if the wire speed and voltage switch settings are not adjusted to suit the wire diameter and thickness of the material being welded.
- If the wire speed is too high for the welding voltage, “stubbing” will occur as the wire dips into the molten pool. If the wire speed is too slow for the welding voltage, large drops will form on the end of the electrode wire, causing spatter. Suppose that wire speed is constant, if the welding voltage is too high, large drops will form on the end of the electrode wire, causing spatter; if the voltage is too low, the wire will not melt.

POSITION OF MIG GUN

The angle of MIG gun to the weld has an effect on the width of the weld run.



DISTANCE FROM THE MIG GUN NOZZLE TO THE WORK PIECE

The electrode stick out from the MIG gun nozzle should be between 2.0mm to 5.0mm when welding with gas shielded wire. An increased distance of 5mm to 10mm is required when welding with Gasless wire. This distance will vary depending on the type of joint that is being weld. .

TRAVEL SPEED

Speed at which a weld travels influences the width of the weld and penetration of the welding run. Welding thin steel will have a faster travel speed than welding thick steel.

MIG WELDING OPERATION

Metal inert gas (MIG) welding is an attractive alternative to MMA (stick welding), offering high deposition rates and high productivity.

PROCESS CHARACTERISTICS

MIG welding is a versatile technique suitable for both thin sheet and thick section components. An arc is struck between the end of a wire electrode and the workpiece, melting both of them to form a weld pool. The wire serves as both heat source (via the arc at the wire tip) and filler metal for the joint. The wire is fed through a copper contact tube (contact tip) which conducts welding current into the wire. The weld pool is protected from the surrounding atmosphere by a shielding gas fed through a nozzle surrounding the wire. Shielding gas selection depends on the material being welded and the application. The wire is fed from a reel by a motor drive, and the welder moves the welding torch along the joint line. Wires may be solid (simple drawn wires), or cored (composites formed from a metal sheath with a powdered flux or metal filling).

Consumables are generally competitively priced compared with those for other processes. The process offers high productivity, as the wire is continuously fed.

Manual MIG welding is often referred as a semi-automatic process, as the wire feed rate and arc length are controlled by the power source, but the travel speed and wire position are under manual control. The process can also be mechanised when all the process parameters are not directly controlled by a welder, but might still require manual adjustment during welding. When no manual intervention is needed during welding, the process can be referred to as automatic. The process usually operates with the wire positively charged and connected to a power source delivering a constant voltage. Selection of wire diameter (usually between 0.6 and 1.6mm) and wire feed speed determine the welding current, as the burn-off rate of the wire will form an equilibrium with the feed speed.

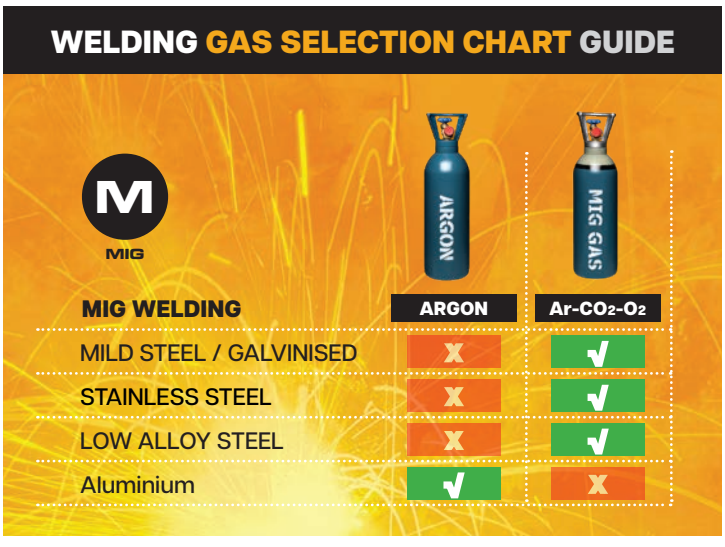
SHIELDING GAS

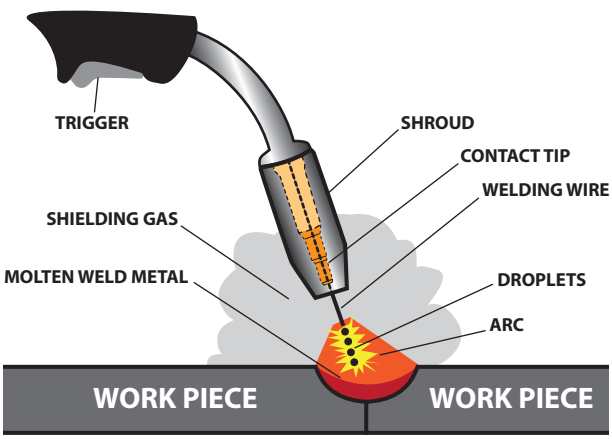
In addition to general shielding of the arc and the weld pool, the shielding gas performs a number of important functions:
- forms the arc plasma
- stabilises the arc roots on the material surface
- ensures smooth transfer of molten droplets from the wire to the weld pool

The shielding gas will have a substantial effect on the stability of the arc and metal transfer and the behaviour of the weld pool, in particular, its penetration. General purpose shielding gases for MIG welding are mixtures of argon, oxygen and CO2, and special gas mixtures may contain helium.

The gases which are normally used for the various materials are:
- Steels: CO2, argon +2 to 5% oxygen, argon +5 to 25% CO2.
- Non-ferrous (e.g. Aluminium, copper or nickel alloys): Argon, argon / helium.

Argon based gases, compared with CO2, are generally more tolerant to parameter settings and generate lower spatter levels with the dip transfer mode. However, there is a greater risk of lack of fusion defects because these gases are colder. As CO2 cannot be used in the open arc (pulsed or spray transfer) modes due to high back-plasma forces, argon based gases containing oxygen or CO2 are normally employed.





MIG TORCH AND CONSUMABLE CARE

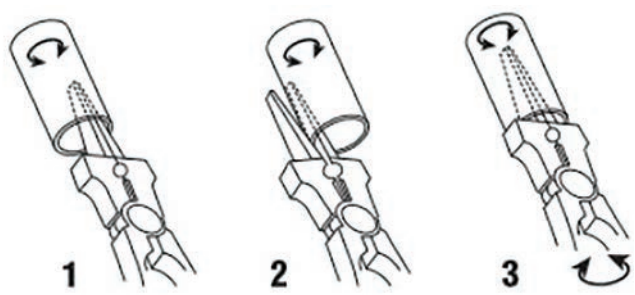
PROPER MIG TORCH INSPECTION

Prior to welding, ensure all connections are tight and that consumables and equipment are in good condition and free from damage. Start with the front of the gun and work your way back to the feeder. A tight neck connection is essential to carry the electrical current from the welding cable to the front-end consumables. Also, be sure to visually inspect the handle and trigger to check there are no missing screws or damage. The cable should be free of cuts, kinks and damage along the outer cover. Cuts in the cable can expose the internal copper wiring and create a potential safety hazard to the welding operator. In addition, these issues can lead to electrical resistance that causes heat buildup – and ultimately cable failure.

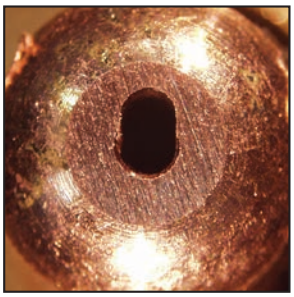
CONSUMABLES

MIG gun front-end consumables are exposed to heat and spatter and therefore often require frequent replacement. However, performing some simple maintenance can help extend consumable life and improve gun performance and weld quality. The gas diffuser provides gas flow to the weld pool and also connects to the neck and carries the electrical current to the contact tip. Make sure all connections are tight, and check the diffuser's O-rings for cracks, cuts or damage. The nozzle's main role is to focus the shielding gas around the weld pool. Watch for spatter buildup in the nozzle, which can obstruct gas flow and lead to problems due to inadequate shielding coverage. Use MIG pliers to clean spatter from the nozzle. The contact tip is the last point of contact between the welding equipment and the welding wire. Keyholing of the contact tip is a concern to watch for with this consumable. This occurs when the wire passing through the tip wears an oblong-shaped slot into the diameter of the tip. Keyholing can put the wire out of center and cause problems such as an erratic arc. If you are experiencing wire feeding issues, try changing the contact tip or switching to a larger-size contact tip. Tips that look worn should be replaced.

SPATTER REMOVAL FROM INSIDE AND OUTSIDE THE NOZZLE USING MIG PLIERS



Build up of spatter can cause damage to nozzle and tip



Keyholing of the contact tip

FINAL THOUGHTS

Taking the time for preventative maintenance can pay off in less downtime in the long run. Along with that, always remember to properly store your MIG gun consumables to help you achieve the best results and extend the life of your equipment. When not in use, the MIG gun should be stored in a coiled position, either hanging or lying flat, such as on a shelf. Do not leave MIG gun on the floor of the shop, where there is a chance the cable could be run over, kinked or damaged.

WELDING PRODUCTS TO HELP PROLONG, MAINTAIN AND PRODUCE BETTER WELDS

BOSSWELD AEROSOL ANTI SPATTER SPRAY

This silicon free spatter release coating is a colourless film which stops weld spatter from sticking to welding equipment, work pieces & fixtures. Easily removed before painting or finishing.

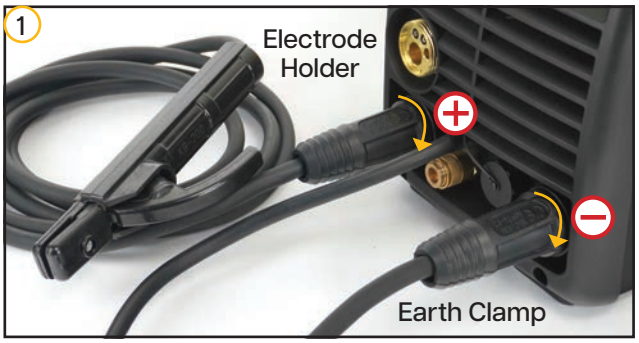
BOSSWELD TIP DIP GEL

Non toxic water based dipping gel for the prevention of weld spatter adherence to MIG torch parts. This silicon free compound is used to prolong the life of nozzles & tips.

BOSSWELD 8 WAYS MIG WELDING PLIERS

Handy 8 function welders pliers. Functions include, nozzle removal, tip removal, cleaning inside of nozzle and wire cutting.

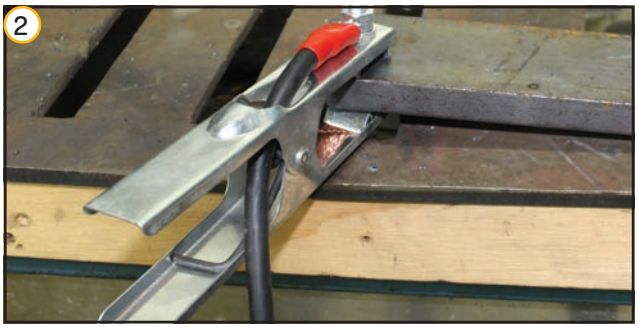
MMA (STICK) WELDING MACHINE SETUP



Assemble Arc and Earth leads into the welding terminals depending on requirements of electrodes.

DCEP: Electrode connected to Positive (+) output socket

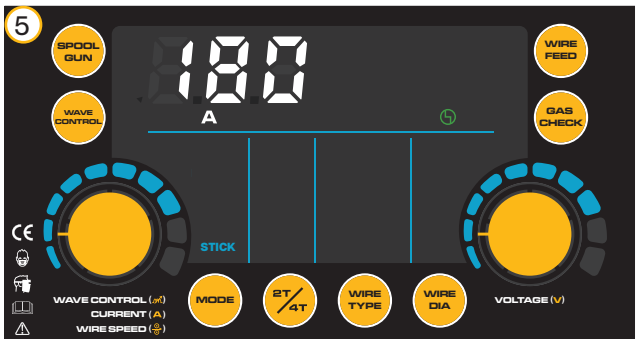
DCEN: Electrode connected to Negative (-) output socket



Connect earth clamp firmly to work-piece ensuring that the clamp makes good contact with bare metal.

Take the electrode holder and press the handle to open the tong. Insert the bare metal rod end of the electrode and release the handle to clamp the electrode.

Plug the machine 10Amp input power lead into the wall socket, ensuring that the power switch on the machine is in the **ON** position. **Ensure the electrode / electrode holder is not near the work-piece or can earth out.** The front displays will light up and the cooling fan will start.



Press **MODE** button to select Stick function.

Rotate **Left knob** to adjust the welding current (10–140A).

Note: It is advisable to run a few test welds using scrap or offcut materials, in order to tune the machine to the correct settings prior to welding the job. Pictures may vary from your machine model.

MMA (STICK) WELDING OPERATION

MANUAL METAL ARC PROCESS (MMA WELDING)

When an arc is struck between the metal rod (electrode) and the workpiece, both the rod and workpiece surface melt to form a weld pool. Simultaneous melting of the flux coating on the rod will form gas and slag which protects the weld pool from the surrounding atmosphere. The slag will solidify and cool and must be chipped off the weld bead once the weld run is complete (or before the next weld pass is deposited).

The process allows only short lengths of weld to be produced before a new electrode needs to be inserted in the holder. Weld penetration is low and the quality of the weld deposit is highly dependent on the skill of the welder.

TYPES OF ELECTRODES

Arc stability, depth of penetration, metal deposition rate and positional capability are greatly influenced by the chemical composition of the flux coating on the electrode. There are many types of Electrodes, and these are generally matched to the base metal. For example if welding Mild Steel then select a Mild Steel (General Purpose Electrode). Electrodes are identified by a universal numbering system (AWS Type code).

BASE METAL	ELECTRODE TYPE	TYPE
Mild Steel	Mild Steel General Purpose	6013
Stainless Steel	Stainless Steel 316L	316L
Dissimilar Metals	Dissimilar 680	312
Cast Iron	Nickel Arc 98	Ni99
High Strength Steel	Low Hydrogen	TC16

Electrodes are often packed in sealed packaging to keep moisture out. However, if a pack has been opened or damaged, it is essential that the electrodes are redried according to the manufacturer's instructions.

ELECTRODE SIZE SELECTION

Electrode size selection will be determined by the thickness of the section being welded. A thicker section will need a larger diameter electrode. The table below shows the maximum size of electrodes for average thicknesses of section (based on General Purpose 6013 Electrode).

AVERAGE METAL THICKNESS	ELECTRODE SIZE
1.0 – 2.0 mm	2.0 mm
2.0 – 5.0 mm	2.6 mm
5.0 – 8.0 mm	3.2 mm
8.0 mm +	4.0 mm

WELDING CURRENT

Welding current level is determined by the size of electrode - the normal operating range and current are recommended by manufacturers. Typical operating ranges for a selection of electrode sizes are illustrated in the table. As a rule of thumb when selecting a suitable current level, an electrode will require about 40 Amps per millimetre (diameter). Therefore, the preferred current level for a 4mm diameter electrode would be 160 Amps, but the acceptable operating range is 140 to 180 Amps. It is important to match the machine to the job

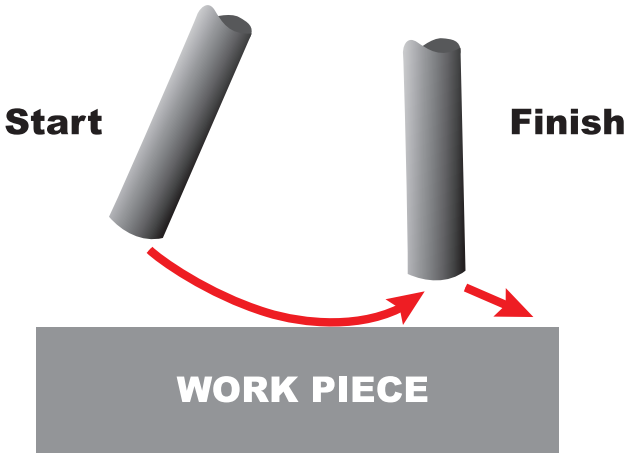
AMPERAGE SELECTION GUIDE	
ROD SIZE/ GAUGE	WELDING CURRENT
1.6 mm	40 – 50 Amps
2.0 mm	50 – 75 Amps
2.5 mm	75 – 105 Amps
3.2 mm	105 – 140 Amps
4.0 mm	140 – 160 Amps

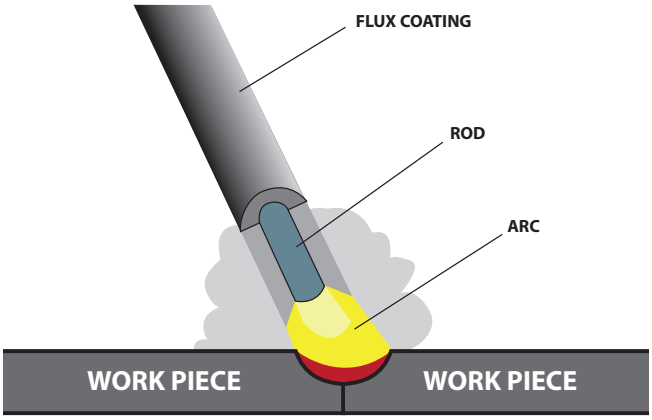
STARTING THE ARC (SCRATCH)

The welding arc is obtained when the welding current is forced across a gap between the electrode tip and the workpiece. A welder must be able to strike and establish the correct arc easily and quickly.

The scratching method is easier for beginners. The electrode is moved across the plate inclined at an angle, as you would strike a match. As the electrode scratches the plate an arc is struck. When the arc has formed, withdraw the electrode momentarily to form an excessively long arc, then return to optimal arc length.

The optimal arc length, or distance between electrode and puddle, is the same as the diameter of the electrode (the actual metal part within the flux covering). Holding the electrode too closely to the joint decreases welding voltage, which creates an erratic arc that may extinguish itself.





TIPS

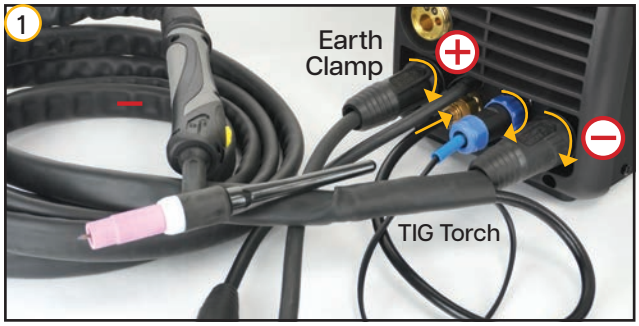
- Keep the welding current as low as possible for the job at hand to maintain the best duty cycle from your welding machine, prevent the flux from burning and make removal slag easier.
- To break the circuit withdraw the electrode from the work piece. Be careful with the end of the electrode, as it will be HOT. Provided the current setting is correct, the surface of the work piece will also melt by the intensity of the electric arc. A degree of “penetration” is thereby obtained, and a complete “fusion” of the work piece and the deposited electrode is met.
- If the transformer overheats, the overload cut-out protector will activate and cut off. The light will illuminate to show that the cut out has operated.
- After cooling, the protector will reconnect the supply circuit and the welder will be ready for further use.

Note: If the duty cycle of the machine is exceeded, the thermostatic protection will activate and the machine will cut out, to cool down.

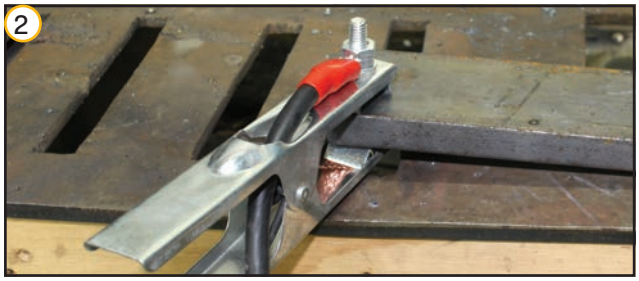
TIG DC WELDING MACHINE SETUP

NOTE: TIG TORCH OPTION SHOWN ARE NOT SUPPLIED WITH THE MACHINE

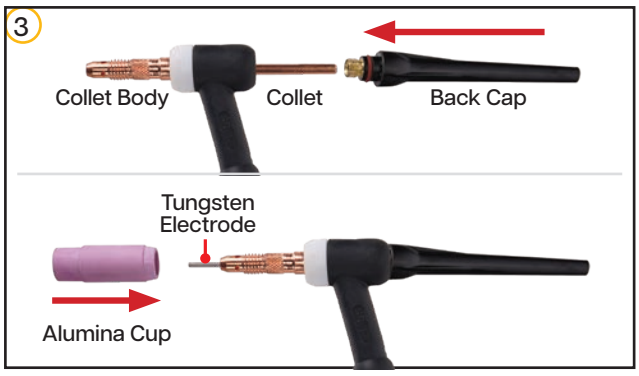
17 Series Complete Air Cooled TIG Torch
Part Number:
95.17.4.1.MST185A



1. Plug **TIG Torch** into the Negative terminal, the Gas hose to the Gas Output and the TIG Torch Control Socket and screw the nut up firmly.
2. Plug **Earth Clamp** into the Positive terminal. Twist to ensure a good connection.



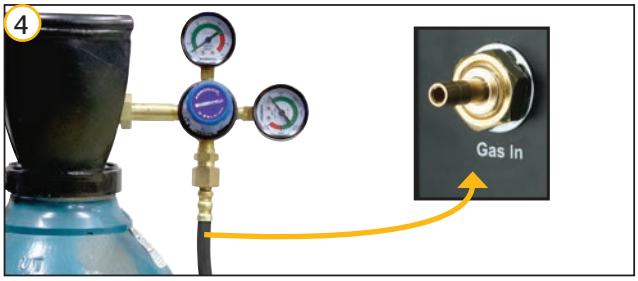
Connect earth clamp firmly to work-piece ensuring that the clamp makes good contact with bare metal.



Set up the TIG torch. Ensure collect body, collet with back cap are screw in firmly. Place the Tungsten Electrode into the torch head then screw in alumina cup.

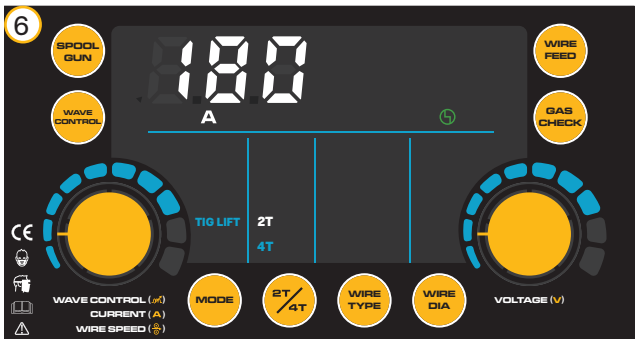
WELDING GAS SELECTION GUIDE
Use the table below as a guide:

METAL TYPE	RECOMMENDED GAS
Mild Steel	Ar
Stainless Steel	Ar
Low Alloy Steel	Ar
Galvanised Steel	Ar



Fit gas regulator to the gas bottle and install gas hose to the gas inlet on the back panel of welder. Turn on regulator and set gas flow to between **10-15 L/min** depending on your welding environment.

Plug the machine 10Amp input power lead into the wall socket, ensuring that the power switch on the machine is in the **ON** position. **Ensure the TIG torch is not near the work-piece or can earth out.** The front displays will light up and the cooling fan will start.



Press **MODE** button to select TIG Lift function.

Rotate **Left knob** to adjust the welding current (10–160A).

Press **2T/4T** button to select 2T or 4T mode.
2T: Press the torch trigger to weld & release to stop.
4T: Press & release the torch trigger to start, weld without holding the trigger on and stop by pressing and releasing the trigger again.

Note: It is advisable to run a few test welds using scrap or offcut materials, in order to tune the machine to the correct settings prior to welding the job. Pictures may vary from your machine model. **IMPORTANT!** - We strongly recommend that you check for gas leakage prior to operation of your machine. We recommend that you close the cylinder valve when the machine is not in use. BOSSWELD authorised representatives or agents of BOSSWELD will not be liable or responsible for the loss of any gas.

TIG WELDING OPERATION

PROCESS CHARACTERISTICS

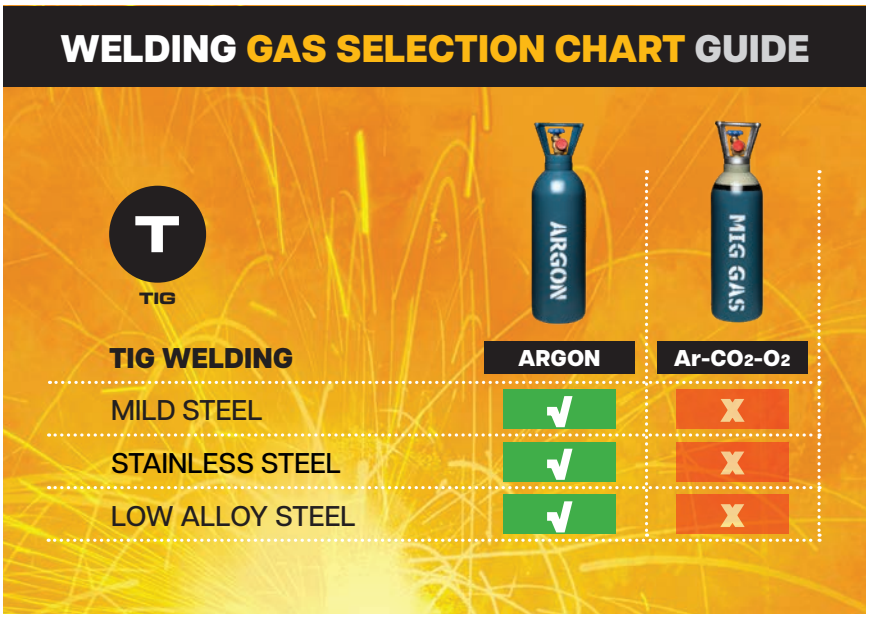
In the TIG process the arc is formed between a pointed tungsten electrode and the workpiece in an inert atmosphere of argon. The small intense arc provided by the pointed electrode is ideal for high quality and precision welding. Because the electrode is not consumed during welding, the welder does not have to balance the heat input from the arc as the metal is deposited from the melting electrode. When filler metal is required, it must be added separately to the weldpool.

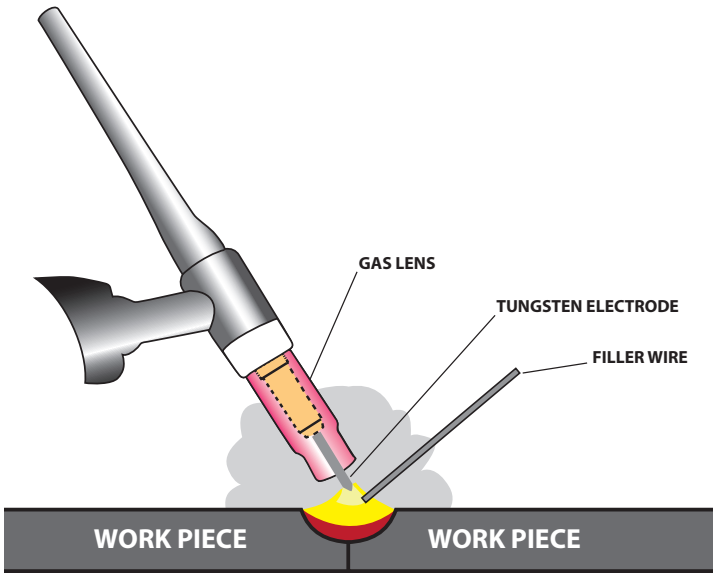
POWER SOURCE

TIG must be operated with a constant current power source. A constant current power source is essential to avoid excessively high currents being drawn when the electrode is short-circuited onto the workpiece surface. This could happen either deliberately during arc starting or inadvertently during welding. If, as in MIG welding, a flat characteristic power source is used, any contact with the workpiece surface would damage the electrode tip or fuse the electrode to the workpiece surface. In DC, because arc heat is distributed approximately one-third at the cathode (negative) and two-thirds at the anode (positive), the electrode is always negative polarity to prevent overheating and melting. However, the alternative power source connection of DC electrode positive polarity has the advantage in that when the cathode is on the workpiece, the surface is cleaned of oxide contamination.

APPLICATIONS

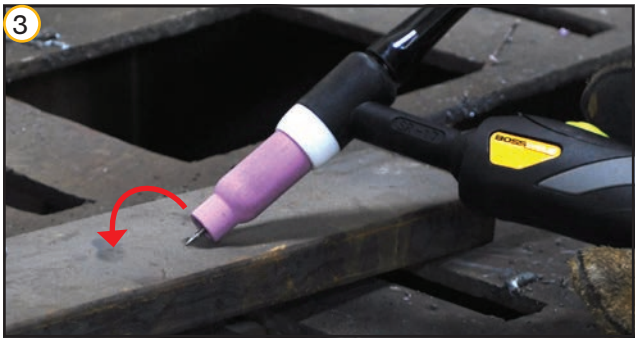
TIG is applied in all industrial sectors but is especially suitable for high quality welding. In manual welding, the relatively small arc is ideal for thin sheet material or controlled penetration (in the root run of pipe welds). Because deposition rate can be quite low (using a separate filler rod) MMA or MIG may be preferable for thicker material and for fill passes in thick-wall pipe welds.





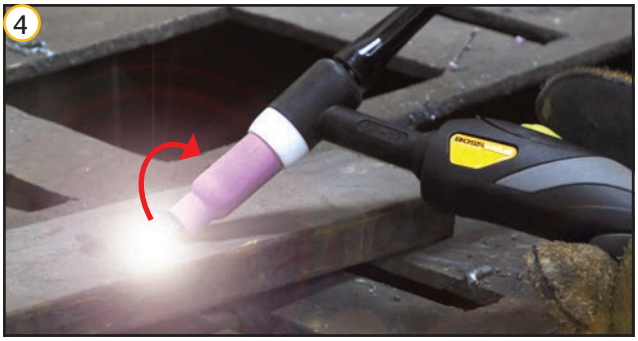
LIFT ARC START

Lay the outside edge of the Gas Cup on the work piece with the Tungsten Electrode 1- 2mm from the work piece.



With a small movement rotate the Gas Cup forward so that the Tungsten Electrode touches the work piece.

Press the button on the TIG torch

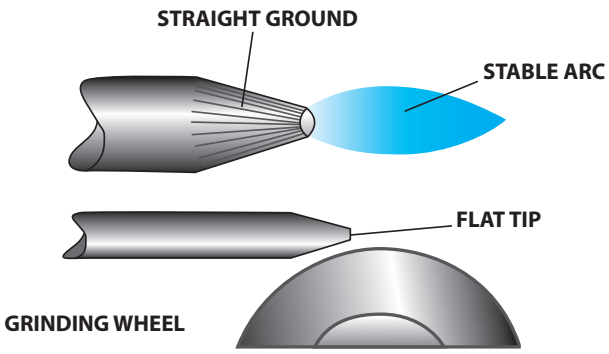


Now rotate the Gas Cup in the reverse direction to lift the Tungsten electrode from the work piece to create the arc.

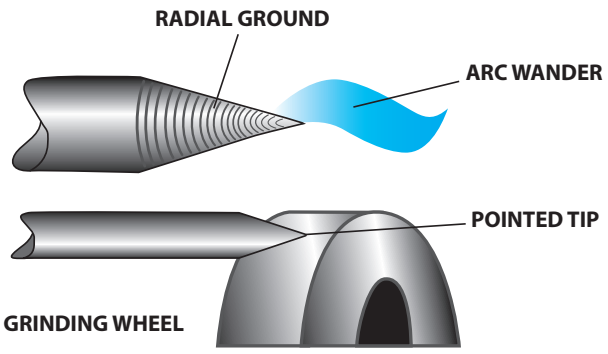
TUNGSTEN PREPARATION & GRINDING

Caution: Grinding can create a hazard as the exposed tungsten/thoria area is greatly increased and fine particles of dust are released into the atmosphere. It is recommended that a dedicated grindstone with local dust extraction is used, and a simple filter mask is worn. If the grinding wheel is not fitted with a protective viewing screen, eye protection must be worn.

CORRECT PREPERATION - STABLE ARC



INCORRECT PREPERATION - STABLE ARC



Note: Do not use wheel for other jobs or tugsten can become contaminated and cause lower weld quality

BZ15 BINZEL STYLE TORCH & SPARE PARTS

BZ15 TORCH	
Current	180 Amps
Duty Cycle @ 40°C	60% @ 180Amp CO2 60% @ 150Amp MIX
Cooling	Air
Wire Size	0.6mm > 1.0mm

BZ15 TORCH SPARES PACK
P/N: 92.15FEK
1 x BZ15 conical nozzle
1 x BZ15 tip holder
3 x 0.8mm M6 contact tips
3 x 0.9mm M6 contact tips

	Part No.	Description
	92.ER.15.3	Binzel Style BZ15 Complete MIG Torch Ergon 3Mt
	92.ER.15.4	Binzel Style BZ15 Complete MIG Torch Ergon 4Mt
1	92.02.15.10	ø 10mm Adjustable Tapered Nozzle
2	92.02.15.CO	ø 12mm Adjustable Conical Nozzle
3	92.02.15.CL	ø 19mm Adjustable Cylindrical Nozzle
4	92.01.15.06	Contact Tip 0.6mm x M6 x 6mm dia x 25mm long
	92.01.15.08	Contact Tip 0.8mm x M6 x 6mm dia x 25mm long
	92.01.15.09	Contact Tip 0.9mm x M6 x 6mm dia x 25mm long
	92.01.15.10	Contact Tip 1.0mm x M6 x 6mm dia x 25mm long
5	92.01.25.06	Contact Tip Heavy Duty 0.6mm x M6 x 8mm dia x 25mm long
	92.01.25.08	Contact Tip Heavy Duty 0.8mm x M6 x 8mm dia x 25mm long
	92.01.25.09	Contact Tip Heavy Duty 0.9mm x M6 x 8mm dia x 25mm long
	92.01.25.10	Contact Tip Heavy Duty 1.0mm x M6 x 8mm dia x 25mm long
6	92.01.M6A09	Contact Tip 0.9mm x M6 Aluminium x 8mm dia x 28mm long
	92.01.M6A10	Contact Tip 1.0mm x M6 Aluminium x 8mm dia x 28mm long

	Part No.	Description
7	92.02.15GL	Bakelite Gasless Nozzles
8	92.05.15	Tip holder with spring l/hand
	92.03.15.01	Spring for tip holder
9	92.03.15	Insulator nut for conductor tube
10	92.06.15	Adjustable swan neck with diffuser and spring
11	92.09.HANDLE	Ergonomic handle with screws
12	92.09.BWT	Trigger
13	92.04.B3	Blue Steel Liner 0.6–0.8mm 3Mt
	92.04.B4	Blue Steel Liner 0.6–0.8mm 4Mt
14	92.04.R3	Red Steel Liner 0.9–1.2mm 3Mt
	92.04.R4	Red Steel Liner 0.9–1.2mm 4Mt
15	92.04.Y3	Yellow Steel Liner 1.2–1.6mm 3Mt
	92.04.Y4	Yellow Steel Liner 1.2–1.6mm 4Mt
16	92.04.BT3	Blue Teflon Liner 0.6–0.9mm 3Mt
	92.04.BT4	Blue Teflon Liner 0.6–0.9mm 4Mt
17	92.04.RT3	Red Teflon Liner 0.9–1.2mm 3Mt
	92.04.RT4	Red Teflon Liner 0.9–1.2mm 4Mt
18	92.04.YT3	Yellow Teflon Liner 1.2–1.6mm 3Mt
	92.04.YT4	Yellow Teflon Liner 1.2–1.6mm 4Mt
19	92.04.U5	Universal Liner 0.9–1.2mm 4Mt
20	92.04.BNL12	Brass Swan Neck Liner 1.2mm 250mm
	92.04.BNL16	Brass Swan Neck Liner 1.6mm 250mm

SPX15 SPOOL GUN & SPARE PARTS

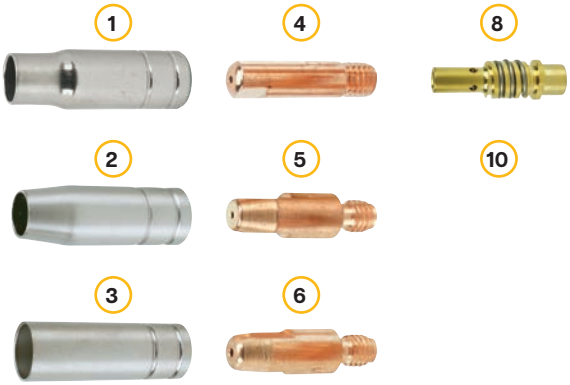
This spool gun is the perfect solution for welding soft alloys, especially aluminium where feeding the aluminium MIG wire is always a challenge due to birds nesting, tangles and feedability problems. A spool gun overcomes these issues by providing a reliable solution that delivers the wire at the gun point with a short feed length compared to a standard mig gun length of at least 3 metres.

FEATURES

- Suits the X series range of machines.
- Can be also used for MIG welding of mild steel and stainless steel.
- Primarily used for MIG (GMAW) welding of aluminium and aluminium alloys.

Euro Connector

SPX15 SPOOL GUN	
Current	180 Amps
Duty Cycle @ 40°C	60% @ 180Amp CO2 60% @ 150Amp MIX
Cooling	Air
Wire Size	0.6mm > 1.0mm



	Part No.	Description
	97.SPX15.4.9	Bossweld 4mt spool gun SPX15 9 pin Plug
	97.SPX15.8.9	Bossweld 8mt spool gun SPX15 9 pin Plug
1	92.02.15.10	ø 10mm Adjustable Tapered Nozzle
	92.02.15.CO	ø 12mm Adjustable Conical Nozzle
	92.02.15.CL	ø 19mm Adjustable Cylindrical Nozzle
2	92.01.15.08	Contact Tip 0.8mm x M6 x 6mm dia x 25mm long
	92.01.15.09	Contact Tip 0.9mm x M6 x 6mm dia x 25mm long
	92.01.15.10	Contact Tip 1.0mm x M6 x 6mm dia x 25mm long
3	92.01.25.06	Contact Tip Heavy Duty 0.6mm x M6 x 8mm dia x 25mm long
	92.01.25.08	Contact Tip Heavy Duty 0.8mm x M6 x 8mm dia x 25mm long
	92.01.25.09	Contact Tip Heavy Duty 0.9mm x M6 x 8mm dia x 25mm long
	92.01.25.10	Contact Tip Heavy Duty 1.0mm x M6 x 8mm dia x 25mm long
4	92.01.M6A09	Contact Tip 0.9mm x M6 Aluminium x 8mm dia x 28mm long
	92.01.M6A10	Contact Tip 1.0mm x M6 Aluminium x 8mm dia x 28mm long
5	92.05.15	Tip holder with spring l/hand

17 SERIES TORCH & SPARE PARTS

17 SERIES TIG TORCH	
Current	140 Amps
Duty Cycle @ 40°C	35% @ 140Amp DC 35% @ 125Amp AC
Cooling	Air
Wire Size	0.5mm > 2.4mm

TIG FRONT END SPARES PACK
P/N: 95.TIGFEK
1 x Medium Back Cap
1 x Long Back Cap
1 x 1.6mm 10N23 Collet
1 x 2.4mm 10N24 Collet
1 x 1.6mm 10N31 Collet Body
1 x 2.4mm 10N32 Collet Body
1 x size 6 10N48 Alumina Cup
1 x size 7 10N47 Alumina Cup

No.	Part No.	Description
	95.17.4.1.MST185A	17 Complete TIG Torch 4Mt 9 Pin
	95.17F.4.1.SW9A	17 Complete Flex Head TIG Torch 4Mt 9 Pin
	95.17F.8.1.SW9A	17 Complete Flex Head TIG Torch 8Mt 9 Pin
1	9510N50	6.0mm Alumina Cup
	9510N49	8.0mm Alumina Cup
	9510N48	9.5mm Alumina Cup
	9510N47	11.5mm Alumina Cup
	9510N46	12.7mm Alumina Cup
	9510N45	17.5mm Alumina Cup
	9510N44	19.0mm Alumina Cup
2	9554N18	6.0mm Gas Lens Alumina Cup
	9554N17	8.0mm Gas Lens Alumina Cup
	9554N16	9.5mm Gas Lens Alumina Cup
	9554N15	11mm Gas Lens Alumina Cup
	9554N14	12.7mm Gas Lens Alumina Cup
	9554N19	17.5mm Gas Lens Alumina Cup
3	9510N29	0.5mm Collet Body
	9510N30	1.0mm Collet Body
	9510N31	1.6mm Collet Body
	9510N32	2.4mm Collet Body
	9510N28	3.2mm Collet Body
	95406488	4.0mm Collet Body

No.	Part No.	Description
4	9545V24	1.0mm Gas Lens Collet Body
	9545V25	1.6mm Gas Lens Collet Body
	9545V26	2.4mm Gas Lens Collet Body
	9545V27	3.2mm Gas Lens Collet Body
	9545V28	4.0mm Gas Lens Collet Body
5	9510N21	0.5mm Collet
	9510N22	1.0mm Collet
	9510N23	1.6mm Collet
	9510N24	2.4mm Collet
	9510N25	3.2mm Collet
6	9518CG	Insulator
6A	9554N01	Insulator for Gas Lens
7	9557Y04	Short Back Cap
	9557Y05	Medium Back Cap
	9557Y02	Long Back Cap
8	95WP17	WP17 Torch Head
	95WP17V	WP17 Torch Head with Valve
	95WP17F	WP17 Flex Torch Head
	95WP17FV	WP17 Flex Torch Head with Valve
9	95.ATSSW	Agility Single Hold Down TIG Switch
10	95.ATMFH	Handle

TROUBLE SHOOTING

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

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

	TROUBLES		REASONS	SOLUTION
1	Turn ON power but the power light is not illuminated.		Switch damaged	Change it
			Fuse damaged	Change it
			Power cord damaged	Change it
2	After welding machine is over-heat, the fan doesn't work		Fan damaged	Change it
			The cable is loose	Screw the cable tight
3	Press the gun switch, no output shielded gas	No output gas when test gas	No gas in the gas cylinder	Change it
			Gas hose leaks gas	Change it
			Electromagnetic valve damaged	Change it
		Output gas when test gas	Control switch damaged	Repair the switch
			Control circuit damaged	Check the PCB
4	Wire-feeder doesn't work	Wire reel doesn't work	Motor damaged	Check and change it
			Control circuit damaged	Check the PCB
		Wire reel works	The idler roll is loose or weld wire skids	Adjust tension screws
			The drive roll doesn't fit with the diameter of weld wire	Change the roll
			Wire reel damaged	Change it
			Wire feed pipe is jammed	Repair or change it
			Tip is jammed because of splash	Repair or change it
5	No striking arc and no output voltage		Output cable is connected incorrectly or loosen	Screw it down or change it
			Control circuit damaged	Check the circuit
6	Welding stops, and alarm light is on		Machine has self-protection	Check over-voltage, over-current, over-temperature, lower-voltage and over-temperature, and solve it
7	Welding current is run away and can be not controlled		The potentiometer damaged	Check or change it
			The control circuit damaged	Check the circuit
8	The crater current can be not adjusted		The PCB damaged	Check it
9	No post-gas		The PCB damaged	Check it

MIG WELDING TROUBLE SHOOTING

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

	TROUBLES	POSSIBLE REASON	SUGGESTED REMEDY
1	Excessive Spatter	Wire feed speed set too high	Select lower wire feed speed
		Voltage too high	Select a lower voltage setting
		Wrong polarity set	select the correct polarity for the wire being used - see machine setup guide
		Stick out too long	Bring the torch closer to the work
		Contaminated base metal	Remove materials like paint, grease, oil, and dirt, including mill scale from base metal
		Contaminated MIG wire	Use clean, dry, rust free wire. Do not lubricate the wire with oil, grease etc.
		Inadequate gas flow or too much gas flow	Check the gas is connected, check hoses, gas valve and torch are not restricted. Set the gas flow between 20-40 CFH (6-12 l/min) flow rate. Check hoses and fittings for leaks. Protect the welding zone from wind and drafts
2	Porosity - small cavities or holes resulting from gas pockets in weld metal.	Wrong gas	Check that the correct gas is being used
		Inadequate gas flow or too much gas flow	Check the gas is connected, check hoses, gas valve and torch are not restricted. Set the gas flow between 20-40 CFh (6-12 l/min) flow rate. Check hoses and fittings for leaks. Protect the welding zone from wind and drafts
		Moisture on the base metal	Remove all moisture from base metal before welding
		Contaminated base metal	Remove materials like paint, grease, oil, and dirt, including mill scale from base metal
		Contaminated MIG wire	Use clean, dry, rust free wire. Do not lubricate the wire.
		Gas nozzle clogged with spatter, worn or out of shape	Clean or replace the gas nozzle
		Missing or damaged gas diffuser	Replace the gas diffuser
		MIG torch euro connect O-ring missing or damaged	Check and replace the O-ring
3	Wire stubbing during welding	Holding the torch too far away	Bring the torch closer to the work and maintain stick out of 5~10mm
		Welding voltage set too low	Increase the voltage
		Wire Speed set too high	Decrease the wire feed speed
4	Lack of Fusion - failure of weld metal to fuse completely.	Contaminated base metal	Remove materials like paint, grease, oil, and dirt, including mill scale from base metal
		Not enough heat input	Select a higher voltage range and /or adjust the wire speed to suit
		Improper welding technique	• Keep the arc at the leading edge of the weld pool. • Gun angle to work should be between 5 & 15°. Direct the arc at the weld joint • Adjust work angle or widen groove to access bottom during welding • Momentarily hold arc on side walls if using weaving technique
5	Excessive Penetration - weld metal melting through base metal	Too much heat	Select a lower voltage range and /or adjust the wire speed to suit Increase travel speed
6	Lack of Penetration - shallow fusion between weld metal and base metal	Poor in incorrect joint preparation	Material too thick. Joint preparation and design needs to allow access to bottom of groove while maintaining proper welding wire extension and arc characteristics. Keep the arc at the leading edge of the weld pool and maintain the gun angle at 5 & 15° keeping the stick out between 5-10mm
		Not enough heat input	Select a higher voltage range and /or adjust the wire speed to suit reduce travel speed.
		Contaminated base metal	Remove materials like paint, grease, oil, and dirt, including mill scale from base metal

MIG WIRE FEED TROUBLE SHOOTING

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

	TROUBLE	POSSIBLE REASON	SUGGESTED REMEDY
1	No wire feed	Wrong mode selected	Check that the TIG/MMA/MIG selector switch set to MIG position
		Wrong torch selector switch	Check that the Wire Feeder / Spool Gun selector switch is set to Wire Feeder position for MIG welding and Spool Gun when using the Spool gun
2	Inconsistent/ interrupted wire feed	Adjusting wrong dial	Be sure to adjust the wire feed and voltage dials for MIG welding. The amperage dial is for MMA and TIG welding mode
		Wrong polarity selected	Select the correct polarity for the wire being used. (see machine setup guide)
		Incorrect wire speed setting	Adjust the wire feed speed
		Voltage setting incorrect	Adjust the voltage setting
		MIG torch lead too long	Small diameter wires and soft wires like aluminum don't feed well through long torch leads - replace the torch with a lesser length torch
		MIG torch lead kinked or too sharp angle being held	Remove the kink, reduce the angle or bend
		Contact tip worn, wrong size, wrong type	Replace the tip with correct size and type
		Liner worn or clogged (the most common causes of bad feeding)	Try to clear the liner by blowing out with compressed air as a temporary cure, it is recommended to replace the liner
		Wrong size liner	Install the correct size liner
		Blocked or worn inlet guide tube	Clear or replace the inlet guide tube
		Wire misaligned in drive roller groove	Locate the wire into the groove of the drive roller
		Incorrect drive roller size	Fit the correct size drive roller; 0.8mm wire requires 0.8mm roller.
		Wrong type of drive roller selected	Fit the correct type roller (e.g. knurled rollers needed for flux cored wires
		Worn drive rollers	Replace the drive rollers
		Drive roller pressure too high	Can flatten the wire electrode causing it to lodge in the contact tip - reduce the drive roller pressure
		Too much tension on wire spool hub	Reduce the spool hub brake tension
		Wire crossed over on the spool or tangled	Remove the spool untangle the wire or replace the wire
		Contaminated MIG wire	Use clean, dry, rust free wire. Do not lubricate the wire.

MMA WELDING TROUBLE SHOOTING

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

	TROUBLE	POSSIBLE REASON	SUGGESTED REMEDY
1	No arc	Incomplete welding circuit	Check earth lead is connected. Check all cable connections.
		Wrong mode selected	Check the MMA selector switch is selected
		No power supply	Check that the machine is switched ON and has a power
2	Porosity - small cavities or holes resulting from gas pockets in weld metal	Arc length too long	Shorten the arc length
		Work piece dirty, contaminated or moisture	Remove moisture and materials like paint, grease, oil, and dirt, including mill scale from metal
		Damp electrodes	Use only dry electrodes
3	Excessive Spatter	Amperage too high	Decrease the amperage or choose a larger electrode
		Arc length too long	Shorten the arc length
4	Weld sits on top, lack of fusion	Insufficient heat input	Increase the amperage or choose a larger electrode
		Work piece dirty, contaminated or moisture	Remove moisture and materials like paint, grease, oil, and dirt, including mill scale from metal
		Poor welding technique	Use the correct welding technique or seek assistance for the correct technique
5	Lack of penetration	Insufficient heat input	Increase the amperage or choose a larger electrode
		Poor welding technique	Use the correct welding technique or seek assistance for the correct technique
		Poor joint preparation	Check the joint design and fit up, make sure the material is not too thick for wire size.
6	Excessive penetration - burn through	Excessive heat input	Reduce the amperage or use a smaller electrode
		Incorrect travel speed	Try increasing the weld travel speed
7	Uneven weld appearance	Unsteady hand, wavering hand	Use two hands where possible to steady up, practice your technique
8	Distortion - movement of base metal during welding	Excessive heat input	Reduce the amperage or use a smaller electrode
		Poor welding technique	Use the correct welding technique or seek assistance for the correct technique
		Poor joint preparation and or joint design	Check the joint design and fit up, make sure the material is not too thick. Seek assistance for the correct joint design and fit up
9	Electrode welds with different or unusual arc characteristic	Incorrect polarity	Change the polarity, check the electrode manufacturer for correct polarity

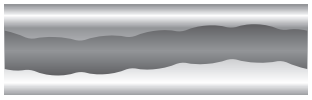
DC TIG WELDING TROUBLE SHOOTING

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

	TROUBLE	POSSIBLE REASON	SUGGESTED REMEDY
1	Tungsten burning away quickly	Incorrect Gas or No Gas	Use pure Argon. Check cylinder has gas, connected, turned on and torch valve is open
		Inadequate gas flow	Check the gas is connected, check hoses, gas valve and torch are not restricted.
		Back cap not fitted correctly	Make sure the torch back cap is fitted so that the O-ring is inside the torch body
		Torch connected to DC +	Connect the torch to the DC- output terminal
		Incorrect tungsten being used	Check and change the tungsten type if necessary
		Tungsten being oxidized after weld is finished	Keep shielding gas flowing 10–15 seconds after arc stop-page. 1 second for each 10amps of welding current.
2	Contaminated tungsten	Touching tungsten into the weld pool	Keep tungsten from contacting weld puddle. Raise the torch so that the tungsten is off the work piece 2 - 5mm
		Touching the filler wire to the tungsten	Keep the filler wire from touching the tungsten during welding, feed the filler wire into the leading edge of the weld pool in front of the tungsten
3	Porosity - poor weld appearance and color	Wrong gas/ poor gas flow/ gas leak	Gas is connected, valve ON, check hoses, gas valve and torch are not restricted. Set the gas flow between 20-40 CFH (6-12 l/min). Check hoses and fittings for leaks
		Contaminated base metal	Remove moisture and materials like paint, grease, oil, and dirt from base metal
		Contaminated filler wire	Remove all grease, oil, or moisture from filler metal
		Incorrect filler wire	Check the filler wire and change if necessary
4	Yellowish residue / smoke on the alumina nozzle & discolored tungsten	Incorrect Gas	Use pure Argon gas
		Inadequate gas flow	Set the gas flow between 20-40 CFH (10-20 l/min) flow rate
		Alumina gas nozzle too small	Increase the size of the alumina gas nozzle
5	Unstable Arc during DC welding	Torch connected to DC +	Connect the torch to the DC- output terminal
		Contaminated base metal	Remove materials like paint, grease, oil, and dirt, including mill scale from base metal.
		Tungsten is contaminated	Remove 10mm of contaminated tungsten and re grind the tungsten
		Arc length too long	Lower torch so that the tungsten is off of the work piece 2 - 5mm
6	Arc wanders during DC welding	Poor gas flow	Check and set the gas flow between 20-40 CFH flow rate
		Incorrect arc length	Lower torch so that the tungsten is off the work piece 2 - 5mm
		Tungsten incorrect or in poor condition	Check that correct type of tungsten is being used. Remove 10mm from the weld end of the tungsten and re sharpen rod.
		Poorly prepared tungsten	Grind marks should run lengthwise with tungsten, not circular. Use proper grinding method and wheel.
		Contaminated base metal or filler wire	Remove contaminating materials like paint, grease, oil, and dirt, including mill scale from base metal. Remove all grease and oil from filler metal
7	Arc difficult to start or will not start DC welding	Incorrect machine set up	Check machine set up is correct
		No gas, incorrect gas flow	Check the gas is connected and cylinder valve open, check hoses, gas valve and torch are not restricted. Set the gas flow between 20-40 CFH flow rate
		Incorrect tungsten size or type	Check and change the size and or the tungsten if required
		Loose connection	Check all connectors and tighten
		Earth clamp not connected to work	Connect the earth clamp directly to the work piece wherever possible

CAUSES & CURES OF COMMON WELDING TROUBLES

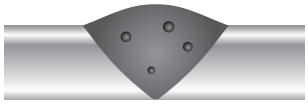
GOOD WELD



1 MAGNETIC ARC BLOW

Why
1. Unbalanced magnetic field during welding
2. Excessive magnetism in parts or fixture

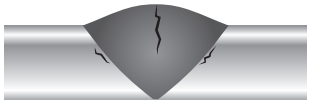
What to Do
1. Change the location of the ground connection on the workpiece
2. Reduce welding current and arc length
3. Use alternating current



2 POROUS WELDS

Why
1. Excessively long or short arc length
2. Welding current too high
3. Too fast travel speed
4. Base metal surface covered with oil, grease, moisture, rust, mill scale, etc.
5. Wet, unclean or damaged electrode

What to Do
1. Maintain proper arc length
2. Use proper welding current
3. Reduce travel speed
4. Properly clean base metal prior to welding
5. Properly maintain and store electrode



3 CRACKED WELDS

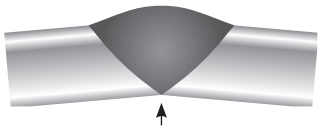
Why
1. Insufficient weld size
2. Excessive joint restraint
3. Poor joint design and/or preparation
4. Filler metal does not match base metal
5. Rapid cooling rate
6. Base metal surface covered with oil, grease, moisture, rust, dirt or mill scales

What to Do
1. Adjust weld size to part thickness
2. Reduce joint restraint through proper design
3. Select the proper joint design
4. Use more ductile filler
5. Reduce cooling rate through preheat
6. Properly clean base metal prior to welding

4 INCLUSIONS

Why
1. Incomplete slag removal between passes
2. Erratic travel speed
3. Too wide a weaving motion
4. Too large an electrode
5. Letting slag run ahead of arc

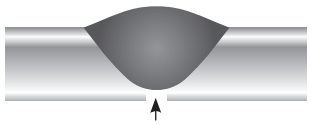
What to Do
1. Completely remove slag between passes
2. Use a uniform travel speed
3. Reduce width of weaving technique
4. Use a smaller electrode size for better access to joint
5. Increase travel speed or change electrode angle or reduce arc length



5 DISTORTION

Why
1. Improper tack welding and/or faulty joint preparation
2. Improper bead sequence
3. Improper set-up and fixturing
4. Excessive weld size

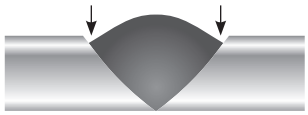
What to Do
1. Tack weld parts with allowance for distortion
2. Use proper bead sequencing
3. Tack or clamp parts securely
4. Make welds to specified size



6 POOR PENETRATION

Why
1. Travel speed too fast
2. Welding current too low
3. Poor joint design and/or preparation
4. Electrode diameter too large
5. Wrong type of electrode
6. Excessively long arc length

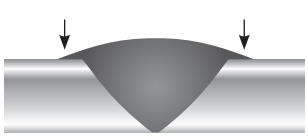
What to Do
1. Decrease travel speed
2. Increase welding current
3. Increase root opening or decrease root face
4. Use smaller electrode
5. Use electrode with deeper penetration characteristics
6. Reduce arc length



7 UNDERCUTTING

Why
1. Faulty electrode manipulation
2. Welding current too high
3. Too fast travel speed
4. Arc blow

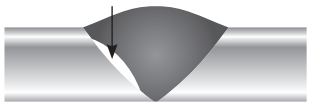
What to Do
1. Pause at each side of the weld bead when using a weaving technique
2. Use proper electrode angles
3. Use proper welding current for electrode size and welding position
4. Reduce travel speed
5. Reduce effects of arc blow



8 OVERLAPPING

Why
1. Too slow travel speed
2. Incorrect electrode angle
3. Too large an electrode

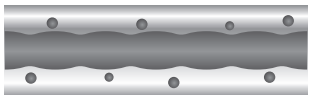
What to Do
1. Increase travel speed
2. Use proper electrode angles
3. Use a smaller electrode size



9 LACK OF FUSION

Why
1. Improper travel speed
2. Welding current too low
3. Faulty joint preparation
4. Too large an electrode diameter
5. Magnetic arc blow
6. Wrong electrode angle

What to Do
1. Reduce travel speed
2. Increase welding current
3. Weld design should allow electrode accessibility to all surfaces within the joint
4. Reduce electrode diameter
5. Reduce effects of magnetic arc blow
6. Use proper electrode angles



10 SPATTER

Why
1. Arc blow
2. Welding current too high
3. Too long an arc length
4. Wet, unclean or damaged electrode
5. Unclean welding surface

What to Do
1. Attempt to reduce the effect of arc blow
2. Reduce working current
3. Reduce arc length
4. Properly maintain and store electrodes
5. Clean welding surface

LIST OF ERROR CODES

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

ERROR TYPE	CODE	DESCRIPTION
Thermal relay	E01	Over-heating (1st thermal relay)
	E02	Over-heating (2nd thermal relay)
	E03	Over-heating (3rd thermal relay)
	E04	Over-heating (4th thermal relay)
	E09	Over-heating (Program default)
Welding machine	E10	Phase loss
	E12	No gas
	E13	Under voltage
	E14	Over voltage
	E15	Over current
	E16	Wire feeder over load
Switch	E20	Button fault on operating panel when switch on the machine
	E21	Other faults on operating panel when switch on the machine
	E22	Torch fault when switch on the machine
	E23	Torch fault during normal working process

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