

VIPER 120 SYNERGIC

Operating Manual | XA-MIG120V



Please read and understand this instruction manual carefully before the installation and operation of this equipment.

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WARRANTY



Thank you for your purchase of your VIPER Welding Machine.

We are proud of our range of plasma cutting and welding equipment that has a proven track record of innovation, performance and reliability.

Our product range represents the latest developments in Inverter technology put together by our professional team of highly skilled engineers. The expertise gained from our long involvement with inverter technology has proven to be invaluable towards the evolution and future development of our equipment range. This experience gives us the inside knowledge on what the arc characteristics, performance and interface between man and machine should be.

Within our team are specialist welders that have a proven history of welding knowledge and expertise, giving vital input towards ensuring that our machines deliver control and performance to the utmost professional level.

We employ an expert team of professional sales, marketing and technical personnel that provide us with market trends, market feedback and customer comments and requirements. Secondly they provide a customer support service that is second to none, thus ensuring our customers have confidence that they will be well satisfied both now and in the future.

Xcel-Arc welders and plasma cutters are manufactured to be compliant with - AS/NZ 60974-1, guaranteeing you electrical safety and performance.

WARRANTY

- 1 Year from date of purchase.
- ESSETI New Zealand Limited warranties all goods as specified by the manufacturer of those goods.
- This Warranty does not cover freight or goods that have been interfered with.
- All goods in question must be repaired by an authorised repair agent as appointed by this company.
- Warranty does not cover abuse, misuse, accident, theft, general wear and tear.
- New product will not be supplied unless ESSETI New Zealand Limited has inspected product returned for warranty and agrees to replace product.
- Product will only be replaced if repair is not possible
- Please view full Warranty term and conditions supplied with machine or at www.XcelArc.nz/warranty-terms/ or at the back of this manual.

ATTENTION! - CHECK FOR GAS LEAKAGE

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 8-10 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.
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 leaks prior to operation of your machine. We recommend that you close the cylinder valve when the machine is not in use.

Esseti NZ Ltd, authorised representatives or agents of Esseti NZ Ltd will not be liable or responsible for the loss of any gas.

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**REGISTER YOUR MACHINE ONLINE TO RECEIVE AN
ADDITIONAL 6 MONTHS ON YOUR WARRANTY**

Visit XcelArc.nz/warranty-registration/ to register your machine.

Welding and cutting equipment can be dangerous to both the operator and people in or near the surrounding working area, if the equipment is not correctly operated. Equipment must only be used under the strict and comprehensive observance of all relevant safety regulations.

Read and understand this instruction manual carefully before the installation and operation of this equipment.

Machine Operating Safety

- Do not switch the function modes while the machine is operating. Switching of the function modes during welding can damage the machine. Damage caused in this manner will not be covered under warranty.
- Disconnect the electrode-holder cable from the machine before switching on the machine, to avoid arcing should the electrode be in contact with the work piece.
- Operators should be trained and or qualified.



Electric shock: It can kill. 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 internal machine circuits are also live when power is on. In MIG/MAG welding, the wire, drive rollers, wire feed housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is dangerous.

- Connect the primary input cable according to Australian and New Zealand standards and regulations.
- Avoid all contact with live electrical parts of the welding/cutting circuit, electrodes and wires with bare hands.
- The operator must wear dry welding gloves while he/she performs the welding/cutting task.
- The operator should keep the work piece insulated from himself/herself.
- Keep cords dry, free of oil and grease, and protected from hot metal and sparks.
- Frequently inspect input power cable for wear and tear, replace the cable immediately if damaged, bare wiring is dangerous and can kill.
- Do not use damaged, under sized, or badly joined cables.
- Do not drape cables over your body.
- We recommend (RCD) safety switch is used with this equipment to detect any leakage of current to earth.



Fumes and 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/cutting fumes and gases.
- In confined or heavy fume environments always wear an approved air-supplied respirator.
- Welding/cutting 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/cut 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/cut. Do not weld/cut these materials unless the area is very well ventilated, and or wearing an air supplied respirator.



Arc rays: harmful to people's eyes and skin. Arc rays from the welding/cutting process produce intense visible and invisible ultraviolet and infrared rays that can burn eyes and skin.

Always wear a welding helmet with correct shade of filter lens and suitable protective clothing including welding gloves whilst the welding/cutting operation is performed.

- Measures should be taken to protect people in or near the surrounding working area. Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.



Fire hazard. Welding/cutting on closed containers, such as tanks, drums, or pipes, can cause them to explode. Flying sparks from the welding/cutting arc, hot work piece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding/cutting.

- The welding/cutting sparks & spatter may cause fire, therefore remove any flammable materials well away from the working area. Cover flammable materials and containers with approved covers if unable to be moved from the welding/cutting area.
- Do not weld/cut on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to the required Safety Standards to insure that flammable or toxic vapours and substances are totally removed, these can cause an explosion even though the vessel has been "cleaned". Vent hollow castings or containers before heating, cutting or welding. They may explode.
- Do not weld/cut where the atmosphere may contain flammable dust, gas, or liquid vapours (such as petrol)
- Have a fire extinguisher nearby and know how to use it. Be alert that welding/cutting sparks and hot materials from welding/cutting can easily go through small cracks and openings to adjacent areas. Be aware that welding/cutting on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.



Gas Cylinders. Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Because gas cylinders are normally part of the welding/cutting process, be sure to treat them carefully. CYLINDERS can explode if damaged.

- Protect gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Insure cylinders are held secure and upright to prevent tipping or falling over.
- Never allow the welding/cutting electrode or earth clamp to touch the gas cylinder, do not drape welding cables over the cylinder.
- Never weld/cut on a pressurised gas cylinder, it will explode and kill you.
- Open the cylinder valve slowly and turn your face away from the cylinder outlet valve and gas regulator.



Gas build up. The build up of gas can causes a toxic environment, deplete the oxygen content in the air resulting in death or injury. Many gases use in welding/cutting are invisible and odourless.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



Electronic magnetic fields. MAGNETIC FIELDS can affect Implanted Medical Devices.

- Wearers of Pacemakers and other Implanted Medical Devices should keep away.
- Implanted Medical Device wearers should consult their doctor and the device manufacturer before going near any electric welding, cutting or heating operation.



Noise can damage hearing. Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



Hot parts. Items being welded/cut generate and hold high heat and can cause severe burns.

Do not touch hot parts with bare hands. Allow a cooling period before working on the welding/cutting gun. Use insulated welding gloves and clothing to handle hot parts and prevent burns.

CAUTION

1. Working Environment.

- i. The environment in which this welding/cutting equipment is installed must be free of grinding dust, corrosive chemicals, flammable gas or materials etc, and at no more than maximum of 80% humidity.
- ii. When using the machine outdoors protect the machine from direct sun light, rain water and snow etc; the temperature of working environment should be maintained within -10°C to +40°C.
- iii. Keep this equipment 30cm distant from the wall.
- iv. Ensure the working environment is well ventilated.

2. Safety Tips.

i. Ventilation

This equipment is small-sized, compact in structure, and of excellent performance in amperage output. The fan is used to dissipate heat generated by this equipment during the welding/cutting operation. Important: Maintain good ventilation of the louvres of this equipment. The minimum distance between this equipment and any other objects in or near the working area should be 30 cm. Good ventilation is of critical importance for the normal performance and service life of this equipment.

ii. Thermal Overload protection.

Should the machine be used to an excessive level, or in high temperature environment, poorly ventilated area or if the fan malfunctions the Thermal Overload Switch will be activated and the machine will cease to operate. Under this circumstance, leave the machine switched on to keep the built-in fan working to bring down the temperature inside the equipment. The machine will be ready for use again when the internal temperature reaches safe level.

iii. Over-Voltage Supply

Regarding the power supply voltage range of the machine, please refer to "Main parameter" table. This equipment is of automatic voltage compensation, which enables the maintaining of the voltage range within the given range. In case that the voltage of input power supply amperage exceeds the stipulated value, it is possible to cause damage to the components of this equipment. Please ensure your primary power supply is correct.

- iv. Do not come into contact with the output terminals while the machine is in operation. An electric shock may possibly occur.

MAINTENANCE

Exposure to extremely dusty, damp, or corrosive air is damaging to the welding/cutting machine. In order to prevent any possible failure or fault of this welding/cutting equipment, clean the dust at regular intervals with clean and dry compressed air of required pressure.

Please note that: lack of maintenance can result in the cancellation of the guarantee; the guarantee of this welding/cutting equipment will be void if the machine has been modified, attempt to take apart the machine or open the factory-made sealing of the machine without the consent of an authorized representative of the manufacturer.

TROUBLE SHOOTING

Caution: Only qualified technicians are authorized to undertake the repair of this welding/cutting equipment. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed in this manual.

VIPER 120 SYNERGIC FEATURES



MIG - 120 Amp DC Inverter Welder

Welds: Steels, Stainless

Easy Set Synergic Single Knob Control
230V Single Phase 120 Amp DC MIG Welder
Approved Domestic 10 Amp Plug Power Supply



Features

- Modern IGBT inverter technology
- MIG/MAG with Gas and Gasless capability
 - Synergic single knob control
 - Automatic Burn Back
 - Excellent welding with CO₂ gas
- 1 kg Spool size
- Incredibly small size, very portable
- Light weight 5.2kg
- Solid case construction
- Thermal overload protection
- IP21S rating for environmental/safety protection
- Generator compatible (recommend 4.5 kVA minimum)
- Tolerant to variable power supply



10 AMP



XA-MIG120V
Standard Package



Technical Data

Power Supply	240V 1-Phase ±15%
Rated Input Power	4.56 kVA
I _{eff} MIG as per AS/NZ60974-1	6.0 Amps
Output Current Range MIG	40A/16V ~ 120A/20V
Duty Cycle @ 40°C as per AS/NZ60974-1	10% @ 120 Amps
Duty Cycle @ 25°C (approximate)	25% @ 120 Amps
Power factor	0.65
Protection Class	IP21S
Insulation Class	F
Wire Spool Capacity	1 kg
Wire Diameter Range (mm)	0.6, 0.8, 0.9
Dimensions (LxWxH)	320 x 130 x 230mm
Weight	4.8 kg
Certification Approval	AS/NZ60974-1

Overview

The VIPER Synergic MIG120 from Xcel-Arc is a brand new low-cost MIG welding machine produced using modern IGBT inverter technology. Designed specifically to meet the needs of the entry level user who may have very little experience with MIG welding, the synergic function of this machine makes it an excellent choice for those users who might be wanting a welding machine for one or two specific jobs, or who might want to weld thinner sections on an occasional basis. The VIPER Synergic MIG120 is as reliable and robust as you would expect from a machine bearing the Xcel-Arc name. The machine allows welding with both Gas Shielded and Gasless wires and set-up is easy with the synergic program and simple interface providing quick and simple weld parameter adjustments, even for the novice welder. The VIPER Synergic MIG120 is an exceptional machine for the price and is suitable for a wide range of applications including light fabrication, body repair, farming and whatever else a Kiwi bloke might be working on in his shed. The VIPER Synergic MIG120 offers great portability with the added convenience of being fitted with a 10 amp domestic plug. Designed and built to our specification and manufactured in compliance to AS/NZ60974-1.

Product Code: XA-MIG120V

Standard Package includes: VIPER Synergic MIG120 Machine, Direct Connect Mig Torch x 2m, Earth Lead 16mm x 2m
(Regulator is optional & extra)

MACHINE PARTS LAYOUT



- 1. SYNERGIC MIG Programs
- 2. Thermal Overload LED
- 3. SYNERGIC Control Knob
- 4. Positive Output
- 5. Polarity Cable
- 6. Negative Output
- 7. Direct Connect MIG Torch



- 8. Power Cable
- 9. Power Switch
- 10. Gas Inlet



- 11. Wire Spool Holder
- 12. Wire Feed Assembly



1. Insert the earth cable plug into the required polarity and tighten - positive (+) for flux cored wires.
2. The weld power cable goes into the opposing negative (-) socket.



(3) Fit the correct size Knurled drive roller for Gas Less Flux Core wire.

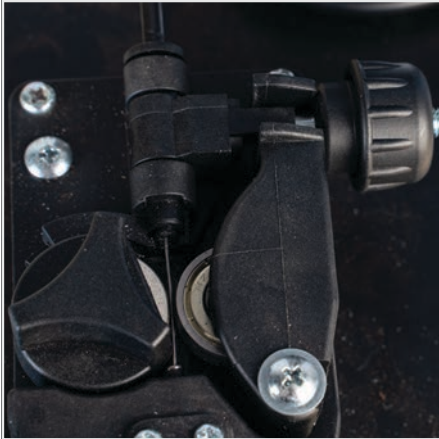


(4) Place wire onto spool holder - (spool retaining nut is left hand thread) Feed the wire through the inlet guide tube into the drive roller.



(5) Feed wire over the drive roller into the outlet guide tube, Push the wire through approx 150mm.

GASLESS MIG INSTALLATION



(6) Close down the top roller bracket and clip the pressure arm into place. Apply a medium amount of pressure to the drive roller.



(7) Remove the gas nozzle and contact tip from the front end of the MIG torch.



(8) Press and hold the Torch Trigger to feed the wire down the torch cable through to the torch head.



(9) Fit the correct size contact tip over the wire and fasten tightly into the tip holder.

IMPORTANT NOTE: When using gasless wire it is recommended to fit a 1 x size larger contact tip.

Example: 0.8mm gasless wire requires a 0.9mm contact tip. This will prevent the wire catching in the contact tip due to thermal expansion of the tip while using gasless wire.



(10) Fit the gas nozzle to the torch head.



(11) Select wire size, then adjust synergic control knob to suit work piece.



1. Insert the earth cable plug into the required polarity and tighten - negative (-) for gas shielded wires.
2. The weld power cable goes into the opposing positive (+) socket.
3. Connect Gas Line to Gas Regulator and connect the gas regulator to the Gas Cylinder.



(4) Fit the correct type and size of drive rollers. V Groove for Hard Wires. Knurled for Flux Cored.



(5) Place wire onto spool holder - (spool retaining nut is left hand thread) Feed the wire through the inlet guide tube into the drive roller. **NOTE:** VIPER MIG 120 is **not** suitable to weld Aluminium as it is a Synergic Welding Machine programmed for Solid Mild Steel wire and Flux Cored (Gasless) wires only.



(6) Feed wire over the drive roller into the outlet guide tube, Push the wire through approx 150mm.

MIG WITH GAS INSTALLATION



(7) Close down the top roller bracket and clip the pressure arm into place. Apply a medium amount of pressure to the drive roller



(8) Remove the gas nozzle and contact tip from the front end of the MIG torch.



(9) Press and hold the Torch Trigger to feed the wire down the torch cable through to the torch head.



(10) Fit the correct size contact tip over the wire and fasten tightly into the tip holder.



(11) Fit the gas nozzle to the torch head.



(12) Carefully open the valve of the gas cylinder, set the flow to 8-10 L/min



(13) Select wire size, then adjust synergic control knob to suit work piece.

WIRE INSTALLATION & SET UP GUIDE



Again the importance of smooth consistent wire feeding during MIG welding cannot be emphasized enough.

The correct installation of the wire spool and the wire into the wire feed unit is critical to achieving an even and consistent wire feed. A high percentage of faults with MIG welders emanate from poor set up of the wire into the wire feeder. The guide below will assist in the correct setup of your wire feeder.

NOTE: VIPER MIG 120 is not suitable to weld Aluminium as it is a Synergic Welding Machine programmed for Solid Mild Steel wire and Flux Cored (Gasless) wires only.



(1) Remove the spool retaining nut.



(2) Note the tension spring adjuster and spool locating pin.



(3) Fit the wire spool onto the spool holder fitting the locating pin into the location hole on the spool. Replace the spool retaining nut tightly



(4) Snip the wire carefully, be sure to hold the wire to prevent the spool uncoiling. Carefully feed the wire into the inlet guide tube of the wire feed unit.



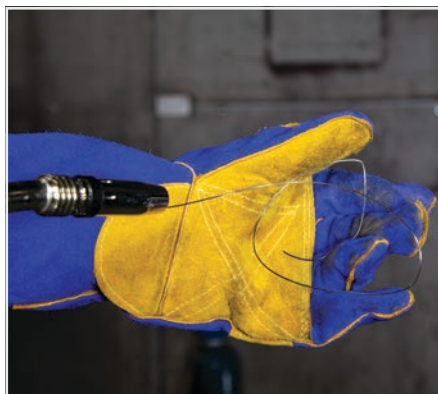
(5) Feed the wire through the drive roller and into the outlet guide tube of the wire feeder.



(6) Lock down the top pressure roller and apply a medium amount of pressure using the tension adjustment knob



(7) Press and hold the Torch Trigger to feed the wire down the torch cable through to the torch head.



(8) A simple check for the correct drive tension is to bend the end of the wire over hold it about 100mm from your hand and let it run into your hand, it should coil round in your hand without stopping and slipping at the drive rollers, increase the tension if it slips.

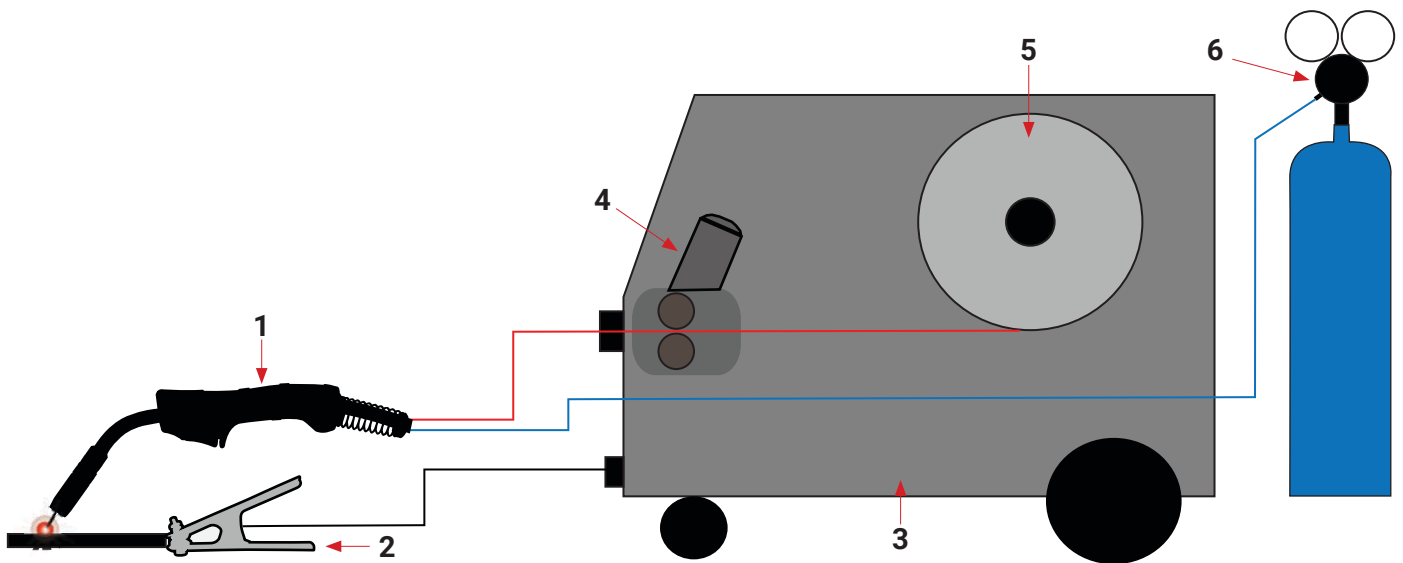


(9) The weight and speed of the wire spool turning creates an inertia that can cause the spool to run on and the wire loop over the side of the spool and tangle. If this happens increase the pressure on the tension spring inside the spool holder assembly using the tension adjustment screw.

MIG (Metal Inert Gas) Welding

Definition of MIG Welding - MIG (metal inert gas) welding also known as GMAW (gas metal arc welding) or MAG (metal active gas welding), is a semi-automatic or automatic arc welding process in which a continuous and consumable wire electrode and a shielding gas are fed through a welding gun. A constant voltage, direct current power source is most commonly used with MIG welding. There are four primary methods of metal transfer in MIG welding, called short circuit (also known as dip transfer) globular transfer, spray transfer and pulsed-spray, each of which has distinct properties and corresponding advantages and limitations. To perform MIG welding, the basic necessary equipment is a welding gun, a wire feed unit, a welding power supply, an electrode wire, and a shielding gas supply. Short circuit transfer is the most common used method whereby the wire electrode is fed continuously down the welding torch through to and exiting the contact tip. The wire touches the work piece and causes a short circuit the wire heats up and begins to form a molten bead, the bead separates from the end of the wire and forms a droplet that is transferred into the weld pool. This process is repeated about 100 times per second, making the arc appear constant to the human eye.

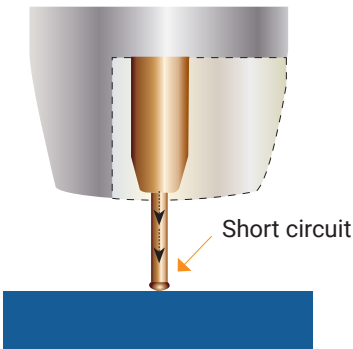
MIG Circuit Diagram



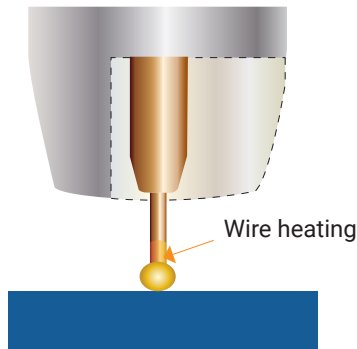
1. MIG Torch - 2. Work Piece - 3. Power Source - 4. Wire Feeder - 5. Wire Spool - 6. Gas

MIG (Metal Inert Gas) Welding

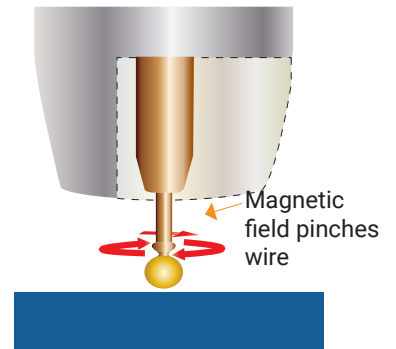
Short Circuit Transfer - Short circuit transfer is the most common used method whereby the wire electrode is fed continuously down the welding torch through to and exiting the contact tip. The wire touches the work piece and causes a short circuit the wire heats up and begins to form a molten bead, the bead separates from the end of the wire and forms a droplet that is transferred into the weld pool. This process is repeated about 100 times per second, making the arc appear constant to the human eye.



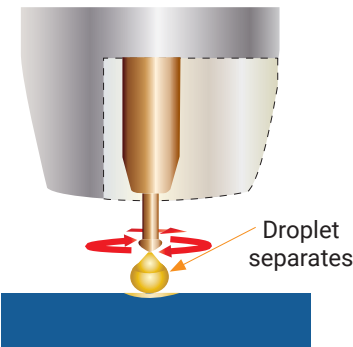
The wire approaches the work piece and touches the work creating a short circuit between the wire and the base metal, because there is no space between the wire and the base metal there is no arc and current flows through the wire.



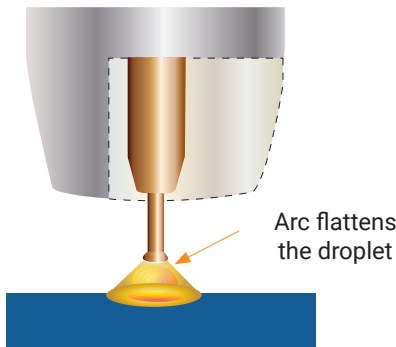
The wire cannot support all the current flow, resistance builds up and the wire becomes hot and weak and begins to melt



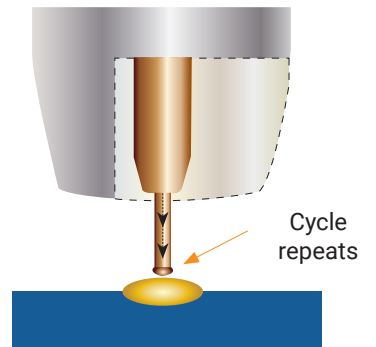
The current flow creates a magnetic field that begins to pinch the melting wire forming it into droplet



The pinch causes the forming droplet to separate and fall towards the now creating weld pool.



An arc is created at the separation of the droplet and the heat and force of the arc flattens out the droplet into the weld pool. The heat of the arc melts the end of the wire slightly as it feeds towards the base metal



The wire feed speed overcomes the heat of the arc and the wire again approaches the work to short circuit and repeat the cycle.

Basic MIG Welding

Good weld quality and weld profile depends on gun angle, direction of travel, electrode extension (stick out), travel speed, thickness of base metal, wire feed speed (amperage) and arc voltage. To follow are some basic guides to assist with your setup.

Gun Position - Travel Direction, Work Angle

Gun position or technique usually refers to how the wire is directed at the base metal, the angle and travel direction chosen. Travel speed and work angle will determine the characteristic of the weld bead profile and degree of weld penetration.

Push Technique

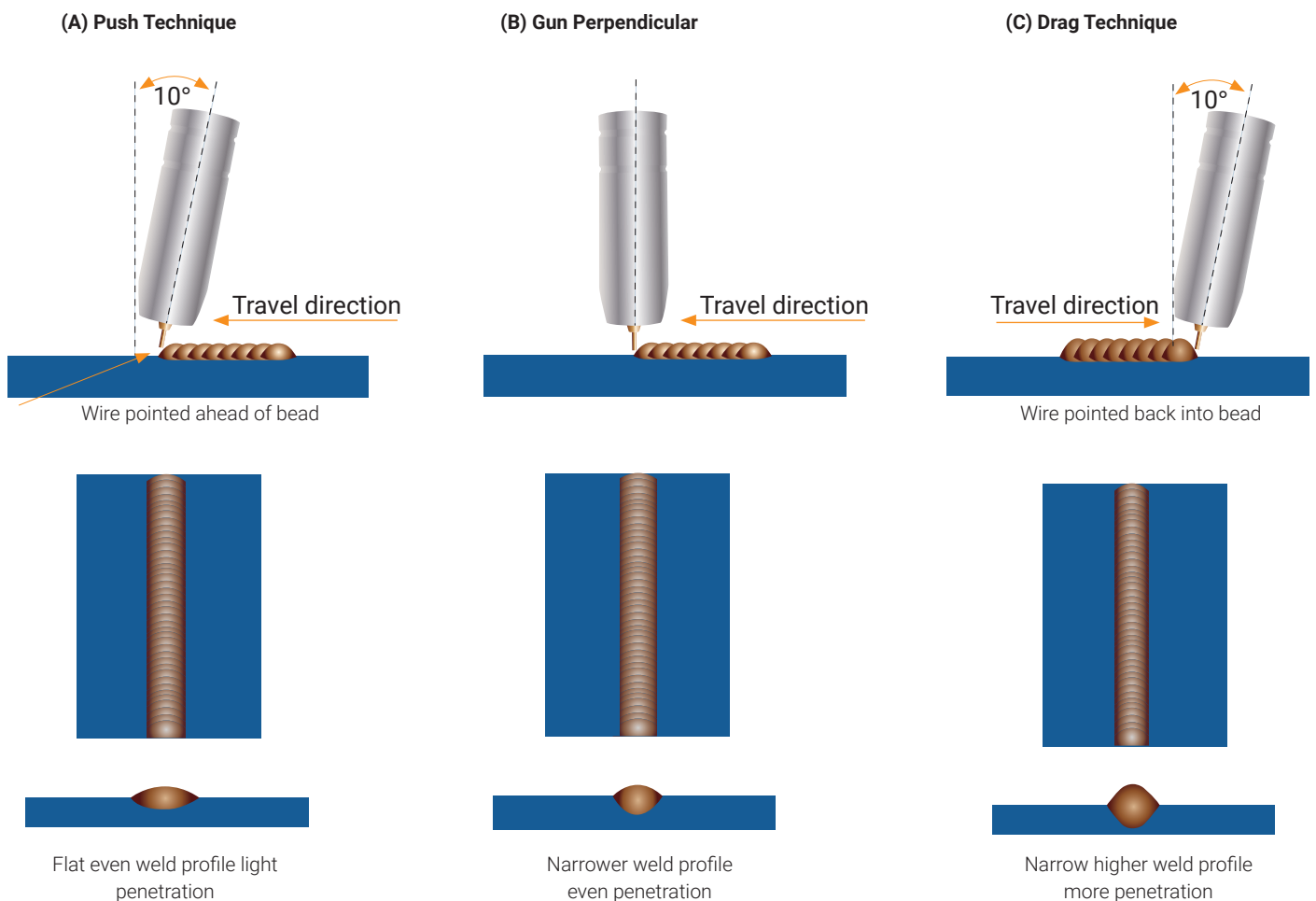
The wire is located at the leading edge of the weld pool and pushed towards the un-melted work surface. This technique offers a better view of the weld joint and direction of the wire into the weld joint. Push technique directs the heat away from the weld puddle allowing faster travel speeds providing a flatter weld profile with light penetration - useful for welding thin materials. The welds are wider and flatter allowing for minimal clean up / grinding time.

Perpendicular Technique

The wire is fed directly into the weld, this technique is used primarily for automated situations or when conditions make it necessary. The weld profile is generally higher and a deeper penetration is achieved.

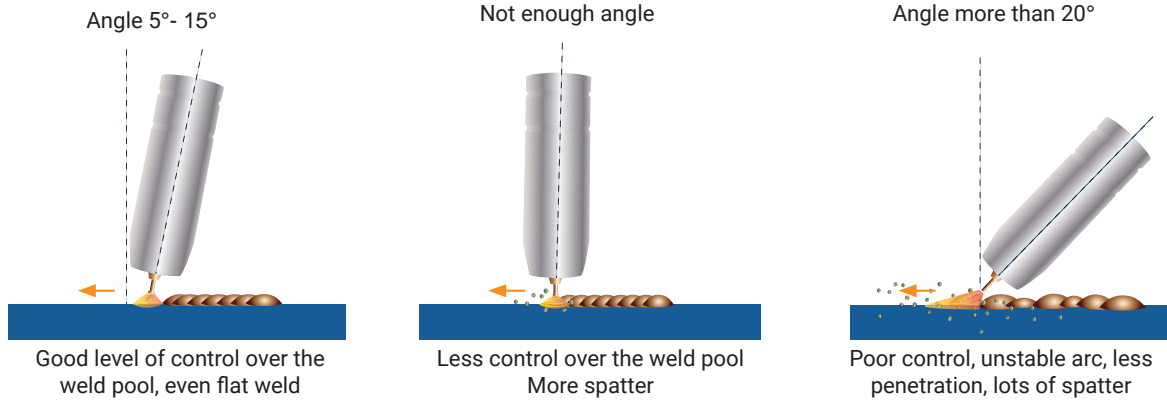
Drag Technique

The gun and wire is dragged away from the weld bead. The arc and heat is concentrated on the weld pool, the base metal receives more heat, deeper melting, more penetration and the weld profile is higher with more build up.



Travel Angle

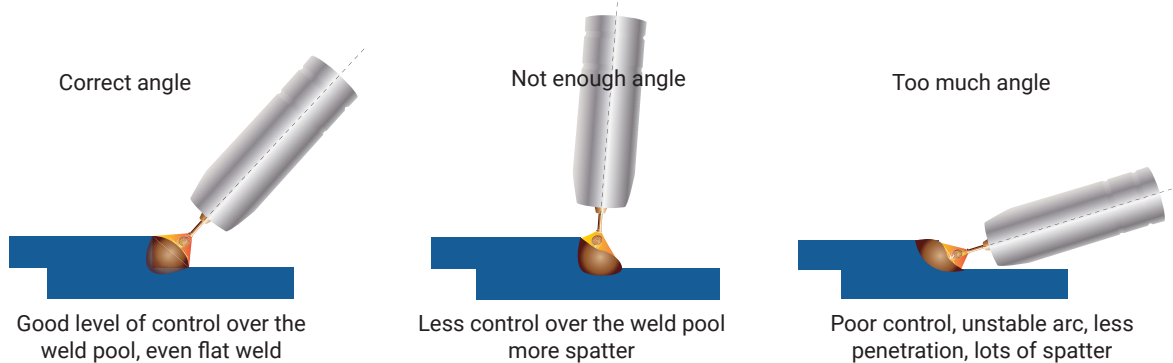
Travel angle is the right to left angle relative to the direction of welding. A travel angle of 5°- 15° is ideal and produces a good level of control over the weld pool. A travel angle greater than 20° will give an unstable arc condition with poor weld metal transfer, less penetration, high levels of spatter, poor gas shield and poor quality finished weld.



Angle to Work

The work angle is the forward back angle of the gun relative to the work piece.

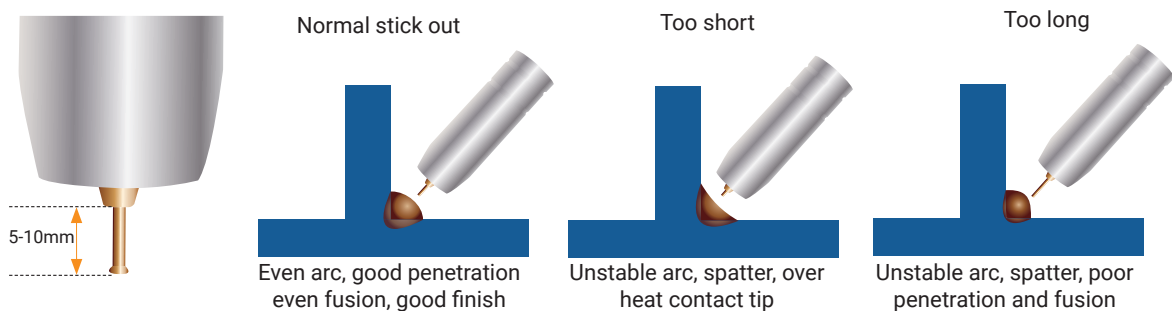
The correct work angle provides good bead shape, prevents undercut, uneven penetration, poor gas shield and poor quality finished weld.



Stick Out

Stick out is the length of the unmelted wire protruding from the end of the contact tip.

A constant even stick out of 5-10mm will produce a stable arc, and an even current flow providing good penetration and even fusion. Too short stick out will cause an unstable weld pool, produce spatter and over heat the contact tip. Too long stick out will cause an unstable arc, lack of penetration, lack of fusion and increase spatter.

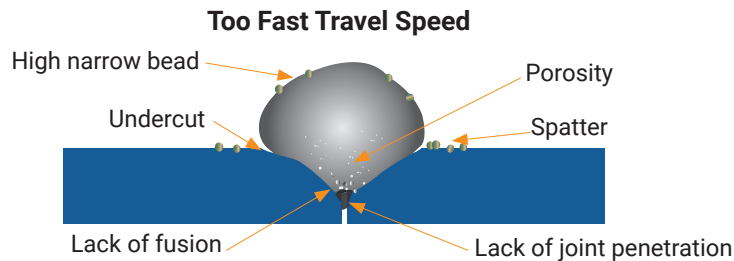


Travel Speed

Travel speed is the rate that the gun is moved along the weld joint and is usually measured in mm per minute. Travel speeds can vary depending on conditions and the welders skill and is limited to the welders ability to control the weld pool. Push technique allows faster travel speeds than Drag technique. Gas flow must also correspond with the travel speed, increasing with faster travel speed and decreasing with slower speed. Travel speed needs to match the amperage and will decrease as the material thickness and amperage increase.

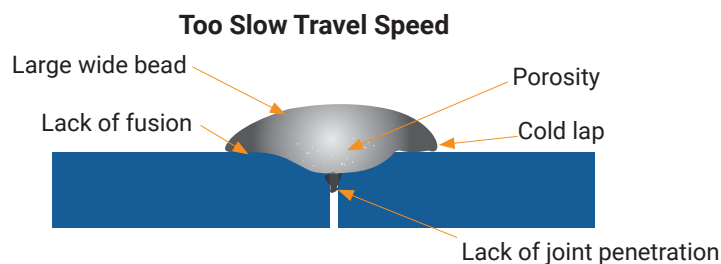
Too Fast Travel Speed

A too fast travel speed produces too little heat per mm of travel resulting in less penetration and reduced weld fusion, the weld bead solidifies very quickly trapping gases inside the weld metal causing porosity. Undercutting of the base metal can also occur and an unfilled groove in the base metal is created when the travel speed is too fast to allow molten metal to flow into the weld crater created by the arc heat.



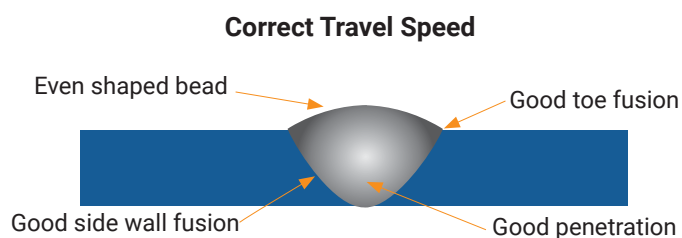
Too Slow Travel Speed

A too slow travel speed produces a large weld with lack of penetration and fusion. The energy from the arc dwells on top of the weld pool rather than penetrating the base metal. This produces a wider weld bead with more deposited weld metal per mm than is required resulting in a weld deposit of poor quality.



Correct Travel Speed

The correct travel speed keeps the arc at the leading edge of the weld pool allowing the base metal to melt sufficiently to create good penetration, fusion and wetting out of the weld pool producing a weld deposit of good quality.



Wire types and sizes

Use the correct wire type for the base metal being welded. Use stainless steel wire for stainless steel, and steel wires for steel.

Use a smaller diameter wire for thin base metals. For thicker materials use a larger wire diameter and larger machine, check the recommended welding capability of you machine.

As a guide refer to the "Welding Wire Thickness Chart" below.

WELDING WIRE DIAMETER CHART							
MATERIAL THICKNESS	RECOMMENDED WIRE DIAMETERS						
	MIG SOLID WIRE				GASLESS FLUX CORED WIRE		
	0.6mm	0.8mm	0.9mm	1.0mm	0.8mm	0.9mm	1.2mm
24 Gauge (.60mm)	Yellow						
22 Gauge (.75mm)	Yellow	Yellow			Yellow		
20 Gauge (.90mm)	Yellow	Yellow			Yellow	Yellow	
18 Gauge (1.0mm)	Yellow	Yellow	Yellow		Yellow	Yellow	
16 Gauge (1.2mm)		Yellow	Yellow		Yellow	Yellow	Yellow
14 Gauge (1.9mm)		Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
3.0mm		Yellow	Yellow	Yellow		Yellow	Yellow
5.0mm			Yellow	Yellow		Yellow	Yellow
6.0mm			Yellow	Yellow			Yellow
8.0mm			Yellow	Yellow			Yellow
10.mm				Yellow			Yellow
12.0mm				Yellow			

For material thickness of 5.0mm and greater, multi-pass runs or a beveled joint design may be required depending on the amperage capability of your machine.

Gas selection

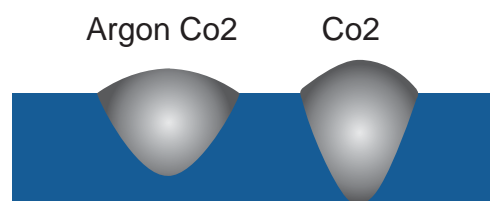
The purpose of the gas in the MIG process is to protect / shield the wire, the arc and the molten weld metal from the atmosphere. Most metals when heated to a molten state will react with the air in the atmosphere, without the protection of the shielding gas the weld produced would contain defects like porosity, lack of fusion and slag inclusions. Additionally some of the gas becomes ionised (electrically charged) and helps the current flow smoothly.

The correct gas flow is also very important in protecting the welding zone from the atmosphere.

Too low flow will give inadequate coverage and result in weld defects and unstable arc conditions.

Too high flow can cause air to be drawn into the gas column and contaminate the weld zone.

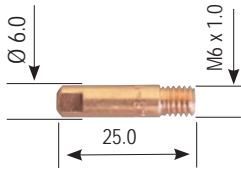
Use the correct shielding gas. Co2 is good for steel and offers good penetration characteristics, the weld profile is narrower and slightly more raised than the weld profile obtained from Argon Co2 mixed gas. Argon Co2 mix gas offers better weld ability for thin metals and has a wider range of setting tolerance on the machine. Argon 80% Co2 20% is a good all round mix suitable for most applications.



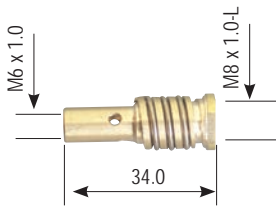
Penetration Pattern for Steel

FRONT END CONSUMABLES

VIPER 120 SYNERGIC CONTACT TIPS



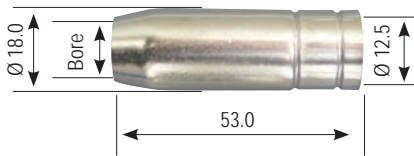
Part-No	Description	Material	QTY
XA1527-06	Contact Tip 0.6mm D6 M6 x 25mm	Ecu	QTY10
XA1527-08	Contact Tip 0.8mm D6 M6 x 25mm	Ecu	QTY10
XA1527-09	Contact Tip 0.9mm D6 M6 x 25mm	Ecu	QTY10
XA1527-10	Contact Tip 1.0mm D6 M6 x 25mm	Ecu	QTY10
XA1527-12	Contact Tip 1.2mm D6 M6 x 25mm	Ecu	QTY10



VIPER 120 SYNERGIC TIP HOLDER

Part-No	Description	Tip Thread	Material	QTY
XA1507SLH	XA15 Tip Holder Short (L.H Thread) = 34.0mm	M6	Brass	QTY2

VIPER 120 SYNERGIC GAS NOZZLE



Part-No	Description	Type	Bore Ø	Material	QTY
XA1529	XA15 Gas Nozzle	Cylindrical	16.0mm	Copper	QTY2
XA1530	XA15 Gas Nozzle	Conical	12.0mm	Copper	QTY2
XA1531	XA15 Gas Nozzle	Tapered	10.5mm	Copper	QTY2
XA1532	XA15 Gas Nozzle	Bottle	12.8mm	Copper	QTY2
XA1533	XA15 Gas Nozzle	Spot Weld	16.0mm	Copper	QTY2

VIPER 120 SYNERGIC NOZZLE SPRING



Part-No	Description	QTY
XA1504	XA15 Nozzle Spring	QTY2

These parts are manufactured in China and are offered as replacement parts suitable for "BINZEL®" style torches.

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.

1: Excessive Spatter	
Possible Reason	Suggested Remedy
Wire feed speed set too high	Adjust SYNERGIC Control Knob
Voltage too high	Adjust SYNERGIC Control Knob
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 6-12 l/min flow rate. Check hoses and fittings for holes, leaks etc Protect the welding zone from wind and drafts
2: Porosity - small cavities or holes resulting from gas pockets in weld metal.	
Possible Reason	Suggested Remedy
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 8 - 10 l/min flow rate. Check hoses and fittings for holes, leaks etc. 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 with oil, grease etc
Gas nozzle clogged with spatter, worn or out of shape	Clean or replace the gas nozzle
3: Wire stubbing during welding	
Possible Reason	Suggested Remedy
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	Adjust SYNERGIC Control Knob
Wire Speed set too high	Adjust SYNERGIC Control Knob
4: Lack of Fusion – failure of weld metal to fuse completely with base metal or a proceeding weld bead.	
Possible Reason	Suggested Remedy
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	
Possible Reason	Suggested Remedy
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.

1: Inconsistent / interrupted wire feed	
Possible Reason	Suggested Remedy
Wrong polarity selected	Select the correct polarity for the wire being used - see machine setup guide
Incorrect wire speed setting	Adjust SYNERGIC Control Knob
Voltage setting incorrect	Adjust SYNERGIC Control Knob
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 e.g.; 0.8mm wire requires 0.8mm drive 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 with oil, grease etc

Gas Flow Regulators

The job of the gas flow regulator is to reduce the bottle pressure gas down to a lower pressure and deliver it at a constant flow. This constant flow of gas is usually fed through the welding machine where it is controlled by a solenoid valve, operated when the torch trigger is pulled. Once the gas has passed the solenoid valve it flows down the torch cable exiting at the gas nozzle to protect the weld pool and surrounding area. There are two main types of flow regulators commonly used for MIG and TIG welding applications. Both regulator types perform the same function, but have a different way of setting and measuring the gas flow. A flow-gauge regulator (Fig.1) has a dial-type pressure gauge to measure the cylinder contents and a second gauge to measure and deliver the flow rate required. The flow-meter regulator (Fig.2) has a pressure gauge to measure the cylinder contents and a flow tube assembly to measure and deliver the flow rate required. Some flowmeter regulators will have two flow tube assemblies (Fig.3) typically one is used for supplying gas to the welding machine and the other is used for purging the welding area with gas prior to welding, during welding and post welding and at a separate rate of flow from that being supplied to the welding machine. The amount of gas flow needed to do the job will depend on the welding gas and the job being done, but a common setting to start with is 10 L/min.



Fig.1



Fig.2



Fig.3

Shielding Gases

Shielding gases are almost always necessary for MIG and TIG welding processes to protect the weld zone from gases that are contained in the surrounding atmosphere, particularly nitrogen and oxygen. If allowed into the weld zone these gases will contaminate the weld pool resulting in fusion defects also porosity and embrittlement of the weld metal. Selecting the right type of shielding gas depends on the welding process being used and type of material being welded. The MIG process is typically a mixture of Argon and Co₂ (AR90% Co₂ 10%) or pure Co₂ for steel welding applications, other specialised mixtures of Argon, Co₂, and Oxygen are available for stainless steel welding but with welding aluminium pure Argon is almost always used. The TIG welding process almost always requires 100% Argon for welding of all materials, however in some specialised applications Helium, or a Helium mix are sometimes used. Today with the multitude of gas mixes available through a number of different suppliers, it is difficult to list and recommend which gas mix is better for which job. If you are unsure about what gas or gas mix to use we recommend you discuss with your application local gas suppliers or your Esseti technical representative.

Shielding Gases

For MIG applications the ideal gas flow rate will depend on the type of mig wire, wire feed speed and current being used and also the type metal transfer mode, i.e. Dip Transfer, Spray, Pulse Mig. Long interconnecting cables between the power source and wire feeder and also long push pull torch cables may require higher flow rates to compensate for the distance. As a general rule of thumb;

1. Small weld pools use 10 L/min,
2. Medium weld pools up to 15 L/min
3. Large spray, pulse mig weld pools use up to 25 L/min.

It is important to note that too high gas flow can be just as bad as having too low flow rate. The reason being that if the gas flow exits the gas nozzle at a too high rate it can.

1. create a vortex and draw air into the gas flow and the weld zone causing contamination of the weld.
2. produce turbulence at the weld pool resulting in a poor quality weld.

WARRANTY TERMS



ESSETI New Zealand Limited ('us', 'we') warrants that the products bearing the brand names ESSETI, XCEL-ARC, RAZORWELD, RAZORCUT, JASIC, VIPER, T&R, XCEL-GAS, Otos, Servore, TECNA & HIT-8SS supplied by us and purchased by you from an Authorised ESSETI (NZ) Ltd. Distributor are free of Material and Faulty Workmanship Defects except for those products listed under 'Warranty Exclusions' and whilst any claim is made subject to the following terms and conditions.

Your rights under the New Zealand Consumer Law may not be limited by a defined time. However, New Zealand Consumer Law does recognise that the relevant time period can vary from product to product, depending on factors such as the nature of the product and the price. Esseti NZ Ltd. adopts the same approach. As you can appreciate, the type of remedy we can offer you may also vary depending on how long it takes you to return the product to us.

WARRANTY PERIOD

We offer the following 'Warranty Periods' from 'date of purchase':

An Extended Warranty Period of 6 months total shall apply only to Machinery where offered and warranty is registered online.

We offer the following 'Warranty Periods' effective from the 'date of purchase':

XCEL-ARC, Inverter MIG/SWF/MTS, MMA/TIG, TIG ACDC, Plasma (Power Source Only*)	2 Years
RAZORWELD, Inverter MIG/SWF/MTS, MMA/TIG, TIG ACDC (Power Source Only*)	3 Years
RAZORCUT, Inverter Plasma (Power Source Only*)	3 Years
VIPER MIG185, Viper TIG180ACDC (Power Source Only*)	2 Years
VIPER ARC140, VIPER ARC160, VIPER CUT30, (Power Source Only*)	1 Year
VIPER TIG200P, VIPER SYNERGIC MIG 120 (Power Source Only*)	1 Year
JASIC, Inverter MIG/SWF/MTS, MMA/TIG, TIG ACDC, Plasma (Power Source Only*)	2 Years
XCEL-ARC & RAZORWELD, Water Coolers, PAPR Air Blower Unit	1 Year
XCEL-GAS, Gas Cutting and Welding Torches	3 Months
XCEL-GAS, Straight Line & Gas Cutting Machines (Machine Only*)	1 Year
XCEL-GAS, Regulators Argon/ Acetylene / Oxygen / LPG / Bobbin Flowmeter	1 Year
XCEL-ARC, Automatic Welding Helmet	2 Years
RAZORSHIELD Digital Welding Mask & Goggle Kit , Automatic Welding Helmets	2 Year
TECNA, Spot Welding Machines (Power Source Only*)	1 Year
ALL WELDING TORCHES – GMAW / GTAW / MMAW / PLASMA	3 Months
ALL EARTH LEADS, INTERCONNECTING CABLES, GAS HOSES	3 Months

(*) This only covers manufacturing faults on any torches, cables and other accessories, either included with a machine kitset or sold separately, for the first three months after date of purchase.

WARRANTY / RETURNS / EXCHANGES

Our Warranty Returns Policy recognises all and any rights you have under New Zealand Consumer Law and other relevant laws.

You shall inspect the goods on delivery and shall within seven (7) days of delivery (time being of the essence) notify the Esseti NZ Ltd. Authorised Distributor from whom you purchased the goods of any alleged defect, shortage in quantity, damage or failure to comply with the description or quote.

You shall also afford Esseti NZ Ltd. the opportunity to inspect the goods within a reasonable time following delivery if you believe the goods are defective in any way.

If you shall fail to comply with these provisions the goods shall be presumed to be free from any defect or damage. For defective goods and where permissible by law, Esseti NZ Ltd. reserves the right to repair or otherwise remedy the defect prior to issuing replacement goods or refunding the purchase price.

If the goods are being purchased for a business purpose then the purchaser acknowledges that the Consumer Guarantees Act will not apply.

The New Zealand Sales of Goods Act applies when goods are not covered by the Consumer Guarantees Act. You may be able to get a full refund or compensation if the trader doesn't have the right to sell the goods, or the goods are:

- not of 'merchantable quality' (so defective that most people wouldn't want them)
- not fit for their normal purpose
- poorer quality than a sample you were shown
- not suitable for what you told the trader you wanted the goods for
- not matching their description

If there has been a misrepresentation you may have rights under the Fair Trading Act or the Contractual Remedies Act and therefore also entitled to, at the consumer's discretion, either a refund of the purchase price of the goods, or repair of the goods, or replacement of the goods.

Returns will only be accepted provided that:

- (a) You have complied with the provisions outlined above, and
- (b) where the goods are unable to be repaired, the goods are returned at your cost within thirty (30) days of the delivery date, and
- (c) Esseti NZ Ltd. will not be liable for goods which have not been stored or used in a proper manner, and
- (d) the goods are returned in the condition in which they were delivered and with all packaging material, brochures and instructional material in as new condition as is reasonably possible in the circumstances.

Esseti NZ Ltd Accepts no responsibility for any products lost, damaged or mislaid whilst in transit. Esseti NZ Ltd. may (at their sole discretion) accept the return of goods for credit but this may incur a handling fee of up to fifteen percent (15%) of the value of the returned Goods plus any freight costs.

MAKING A CLAIM

If you wish to make a claim under this Warranty, you should:

- Return the product to the point of purchase either in person or via prepaid courier; or
- Contact us by Telephone – Esseti NZ Ltd – 06 355 1103

When returned, the product must be accompanied with the original Receipt or Tax Invoice clearly showing the purchase date and disclosing the purchase price. All costs of installation, cartage, freight, travelling expenses, hiring tools and insurance are paid by the Customer. To the extent permitted by law, our total liability for loss or damage of every kind related to the goods in any way whatsoever is limited to the amount paid to the retailer by you for the goods or the value of the goods. No responsibility will be taken for any products lost, damaged or mislaid whilst in transit.

WARRANTY EXCLUSIONS

This Warranty covers Material and Faulty Workmanship defects only.

This Warranty does not cover damage caused by:

- Normal wear and tear due to usage
- Misuse or abusive use of the machine and/or failure to correctly follow set up or operating instructions supplied with these products
- Failure to clean or improper cleaning of the product
- Failure to maintain the equipment such as regular services, etc.
- Incorrect voltage or non-authorised electrical connections
- Improper installation
- Use of non-authorised/non-standard parts
- Abnormal product performance caused by any ancillary equipment interference or other external factors
- Failure or any breakage caused by overload, dropping or abusive treatment or use by the customer
- Repair, modifications or other work carried out on the product other than by an Esseti-Authorised Service Agent

Unless it is a manufacturing fault, this Warranty does not cover the following parts:

- **All Batteries, including Button Type and Cell Type Batteries**
- **MIG Welding Torch Consumables, such as:**

Gas Nozzles, Gas Diffusers, Contact Tip Holders, Contact Tips, Swan Necks, Triggers, Handles, Liners, Euro Block, Shroud Springs, Knobs, All XCEL-ARC / Magmaweld Mig Welding Wires & Electrodes, Arc Leads, Welding Cable, Electrode Holder, Earth Clamps

- **MMA & TIG Welding Torch Consumables, such as:**

Tungsten Electrodes, Collet, Collet Body, Alumina Nozzle, Torch Head, Torch Head water Cooled, Torch Head Flexible, Back Caps, Gas Lens, Torch Handle, Cup Gasket, Torch Body Gas Valve, O-ring, All XCEL-ARC TIG Welding Rods, All XCEL-ARC / Magmaweld Electrodes, Arc Leads, Welding Cable, Electrode Holder, Earth Clamps

- **PLASMA Cutting Torches Consumables, such as:**

All Cutting Tips, All Diffuser/Swirl Ring, All Electrodes, Retaining Caps, Nozzle Springs, All Spacers, All Shield Caps, All Air and Power Cables, All Switches, All O-rings, All Springs, All Circle Guides and Cutting Kits, Torch Bodies, Air Filter Regulator, Welding Cable, Earth Clamps

- **Gas Welding & Cutting Torch and Straight Line Cutting Machine Consumables and Fittings, such as:**

All Cutting, Welding & Brazing Tips, Adaptors, Hoses, Fittings, Tracks and associated parts

- **Automatic Welding & Cutting Carriage Machine Parts, such as:**

Input Cord, Inter-connecting Power Cord, Triggering Cable

This Warranty does not cover products purchased:

- Without the provision of a suitable Receipt or Tax Invoice that clearly provides proof of purchase as outlined above
- At an auction or from a private seller
- Unless it is a manufacturing fault, this Warranty does not apply to any products sold to Hire Companies.

These conditions may only be varied with the written approval of the Directors of Esseti NZ Limited.

REMEMBER TO RETAIN YOUR ORIGINAL INVOICE FOR PROOF OF PURCHASE.

NOTES



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