UNIMIG

VIPER
MULTI 195 MAX

U11011 | Operating Manual

1. Safety

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.

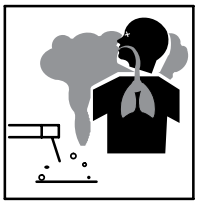
Read and understand this instruction manual carefully before the installation and operation of this equipment.

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 workpiece.
- 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 workpiece 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, undersized, 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

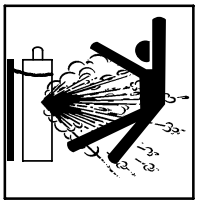
- Smoke and gas generated while welding or cutting can be harmful to people's health. Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.
- Do not breathe the smoke and gas generated while welding or cutting, keep your head out of the fumes.
- Keep the working 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 degreasing, 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 galvanised, 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 the correct shade of filter lens and suitable protective clothing, including welding gloves while 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.

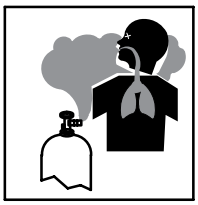
Fire hazard

- Welding/cutting on closed containers, such as tanks, drums, or pipes, can cause them to explode. Flying sparks from the welding/cutting arc, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of the 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 correctly prepared according to the required Safety Standards to ensure 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 a fire on the hidden side.



Gas cylinders

- Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Because gas cylinders usually are 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.
- Ensure 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 cause 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

Working environment

- 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 a maximum of 80% humidity.
- When using the machine outdoors, protect the machine from direct sunlight, rainwater and snow, etc.; the temperature of the working environment should be maintained within -10°C to +40°C.
- Keep this equipment 30cm distant from the wall.
- Ensure the working environment is well ventilated.

Safety tips

- **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.
- **Thermal Overload Protection:** Should the machine be used to an excessive level, or in a 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 a safe level.
- **Over-Voltage Supply:** Regarding the power supply voltage range of the machine, please refer to the “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.
- Do not come into contact with the output terminals while the machine is in operation. An electric shock may occur.

Maintenance

Exposure to extremely dusty, damp, or corrosive air is damaging to the welding/cutting machine. 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.

Note: *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.*

Troubleshooting

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.

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

Welding Guns Of Australia PTY LTD, authorised representatives or agents of Welding Guns Of Australia PTY LTD will not be liable or responsible for the loss of any gas.

2. Machine Features

10A Plug

Plug in and play. The 10A power plug can be used on any domestic outlet, so it's perfect for the DIY home handyman or the professional welder looking to take it anywhere.

Smart Fan

The Smart Fan diminishes noise, saves power, helps reduce energy costs, and minimises the number of contaminants being pulled through the machine.

4.0" Colour LCD Screen

The intuitive screen controls and next-generation user interface make changing your settings easier than ever.

Power Factor Correction (PFC)

Get the most out of your machine. The PFC maximises the electrical efficiency of the machine and automatically compensates for any voltage fluctuations, so you get more output power and the internal components last longer.

IP21 Rating

Rated IP21, so it's protected from touch by fingers and objects greater than 12mm, and water spray from a vertical direction.

Dual Gas Input

Fitted with separate MIG and TIG gas inputs, allowing you to switch processes quicker than ever before.

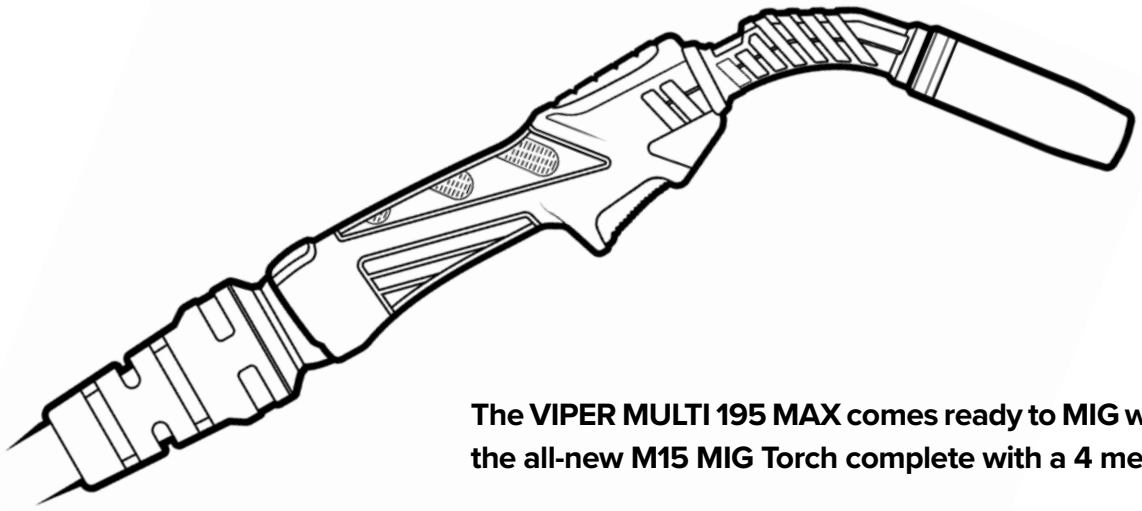
Job Memory

The job memory function allows you to enter and store weld parameter settings under job numbers. Weld parameters can be further adjusted and stored as required. A total of 20 jobs can be memorised and stored for recall.

Foot Control Ready

This machine supports the connection of both a wired or wireless foot control for extra versatility and convenience while welding. You can adjust your amperage hands-free to avoid disrupting your torch movement, and the wireless option reduces cables and adds greater manoeuvrability.

3. MIG Features



The VIPER MULTI 195 MAX comes ready to MIG weld with the all-new M15 MIG Torch complete with a 4 metre lead.

MIG Smart-Set™

Setting up for a weld has never been easier, just set your joint type, filler wire, gas mixture, wire diameter, and material thickness and you're ready to weld!

Complete MIG Weld Cycle Control

Get complete control over your MIG welds with a full set of adjustable parameters, such as pre- and post-gas flow, arc ignition speed, and burnback.

Gas-shielded & Gasless Wires

Capable of running both gas-shielded and gasless MIG wire, you can to tackle a wide variety of welding projects with ease. Whether you're working with mild steel, stainless steel, aluminium, or flux-cored wire, our machine has got you covered.

Spool Gun Ready

Make welding aluminium even easier. No need to change your existing setup. The spool gun lets you quickly switch over and get any job done with no downtime.

Crater Fill

End your welds as strong as they started. The Arc End feature ramps your welding current and voltage down at the end of a weld, filling it in at a lower amperage, eliminating craters and pinholes.

Inductance Control

Change the frequency of your short circuit MIG welds with the Inductance settings, so you can choose your preferred arc characteristics.

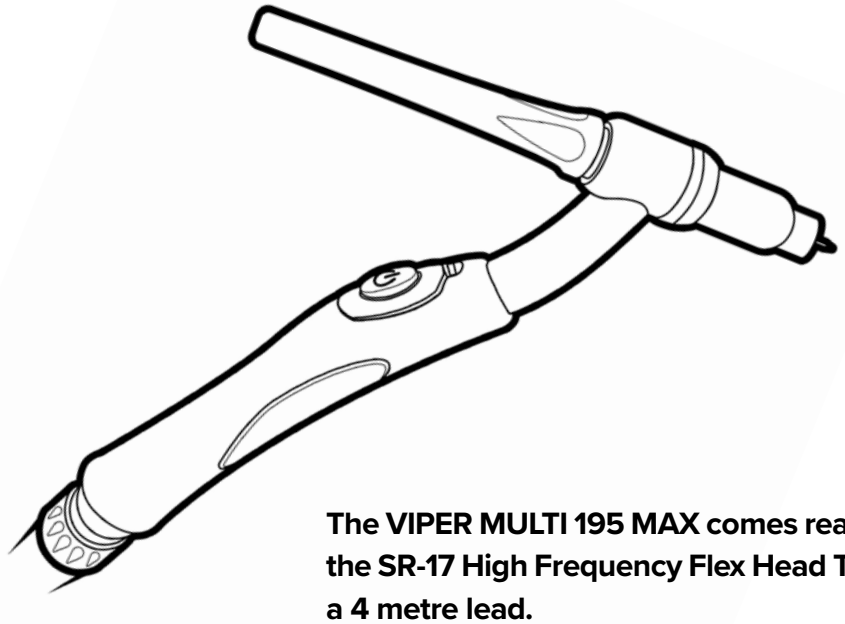
Digital Geared Wire Drive

Experience unparalleled accuracy with our all-new Digital Geared Wire Drive system. Designed to sustain a consistent arc in varying conditions and with different wire types, it ensures an accurate wire feed speed. With this system, achieving precision in every welding task is effortless.

Arc Start

Get the smoothest arc starts possible with the Arc Start dual function. Set above 100% and the Hot Start gives you a boost in current at the start of your weld, eliminating issues with starting on cold metal, and makes welding on thicker materials easier. Set below 100% and Soft Start helps with edge arc ignition by starting at a lower current and ramping up when welding away from the edge.

4. TIG Features



The VIPER MULTI 195 MAX comes ready to TIG weld with the SR-17 High Frequency Flex Head Torch complete with a 4 metre lead.

TIG Smart-Set™

The easiest way to set up for a TIG weld, simply set your material, joint type, tungsten diameter, plate thickness, and gas mixture and you're good to go!

Pulse TIG

Minimise the heat input without compromising on any of the penetration. Alternating between a peak and base current reduces the amount of heat input and focuses the arc, perfect for sheet metals and out-of-position welding.

DC High-Frequency TIG

Maximise your results from start to finish. A high-frequency torch can start an arc without contacting the workpiece, reducing the risk of contaminating the tungsten or the weld. It also means you get access to the entire TIG weld cycle, including pre- and post-gas and up and down slope parameters.

Heat Control Trigger (HCT) Mode

Heat Control Trigger Mode lets you set a base current, which you can switch to at any time during a weld by pressing the trigger button. Heat Control Trigger Mode is great for manual heat input control as you go.

5. MMA Features

The VIPER MULTI 195 MAX comes ready to MMA weld with a 4 metre long twist lock electrode holder.

VOLTAGE REDUCTION DEVICE (VRD)

Reduces Open Circuit Voltage (OCV), protecting yourself and the machine.

ARC FORCE

Arc Force helps to keep the arc stabilised throughout the weld, by detecting any short circuits and increasing the peak current to prevent the arc cutting out or electrode sticking.

HOT START

Hot Start increases the stability of your arc ignition, and prevents a lack of fusion at the start of the weld.

ANTI STICK

Anti-stick prevents your electrode from sticking to your workpiece. When the machine detects sticking, the current will shut off and unstick the electrode.

PULSE MMA (STICK)

Pulse MMA (STICK) welding helps reduce spatter, improves heat control and allows for an easier removal of slag. It also improves the speed and efficiency of vertical up welds by eliminating the use of the "Christmas Tree" technique, while still maintaining root fusion.

6. Machine Specifications

Technical Data

Parameter	Values
SKU	U11011
Primary Input Voltage	240V Single Phase
Supply Plug	10 AMP
Ieff (A)	8.9
Rated Output (MIG)	25A/15V - 195A/23.8V
No Load Voltage (V)	67
Protection Class	IP21
Insulation Class	H
Minimum Generator (kVA)	8.5
Dinse Connector	35/50
Standard	AS/NZ60974-1
Warranty (Years)	3

MIG Specifications

MIG Welding Current Range	25-195A
MIG Duty Cycle @ 40°C	15% @ 195A 60% @ 98A 100% @ 76A
MIG Welding Thickness Range	1-8mm

TIG Specifications

TIG Function Type	DC High Frequency
TIG Welding Current Range	5-195A
TIG Duty Cycle @ 40°C	30% @ 195A 60% @ 138A 100% @ 107A
TIG Welding Thickness Range	1-8mm

STICK Specifications

STICK Welding Current Range	5-195A
STICK Duty Cycle @ 40°C	15% @ 195A 60% @ 98A 100% @ 76A
STICK Welding Thickness Range	2-10mm

Size & Weight

Dimensions (mm)	470×190×350
Weight (kg)	11.8

Capable Welding Material Types By Welding Process

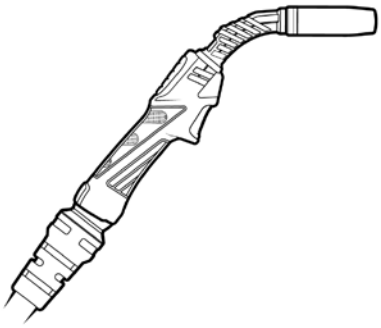
MIG: Mild Steel, Stainless Steel, Aluminium, Silicon Bronze

TIG: Mild Steel, Stainless Steel, Copper, Silicon Bronze

MMA: Mild Steel, Stainless Steel, Cast Iron

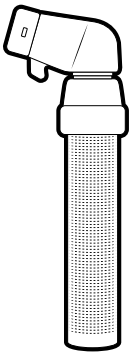
7. Package Contents

VIPER MULTI 195 MAX

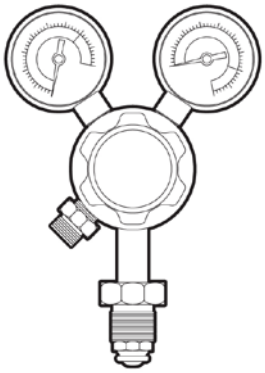


4m M15 MIG Torch

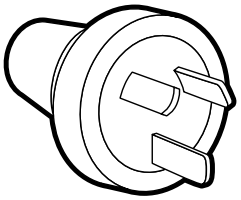
4m SR17 TIG Flex Head Torch



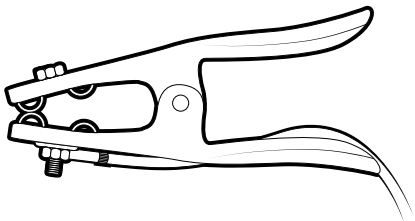
4m Electrode Holder



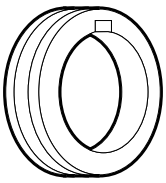
Twin Gauge Argon Regulator



10A Plug Fitted



4m 300 AMP Earth Clamp

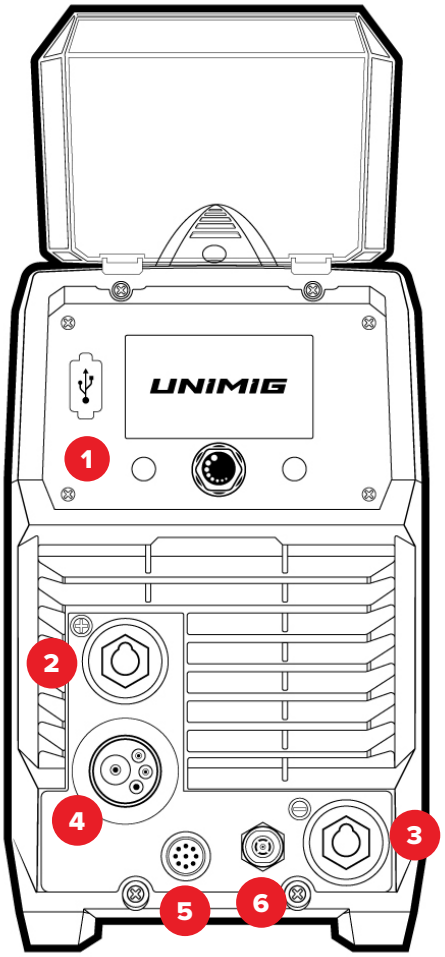


Drive Roller

Includes:

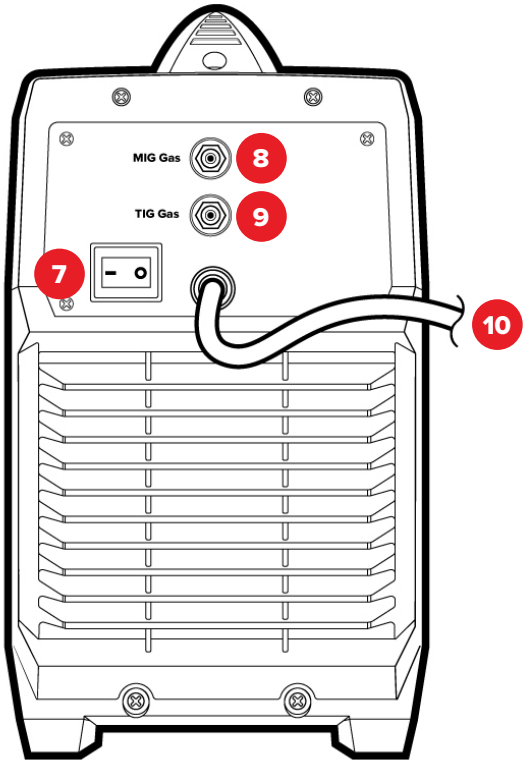
- 0.8-0.9mm "V GROOVE" 30/22
- 0.8-0.9mm "F GROOVE" 30/22
- 1.0-1.2mm "U GROOVE" 30/22

8. Machine Layout



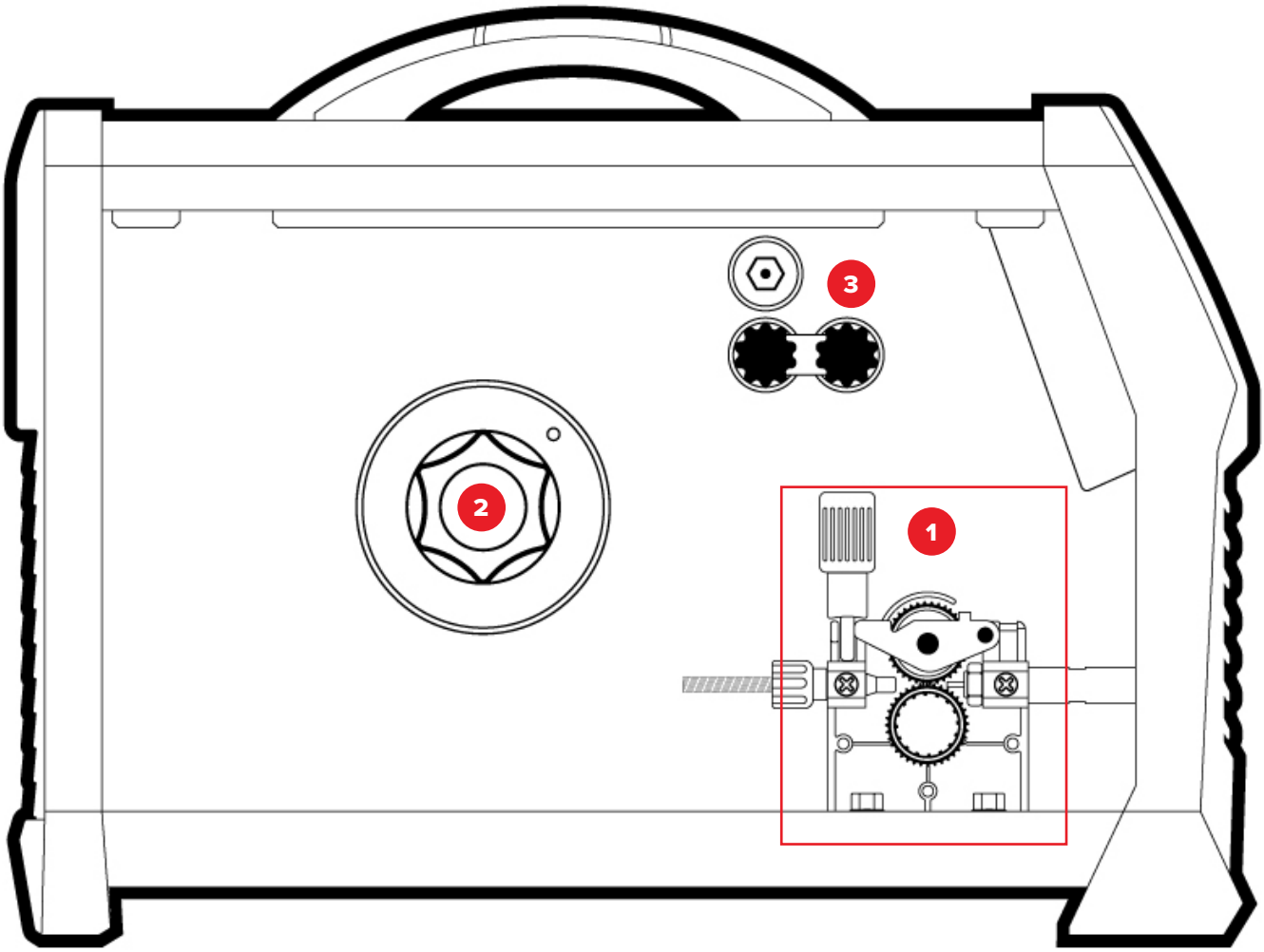
8.1 Front Panel Layout

1. Control Panel
2. “+” Output Terminal
3. “-” Output Terminal
4. Euro Connect Torch Port
5. Wired Remote Connection Port
6. Gas Output



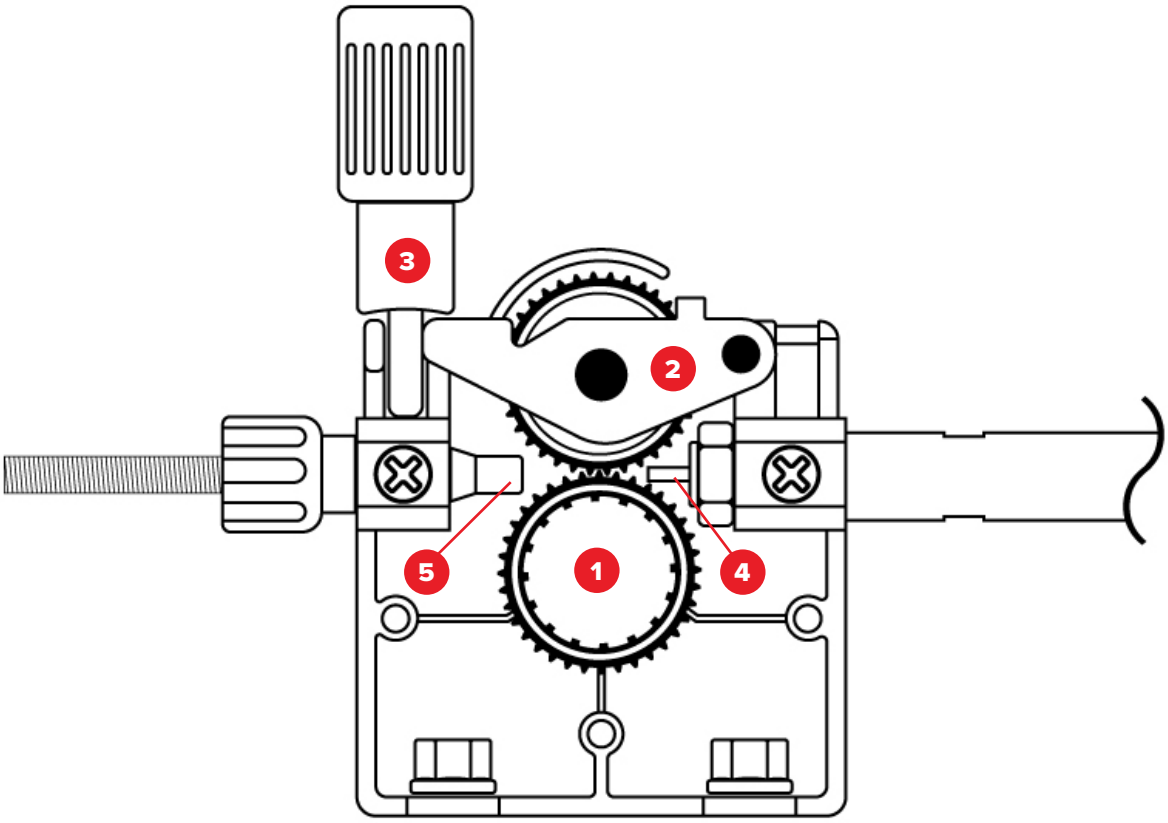
8.2 Rear Panel Layout

7. On/Off Switch
8. MIG Gas Input
9. TIG Gas Input
10. Input Power Cord



8.3 Interior Layout

1. Geared Wire Drive System
2. Wire Spool Holder
3. Torch Polarity Connector



8.4 Geared Wire Drive System

1. Geared Drive Roller Assembly
2. Upper Roller Assembly
3. Tensioner Knob
4. Guide Tube
5. Wire Inlet Guide Tube

9. Control Panel Layout

1. LCD Display
2. Selector / Scroll Knob
3. Left Action Button
4. Right Action Button
5. USB Update Port

10. Navigating the Interface

10.1 Main Menu

The main menu is what you will need to access to change welding processes, and to enter the settings menu. At any point of operation you can reach the main menu by pressing the **Left Action Button**.

Press the **Left Action Button** to return to your previous welding process setup.

Rotate the **Selector Knob** to choose your desired welding process or for machine settings. Press the knob to enter the desired menu.

Press the **Right Action Button** to load the saved jobs menu.

Note: *While hovering over MIG Smart-Set Mode or MIG Manual mode, you can perform a gas test by pressing and holding the* ***Left Action Button.*** *You can also feed wire by pressing and holding the* ***Right Action Button.***

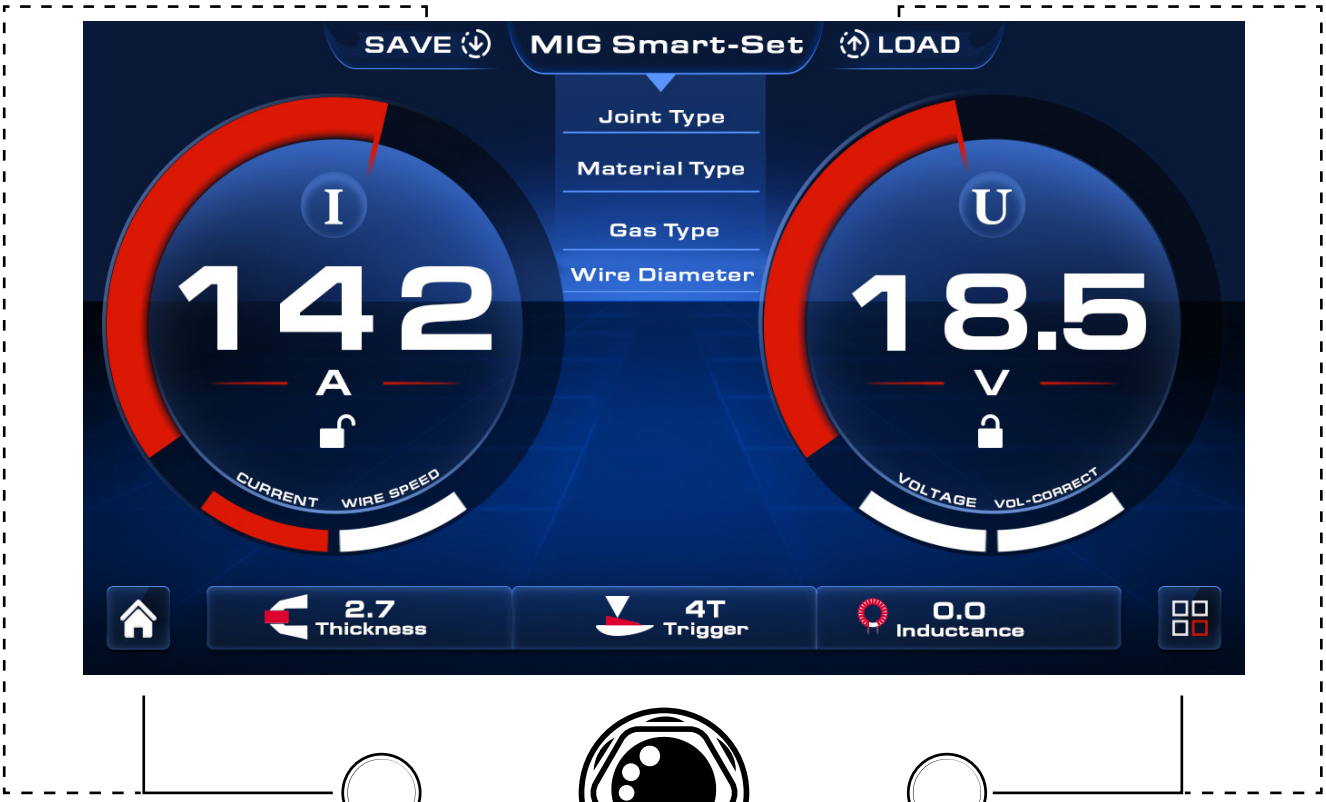
10.2 MIG Smart-Set

After selecting MIG Smart-Set from the main menu, you will then be prompted to enter the specifications of your desired welding job.

JOINT TYPE ▶ WIRE TYPE ▶ GAS TYPE ▶ WIRE DIAMETER

Using the selector knob, navigate through the setup wizard and select the appropriate parameters for your welding job. After completing the setup wizard, the machine will inform you which polarity you need to set the machine up in.

Note: *If you need to change polarity, remember to change the torch polarity via the internal* ***Torch Polarity Connector*** *located above the geared wire drive system inside the machine.*



Press the **Left Action Button** for main menu. Hold for 3 seconds for Save Jobs menu.

ADJUST VALUE

CYCLE THROUGH AVAILABLE SETTINGS

Press the **Right Action Button** for Weld Cycle menu. Hold for 3 seconds for Load Jobs menu.

Amperage — **Wire Speed** — **Voltage Correction**

-9.9 +9.9

Material Thickness — **Torch Mode** — **Inductance**

- 2T
- S2T
- 4T
- S4T
- SPOT

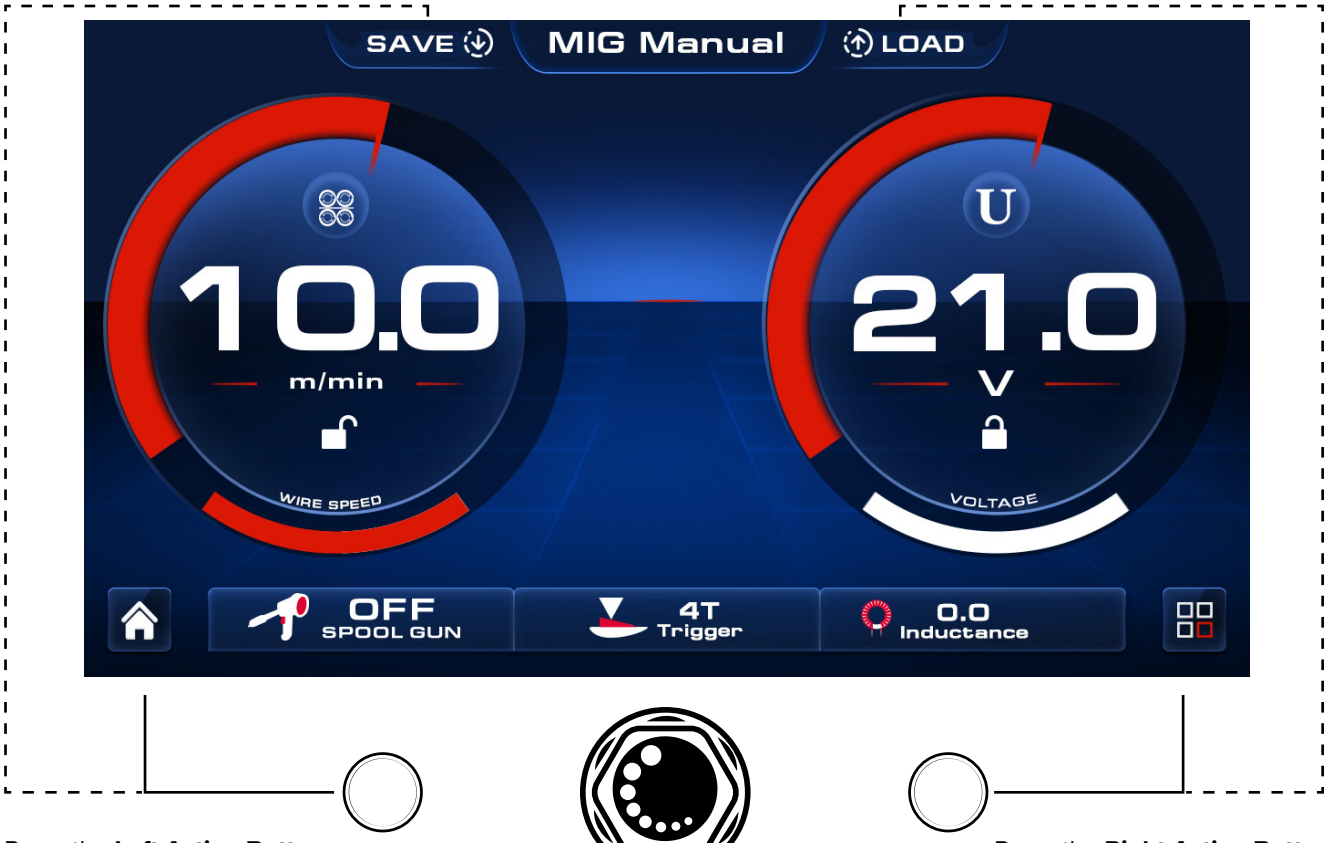
-10 +10

Note: *The adjustable settings can be limited by the specifications chosen in the setup wizard.*

10.3 MIG Manual

MIG Manual is your standard, fully customisable MIG welding mode. You will need to be using MIG Manual if you are using a spool gun.

Note: *S2T/S4T Torch Trigger modes are not available in MIG Manual.*

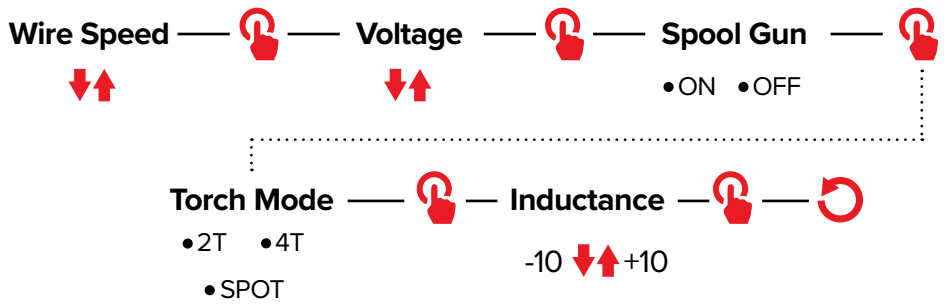


Press the **Left Action Button** for Main Menu. Hold for 3 seconds for Save Jobs menu.

ADJUST VALUE

CYCLE THROUGH AVAILABLE SETTINGS

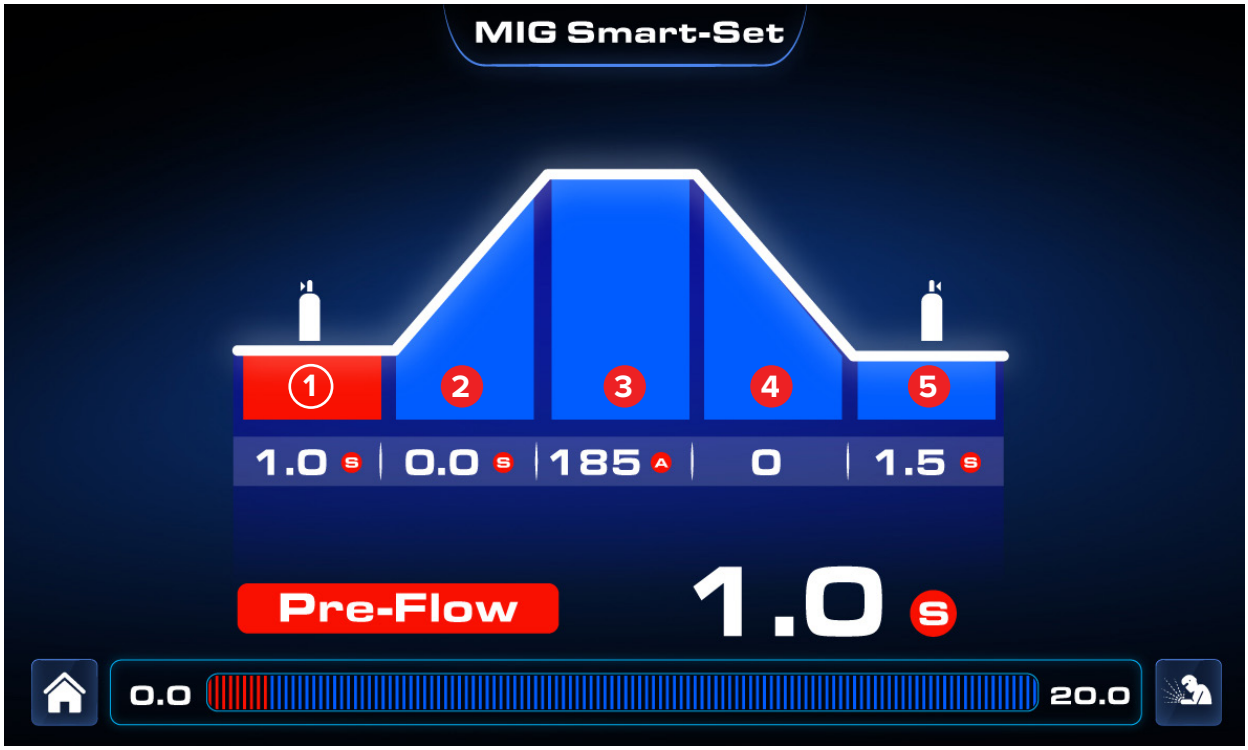
Press the **Right Action Button** for Weld Cycle menu. Hold for 3 seconds for Load Jobs menu.



10.4 MIG Weld Cycle Menus

Torch trigger modes alter the weld cycle menu. The weld cycle menu is where you can further fine-tune your welds. There are different weld cycle menus for 2T/4T Mode, S2T/S4T Mode, and Spot Mode.

2T/4T Mode (MIG Smart-Set + MIG Manual)



Press the **Left Action Button** to return to the main menu.

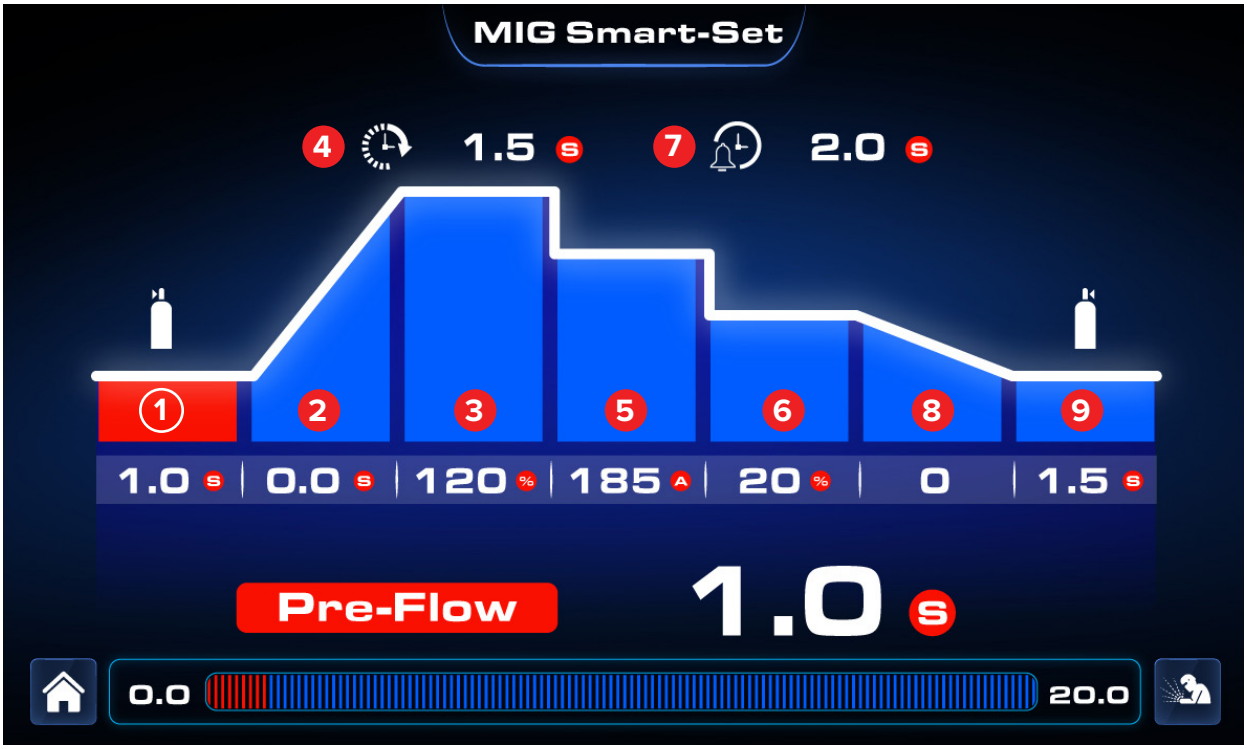
Press the **Right Action Button** to return to the Weld Screen.

ADJUST VALUE **CYCLE THROUGH AVAILABLE SETTINGS**

1. **Pre-Flow** — 0.0 - 20.0 Seconds
2. **Slow Feed** — 0.0 - 5.0 Seconds
3. **Welding Amp** — 65 - 195 Amps
4. **Burn Back** — 0 - 10
5. **Post-Flow** — 0.0 - 20.0 Seconds

S2T/S4T Mode (MIG Smart-Set only)

Note: *S2T and S4T add in adjustable Start and End Amperages with individual timers.*



Press the **Left Action Button** to return to the main menu.

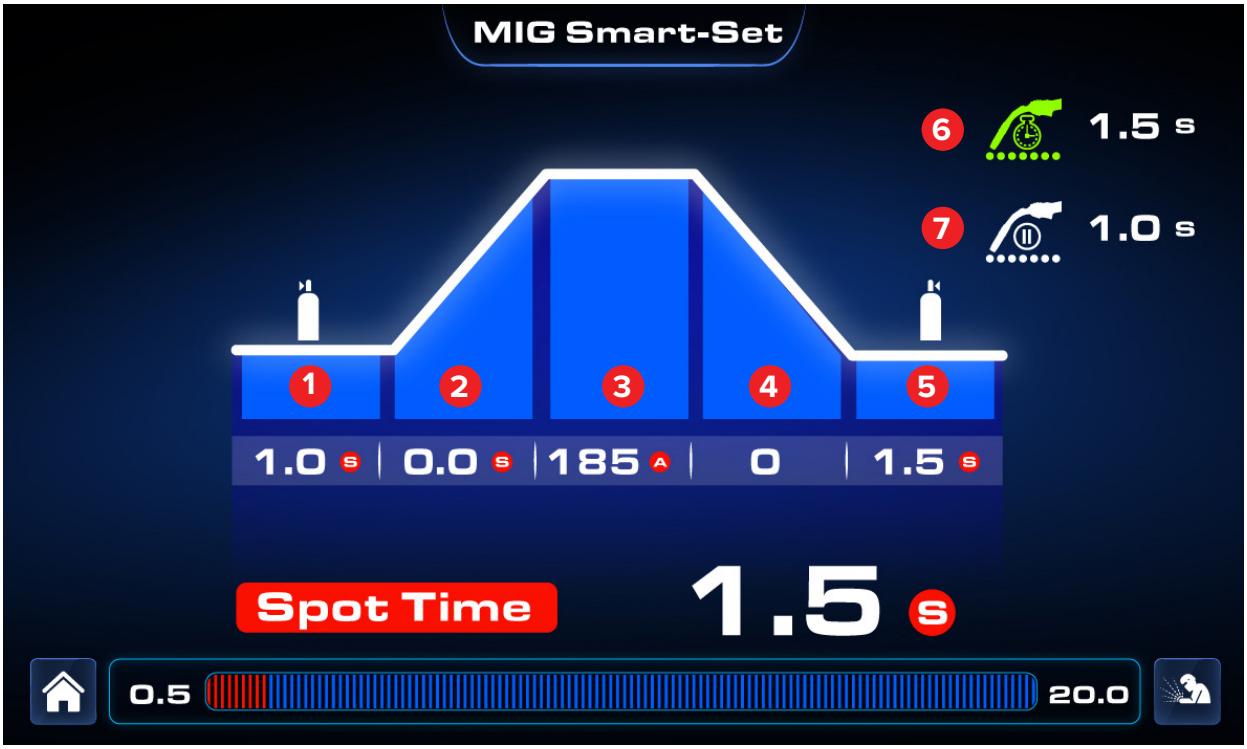
Press the **Right Action Button** to return to the Weld Screen.

ADJUST VALUE

CYCLE THROUGH AVAILABLE SETTINGS

1. **Pre-Flow** — 0.0 - 20.0 Seconds
2. **Slow Feed** — 0.0 - 5.0 Seconds
3. **Start Amp** — 1 - 200 Percent
4. **Start Amp Time** — 0.0 - 20.0 Seconds
5. **Welding Amp** — 65 - 195 Amps
6. **End Amp** — 1 - 200 Percent
7. **End Amp Time** — 0.0 - 20.0 Seconds
8. **Burn Back** — 0 - 10
9. **Post-Flow** — 0.0 - 20.0 Seconds

Spot Mode (MIG Smart-Set + MIG Manual)



Press the **Left Action Button** to return to the main menu.

Press the **Right Action Button** to return to the Weld Screen.

ADJUST VALUE **CYCLE THROUGH AVAILABLE SETTINGS**

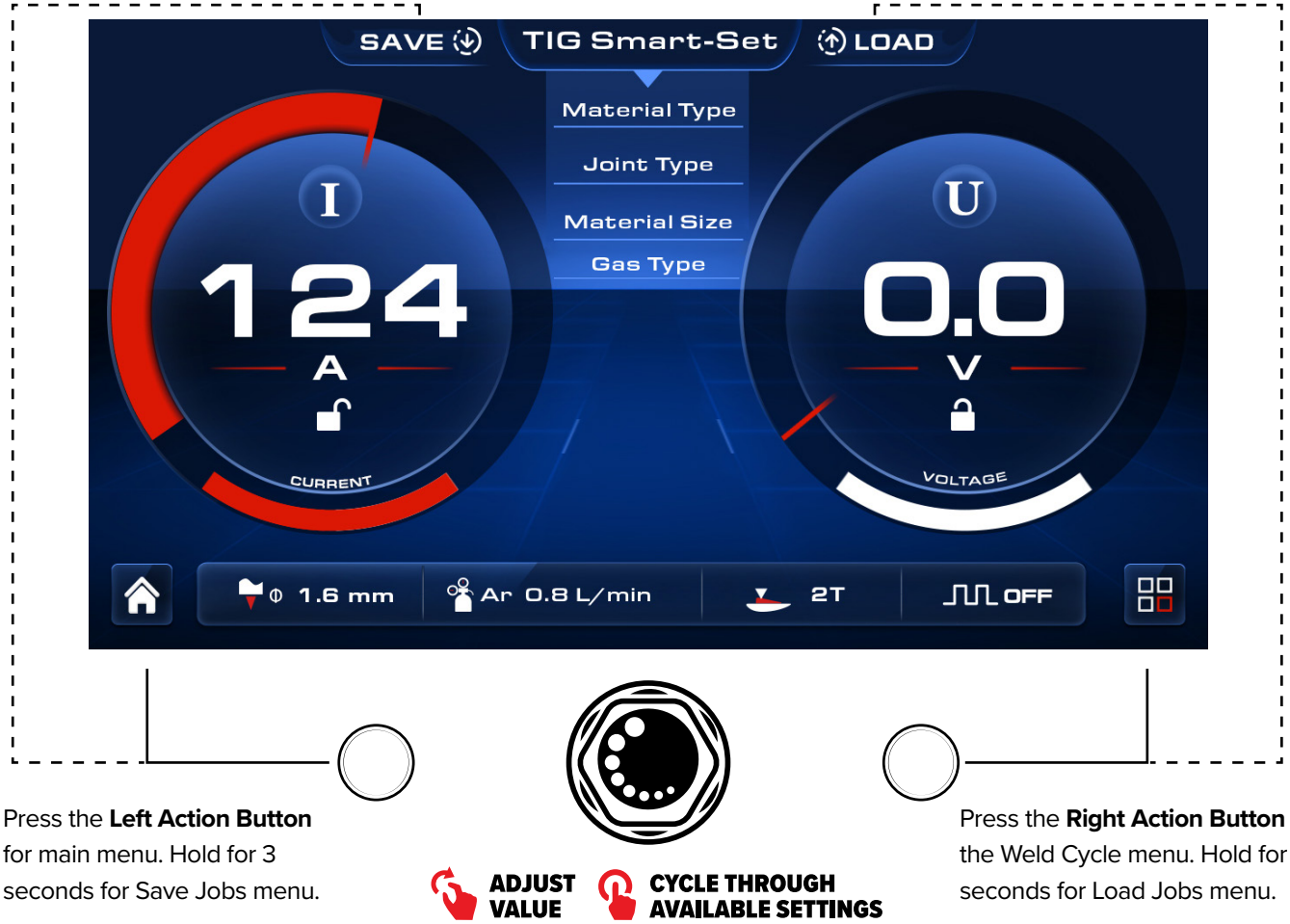
1. **Pre-Flow** — 0.0 - 20.0 Seconds
2. **Slow Feed** — 0.0 - 5.0 Seconds
3. **Welding Amp** — 65 - 195 Amps
4. **Burn Back** — 0 - 10
5. **Post-Flow** — 0.0 - 20.0 Seconds
6. **Spot Time** — 0.0 - 20.0 Seconds
7. **Spot Pause Time** — 0.0 - 20.0 Seconds

10.5 TIG Smart-Set

After selecting TIG Smart-Set from the main menu, you will then be prompted to enter the specifications of your desired welding job.

MATERIAL TYPE ▶ JOINT TYPE ▶ TUNGSTEN DIAMETER ▶ MATERIAL THICKNESS ▶ GAS

Using the selector knob, navigate through the setup wizard and select the appropriate parameters for your welding job.



Press the **Left Action Button** for main menu. Hold for 3 seconds for Save Jobs menu.

ADJUST VALUE

CYCLE THROUGH AVAILABLE SETTINGS

Press the **Right Action Button** for the Weld Cycle menu. Hold for 3 seconds for Load Jobs menu.

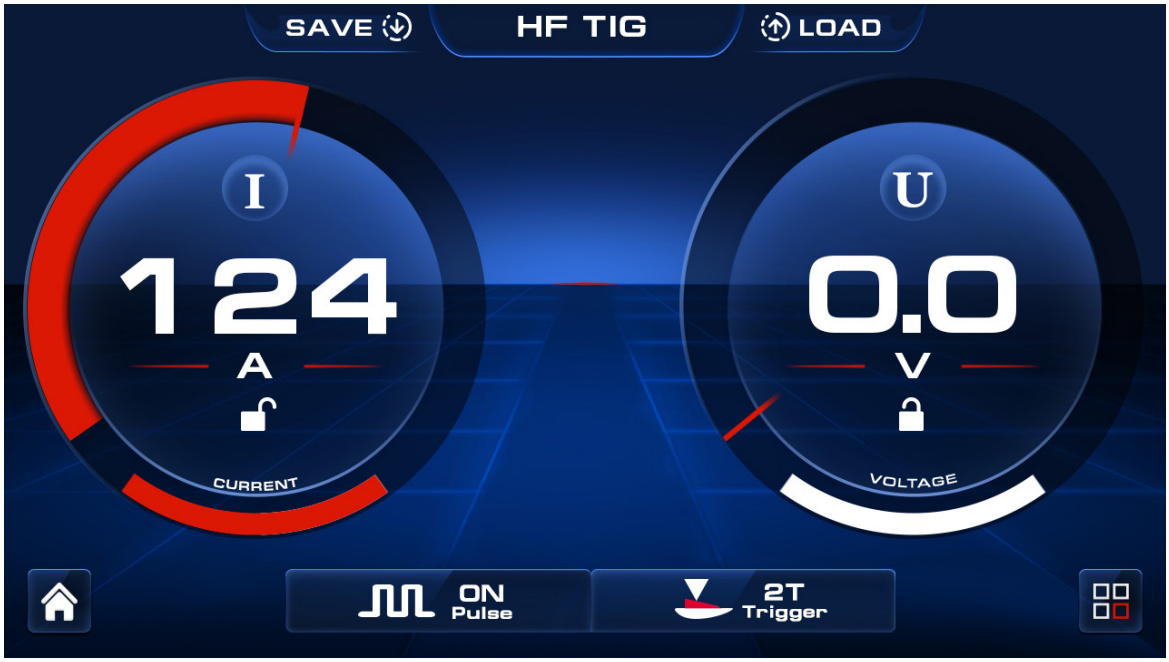
Amperage — **Pulse TIG** — **Torch Mode**

- Pulse TIG: • ON • OFF
- Torch Mode: • 2T • 4T • HCT • SPOT

Note: *The adjustable settings can be limited by the specifications chosen in the setup wizard.*

10.6 HF TIG & Lift TIG

HF TIG and Lift TIG are identical in terms of menus and options, with one exception: Lift TIG does not have Spot Mode.



Press the **Left Action Button** for main menu. Hold for 3 seconds for Save Jobs menu.

ADJUST VALUE

CYCLE THROUGH AVAILABLE SETTINGS

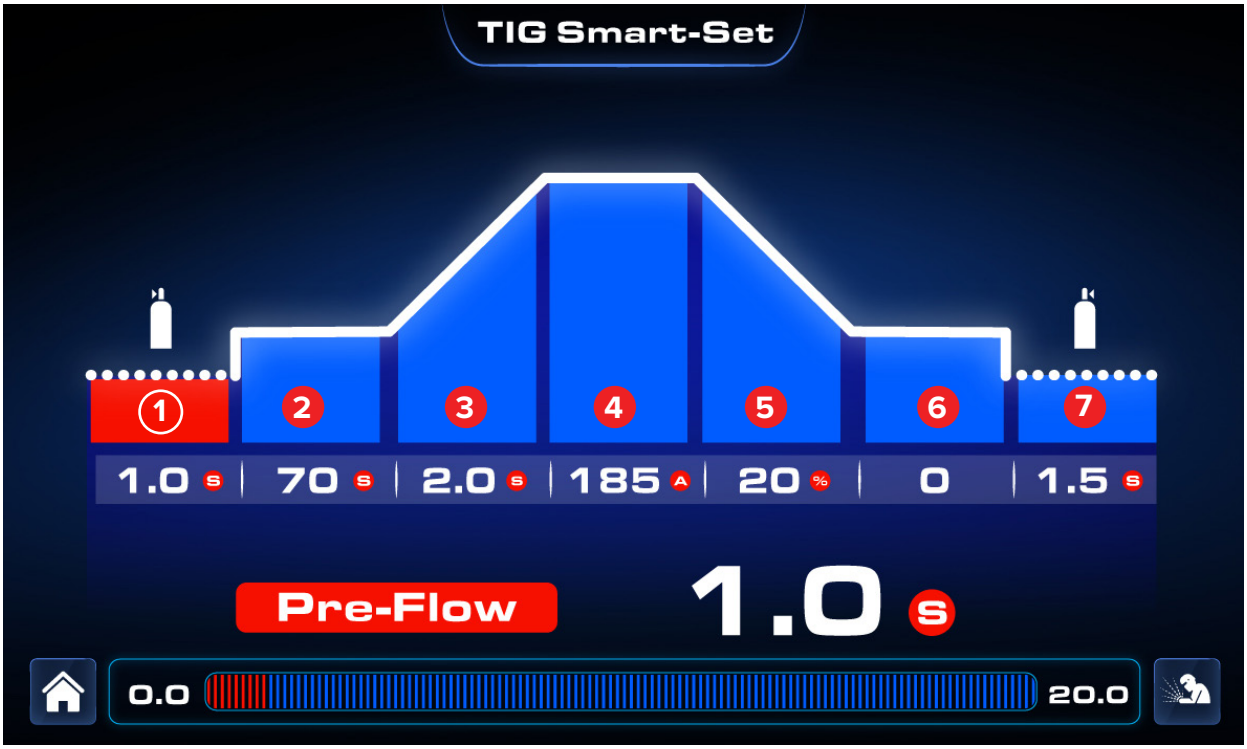
Press the **Right Action Button** for the Weld Cycle menu. Hold for 3 seconds for Load Jobs menu.

Amperage — **Pulse TIG** — **Torch Mode**

- Pulse TIG: •ON •OFF
- Torch Mode: •2T •4T •HCT • SPOT (HF ONLY)

10.7 TIG Weld Cycle Menus

2T/4T Mode No Pulse (TIG Smart-Set + HF TIG + Lift TIG)



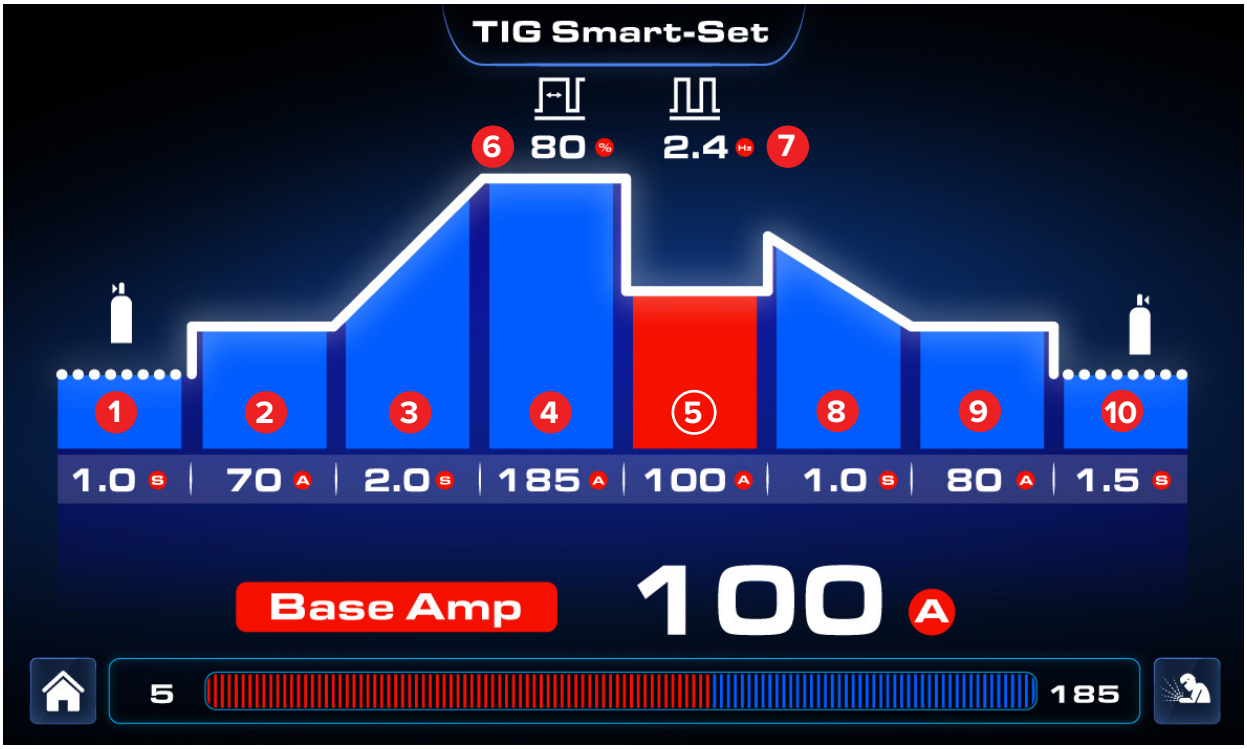
Press the **Left Action Button** to return to the main menu.

Press the **Right Action Button** to return to the Weld Screen.

ADJUST VALUE **CYCLE THROUGH AVAILABLE SETTINGS**

1. **Pre-Flow** ——— 0.0 - 20.0 Seconds
2. **Start Amp** ——— 5 - 195 Amps
3. **Up Slope** ——— 0.0 - 20.0 Seconds
4. **Peak Amp** ——— 5 - 195 Amps
5. **Down Slope** ——— 0.0 - 20.0 Seconds
6. **End Amp** ——— 5 - 195 Amps
7. **Post-Flow** ——— 0.0 - 20.0 Seconds

2T/4T Mode Pulse (TIG Smart-Set + HF TIG + Lift TIG)



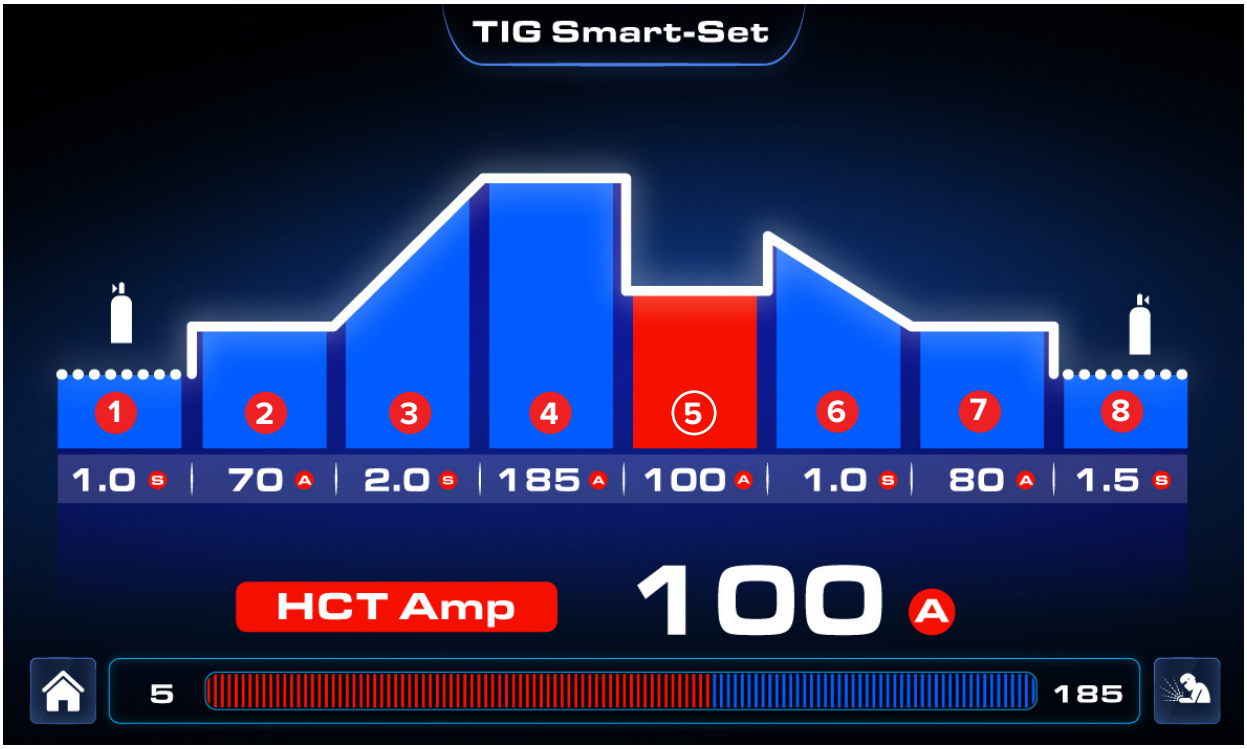
Press the **Left Action Button** to return to the main menu.

Press the **Right Action Button** to return to the Weld Screen.

ADJUST VALUE **CYCLE THROUGH AVAILABLE SETTINGS**

1. **Pre-Flow** — 0.0 - 20.0 Seconds
2. **Start Amp** — 5 - 195 Amps
3. **Up Slope** — 0.0 - 20.0 Seconds
4. **Peak Amp** — 5 - 195 Amps
5. **Base Amp** — 5 - 195 Amps
6. **Pulse Width** — 0 - 100 Percent
7. **Pulse Frequency** — 0.5 - 999 Hz
8. **Down Slope** — 0.0 - 20.0 Seconds
9. **End Amp** — 5 - 195 Amps
10. **Post-Flow** — 0.0 - 20.0 Seconds

HCT Mode (TIG Smart-Set + HF TIG + Lift TIG)



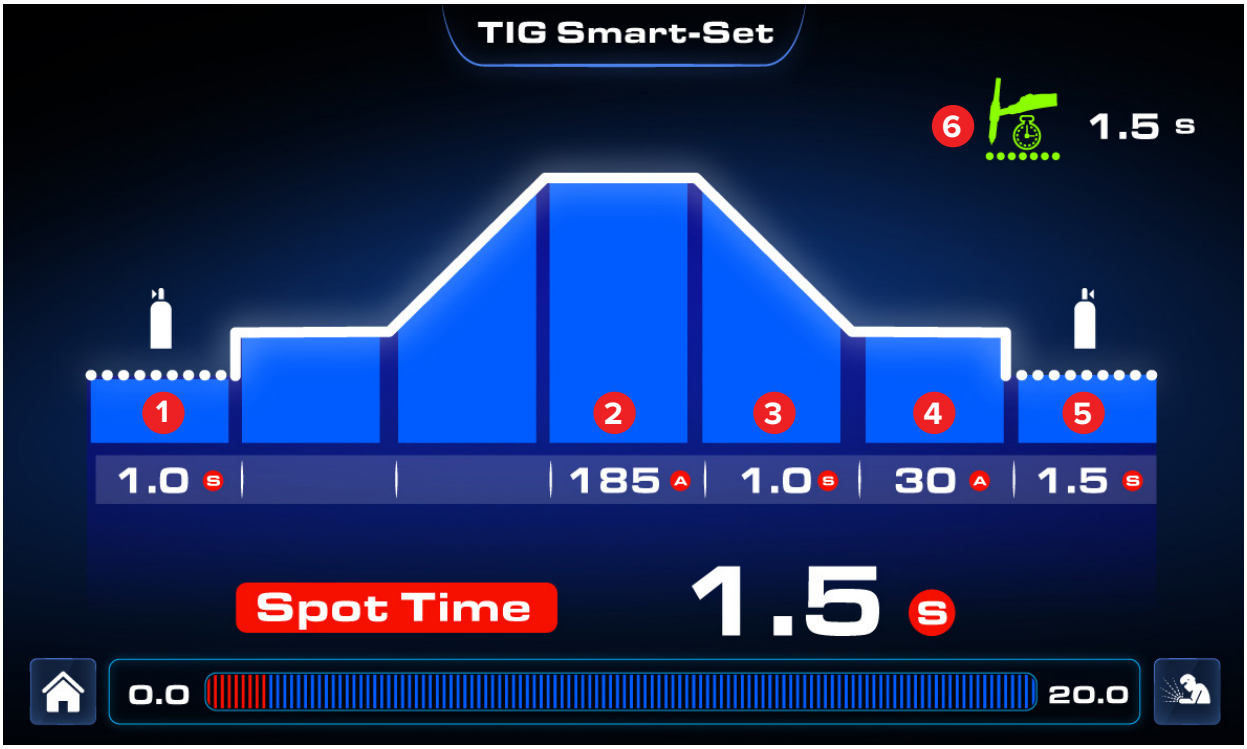
Press the **Left Action Button** to return to the main menu.

Press the **Right Action Button** to return to the Weld Screen.

ADJUST VALUE **CYCLE THROUGH AVAILABLE SETTINGS**

1. **Pre-Flow** — 0.0 - 20.0 Seconds
2. **Start Amp** — 5 - 195 Amps
3. **Up Slope** — 0.0 - 20.0 Seconds
4. **Peak Amp** — 5 - 195 Amps
5. **HCT Amp** — 5 - 195 Amps
6. **Down Slope** — 0.0 - 20.0 Seconds
7. **End Amp** — 5 - 195 Amps
8. **Post-Flow** — 0.0 - 20.0 Seconds

Spot Mode (TIG Smart-Set + HF TIG)



Press the **Left Action Button** to return to the main menu.

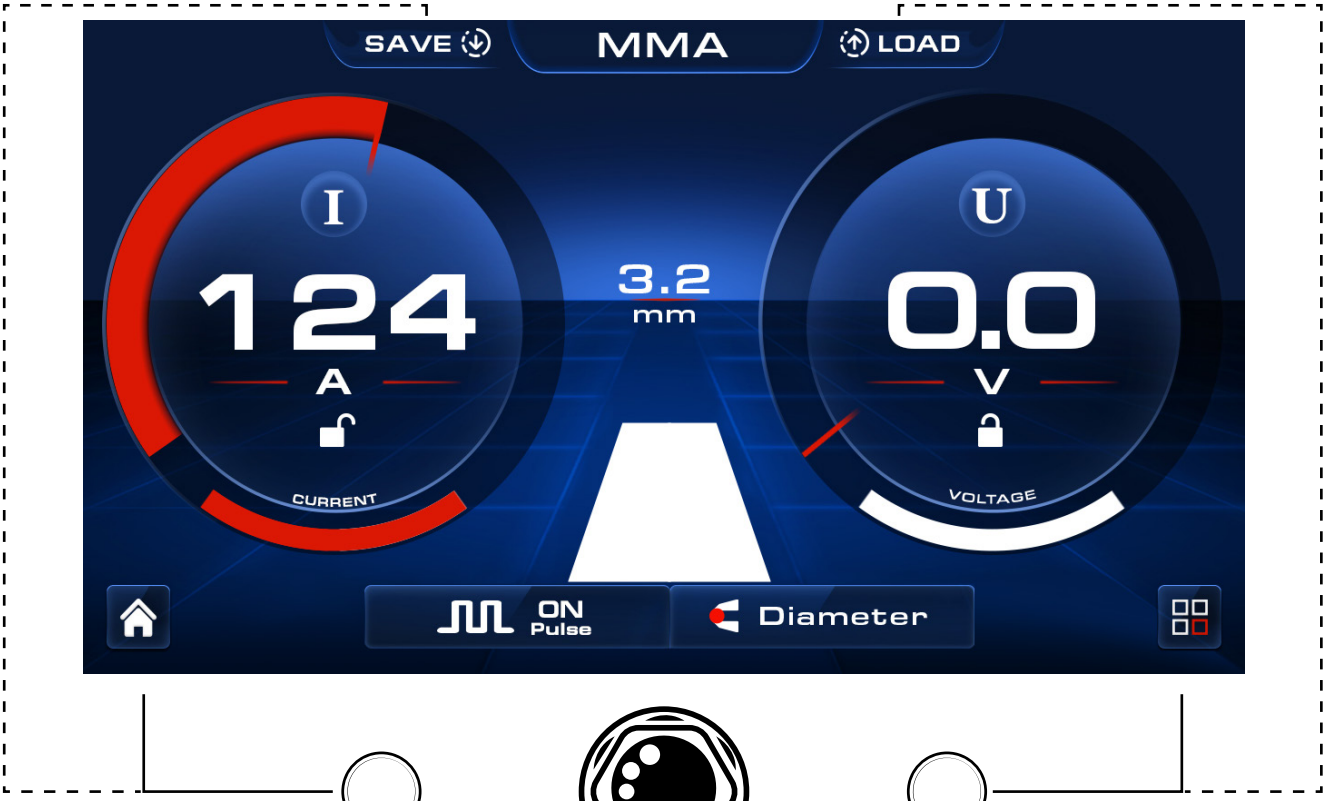
Press the **Right Action Button** to return to the Weld Screen.

ADJUST VALUE **CYCLE THROUGH AVAILABLE SETTINGS**

1. **Pre-Flow** — 0.0 - 20.0 Seconds
2. **Peak Amp** — 5 - 195 Amps
3. **Down Slope** — 0.0 - 20.0 Seconds
4. **End Amp** — 5 - 195 Amps
5. **Post-Flow** — 0.0 - 20.0 Seconds
6. **Spot Time** — 0.0 - 20.0 Seconds

10.8 MMA

MMA displays a live suggested electrode size based on your chosen amperage.



Press the **Left Action Button** for main menu. Hold for 3 seconds for Save Jobs menu.

ADJUST VALUE

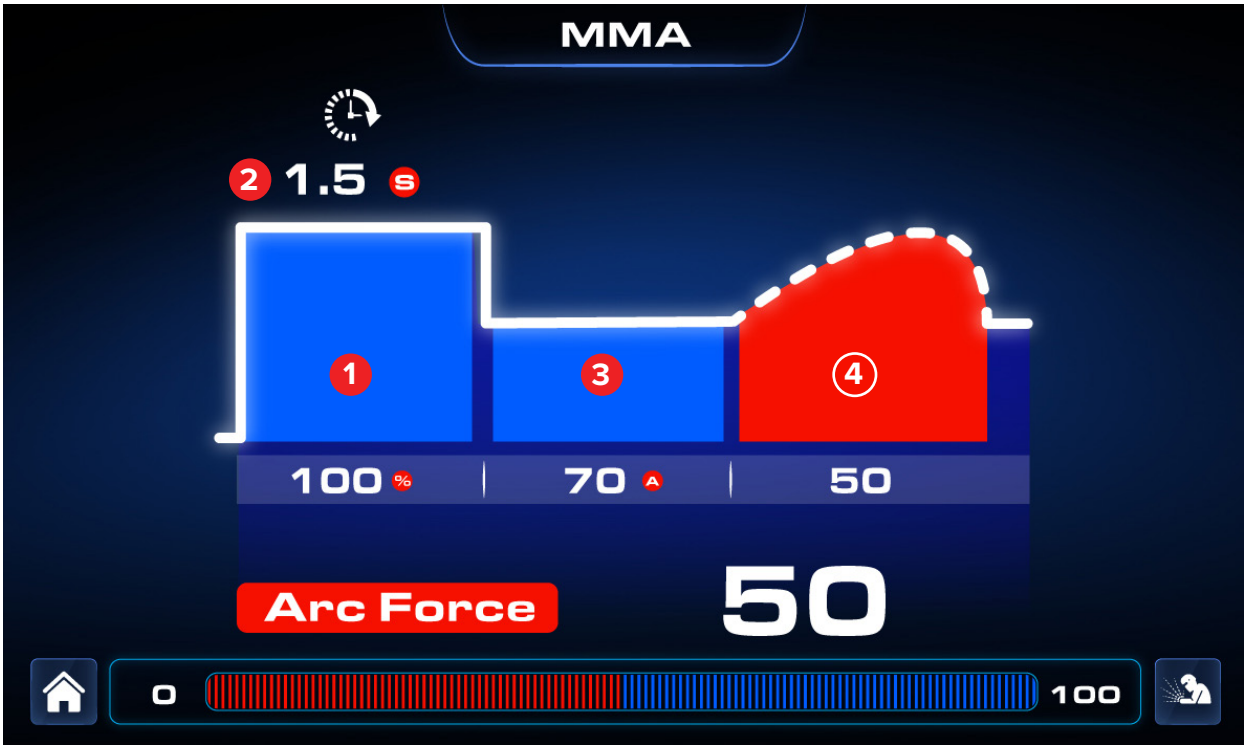
CYCLE THROUGH AVAILABLE SETTINGS

Press the **Right Action Button** for the Weld Cycle menu. Hold for 3 seconds for Load Jobs menu.

Amperage — **Pulse MMA** — • ON • OFF

10.9 MMA Weld Cycle Menus

MMA Standard Mode



Press the **Left Action Button** to return to the main menu.

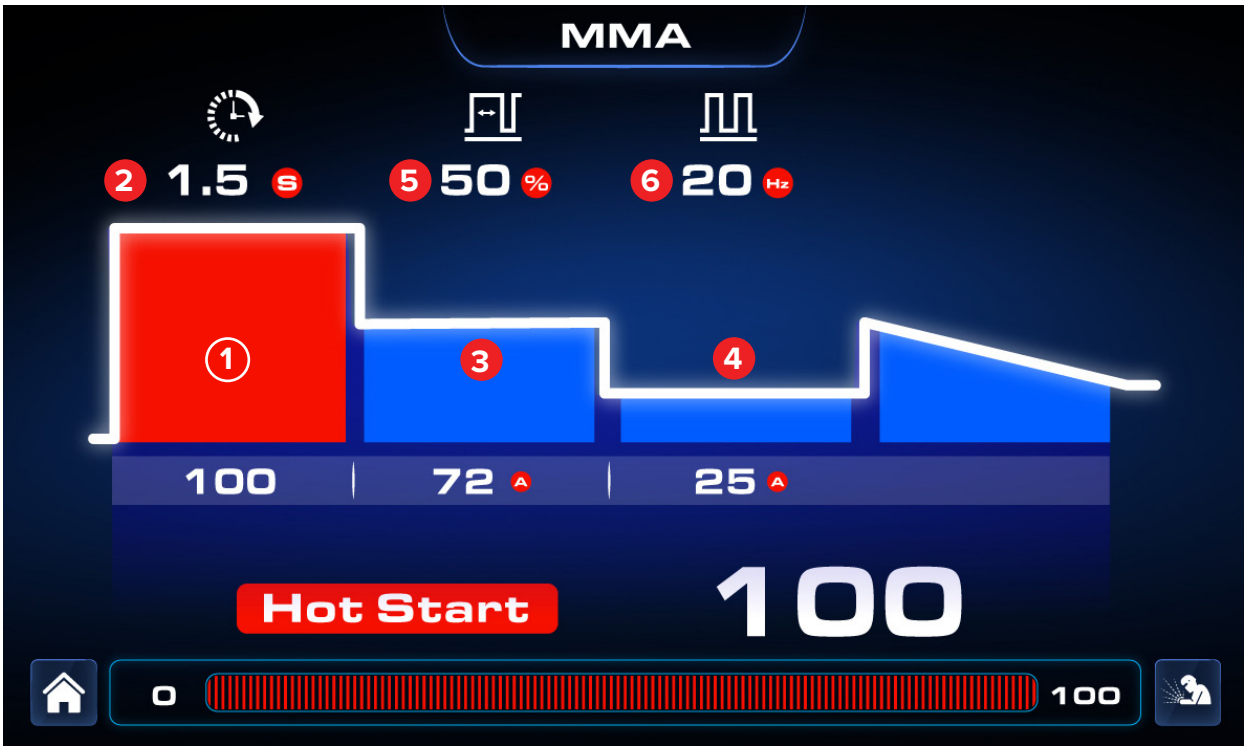
Press the **Right Action Button** to return to the Weld Screen.

ADJUST VALUE

CYCLE THROUGH AVAILABLE SETTINGS

1. **Hot Start** ——— 0 - 100
2. **Hot Start Time** — 0.0 - 20.0 Seconds
3. **Welding Amp** ——— 5 - 195 Amps
4. **Arc Force** ——— 0 - 100

MMA Pulse Mode



Press the **Left Action Button** to return to the main menu.

Press the **Right Action Button** to return to the Weld Screen.

ADJUST VALUE

CYCLE THROUGH AVAILABLE SETTINGS

1. **Hot Start** — 0 - 100
2. **Hot Start Time** — 0.0 - 20.0 Seconds
3. **Welding Amp** — 5 - 195 Amps
4. **Base Amp** — 5 - 195 Amps
5. **Pulse Width** — 5 - 95
6. **Pulse Frequency** — 0.5 - 400 Hz

11. Settings Menu

Navigate to the settings menu by using the scroll knob. Enter the menu by pressing the scroll knob down.

Note: *this menu is subject to change due to potential software updates. Please reach out to UNIMIG Service support for more information about system updates.*

NAVIGATE MENUS / ADJUST VALUE

ENTER SUB-MENU / CONFIRM SETTING

Remote Mode

- **OFF**
- **Torch**
- **Foot Pedal (Wired)**
- **Wireless Foot Pedal**

Remote mode adjusts the type of remote accessory you are using for TIG welding, or to activate a potentiometer on a spool gun.

If you are using an optional wireless foot pedal, this is where you will also connect the foot pedal. Select the wireless foot pedal option, then run through the setup wizard. Refer to the wireless foot pedal or reach out to UNIMIG Service support if you need help connecting the wireless foot pedal.

Activating a remote mode also adds in the minimum amperage adjustment value on each of the TIG Weld Cycle Menus. This can be achieved by setting the minimum value closer to the base amp value. Consequently, when using a torch with a potentiometer control or a foot pedal, they will begin function at your desired setting value rather than starting from zero.

Brightness

1-10

This is where you can adjust the LCD display screen brightness.

Note: *Sometimes during a system update or if you factory reset the machine it is possible that this value is reset to 1.*

Fan

- **Normal**
- **Smart**

The Fan menu is where you adjust the machine from Normal Fan mode to Smart Fan mode. Normal mode will keep the machine's fan running whenever the machine is switched on. Smart mode uses an internal temperature reading to ensure the fan is only on when needed.

Unit

- **Metric**
- **Inch**

This menu is where you can adjust the measurement values to either metric or imperial.

Beeper

- **Off**
- **On**

Beeper adds in an audible beep for whenever the scroll knob is used.

Information

This is used to display the current installed software version. This menu has no adjustablity.

Factory Reset

Perform a factory reset to reset all adjustable values of the machine. This will not revert the machine to original software version if new updated software has been installed.

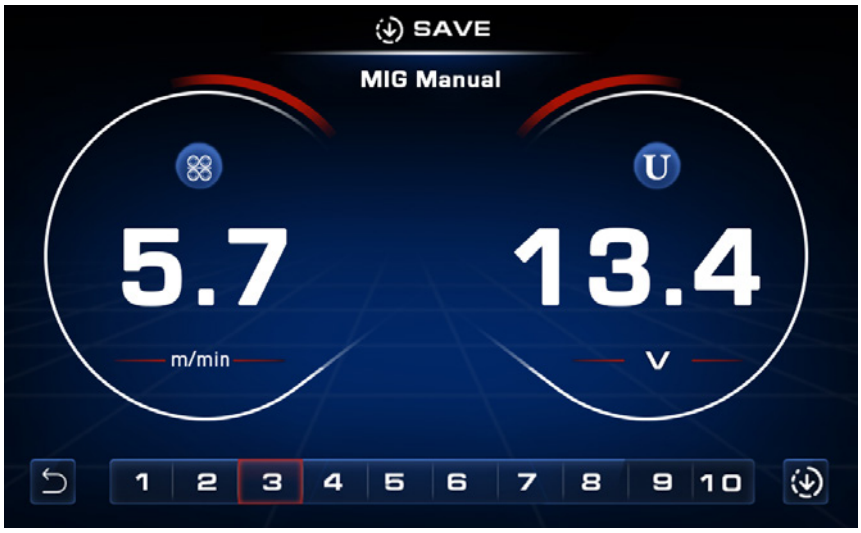
Warning! This can not be undone. This action will NOT erase your saved jobs.

Program Update

This will perform a system update provided you have the correct materials. Please reach out to UNIMIG Service support to check to see if your machine has an available update.

Note: *this action will NOT erase your saved jobs.*

12. Save Jobs



You can reach the Save Jobs menu and Load Jobs menu from any of the welding screens. Press and hold the **Left Action Button** to reach the Save Jobs menu, press and hold the **Right Action Button** to reach the Load Jobs menu.

To save a job, first enter the welding parameters on the desired welding process screen. Press and hold the **Left Action Button** to enter the Save Jobs menu. Use the scroll knob to select a number (1-20) and press the **Right Action Button** to save the job. If you have selected a number with a job already saved to that number, the new job will overwrite the old job.

To load a job, enter any welding screen. Press and hold the **Right Action Button** to reach the Load Jobs menu. Use the scroll knob to navigate to the job number (1-20) and then press the **Right Action Button** to load that job.

13. Glossary of Terms

MIG

Metal Inert Gas (MIG) welding is an arc welding process that uses a continuous solid wire electrode fed into the weld pool from a welding torch. The torch also feeds gas to shield the weld pool from contaminants in the air.

FCAW

Flux-Cored Arc Welding (FCAW), or Gasless MIG, operates on the same principles as MIG welding, however it does not use a shielding gas. Instead, the flux inside the wire releases gases as it melts and forms a protective slag layer over the weld.

TIG

Tungsten Inert Gas (TIG) welding is an arc welding process that uses a non-consumable tungsten electrode and an inert gas to shield the welding arc. A filler metal rod is fed into the arc by hand. TIG welding can also produce fusion welds, welding without a filler rod (on thinner metals).

MMA

Manual Metal Arc (MMA), or stick welding, is an arc welding process in which an arc is formed between a flux covered electrode and the base metal. The arc melts the electrode into the workpiece, forming the weld.

Polarity

Welding polarity is the form of circuit the weld completes. The VIPER MAX 195 uses direct current, and can run in both Direct Current Electrode Positive (DCEP) and Direct Current Electrode Negative (DCEN). DCEP is setup as the MIG/TIG Torch or Electrode Holder in positive, and the earth clamp in negative. DCEN is the opposite (torch - and earth +). Based on the process and electrode/wire, you will need to change polarity.

Smart-Set

The Smart-Set programs for both MIG and TIG are a series of synergic programs, which give you good starter welding parameters based on the information you input about the job.

Wire Drive

The wire drive system is what feeds the wire from the spool into the torch lead. The 195 features a geared wire drive system for more reliable and smooth wire feeding.

High Frequency

High Frequency is a touchless form of TIG arc ignition. High Frequency allows you to start a weld arc with the push of a button without touching the electrode to the workpiece. Typically a feature found on professional machines, this is more user friendly and keeps your tungsten from getting stuck or contaminated.

2T

2T (two touch) means you need to hold the trigger down on your torch while you weld. Releasing the trigger will end the weld. Available in MIG and TIG welding modes.

4T

4T (four touch) means you only need to press the trigger to ignite the arc and the torch will continue to weld until you press it again to turn it off. Available in MIG and TIG welding modes.

HCT

Heat Control Trigger (HCT) mode is used with TIG welding. HCT mode lets you set a base current which you can switch to at any time during a weld by pressing the trigger button. During the weld cycle push the torch trigger to switch to the HC Base Amp, and push trigger again to return to the Peak Amp. Hold the torch trigger to end the weld cycle. This mode is useful in manually managing the heat of your weld.

Pulse Welding

The VIPER MULTI 195 MAX is equipped with Pulse TIG and Pulse MMA welding functionality. Pulse welding works by alternating between a peak amp and a base amp, in intervals of your choosing. This decreases heat input without sacrificing on penetration.

Pulse Width Pulse Width is the percentage of time spent in peak amps during the pulse cycle. A high percentage will have a hotter weld, and a low percentage will have a cooler weld.

Pulse Frequency Pulse Frequency (Hz) is the number of times per second the current cycle will switch between peak amps and base amps. A pulse frequency of 100Hz would be 100 cycles in 1 second.

Pre-Gas Pre-Gas (MIG and TIG) is how long the gas will run before arc ignition. This aids in shielding the area you are about to start welding from the atmosphere (and the tungsten electrode for TIG).

Start Amp Start Amp is the setting for the amperage at the start of your weld cycle. Start Amp can be set to lower or higher amp start, depending on your material thickness. Think of Start Amps as a sort of a pre-heat. This helps prepare the metal for better weld fusion.

Up Slope Up Slope is the transition time from Start Amp to Peak Amp when TIG welding.

Base Amp Base Amp is the lower amperage set in a Pulse TIG or MMA cycle.

Peak Amp Peak Amp is the amperage of your current while TIG welding. For pulse TIG welding, Peak Amp is the high amp setting relative to your Base Amp setting.

Down Slope Down Slope is the transition time from Peak Amp to End Amp.

End Amp End Amp is the finishing amperage setting in your TIG weld cycle. End Amp can be set lower than your Peak Amp setting to allow the weld a more gradual cool down. This can help prevent craters and cracks in the end of your weld.

Post-Gas Post-Gas (TIG and MIG) is the amount of time the gas continues to flow out of the torch to allow the weld to properly cool while still maintaining a proper gas shield. In TIG welding, Post-Gas also helps cool the tungsten electrode.

Slow Feed Slow Feed is a MIG setting, which slows down the wire feed at the beginning of a weld. This allows for a smoother arc ignition and allows the weld pool to heat up before delivering the full wire feed speed.

Burn Back Burn Back (MIG) happens when the wire fuses with the contact tip of the MIG torch. Burn Back control adjusts the timing of the wire feed after the trigger is released. Increase your Burn Back setting if you keep sticking the wire to the tip. Decrease if too much wire feeds out after you finish welding.

Inductance Inductance controls how fast the current rises to reach the amps that have been selected when short circuit welding. Setting the inductance to a low value produces a harder and sharper weld pool, but it may also lead to increased spatter. A higher inductance setting produces a softer and fluid weld pool.

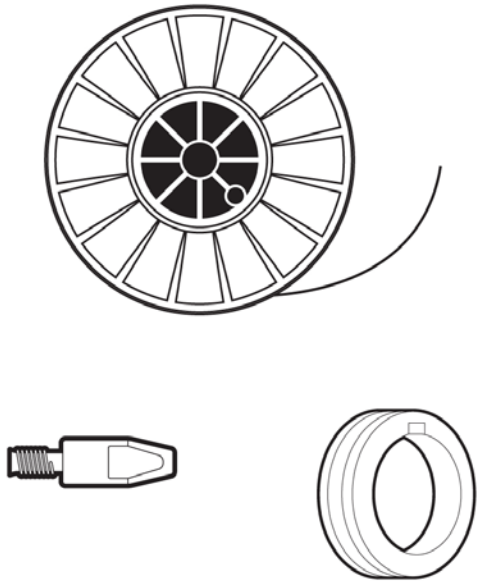
Hot Start Hot Start (MMA) is a boost of current during the begnning of a weld to improve electrode ignition.

Arc Force Arc Force (MMA), like Hot Start, adds a boost of current when the arc becomes shorter, to stop the electrode sticking during a weld. It will also decrease the current when the arc becomes longer to maintain stability in the weld.

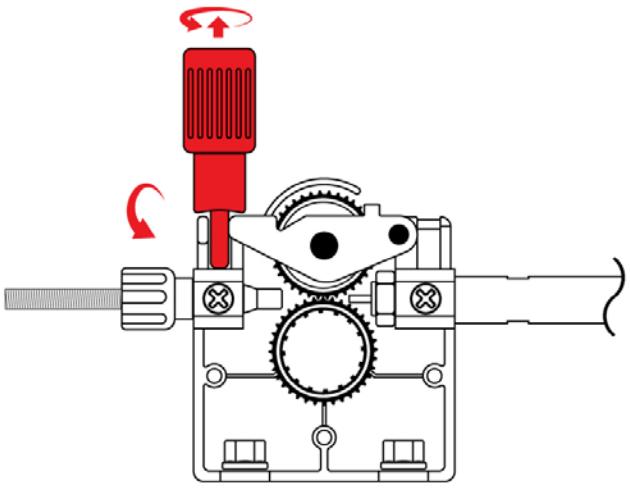
Anti-Stick Anti-Stick senses when an electrode is stuck, and drops the current for easy removal.

14. MIG: Machine Setup

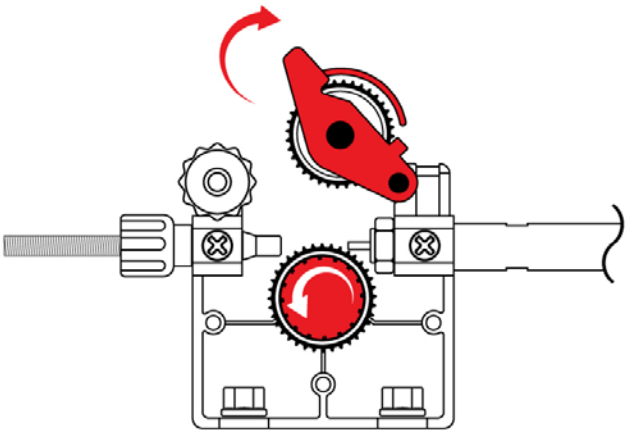
1. Begin by first choosing your desired MIG wire based on what you're welding. Then ensure that you have paired the selected wire to the correct torch tip, torch liner, and drive roller.



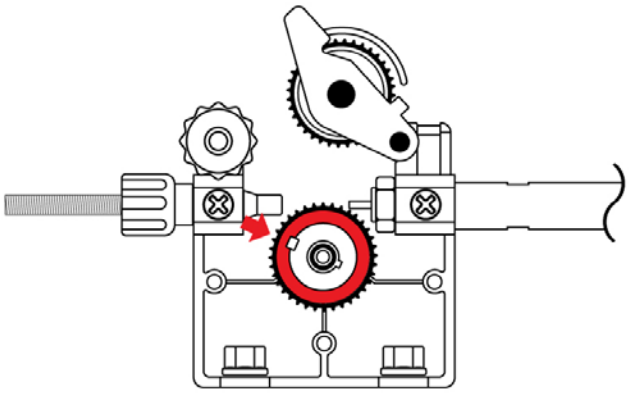
2. To change the drive roller, start by loosening the tensioner knob by twisting it anti-clockwise. Then pull it towards you so that the knob clears the upper roller assembly.



3. Lift the upper drive roller assembly up and out of the way. Then, loosen and remove the drive roller retaining nut by spinning it anti-clockwise.



4. You now have access to the drive roller. When re-installing, ensure you line up the key slot.



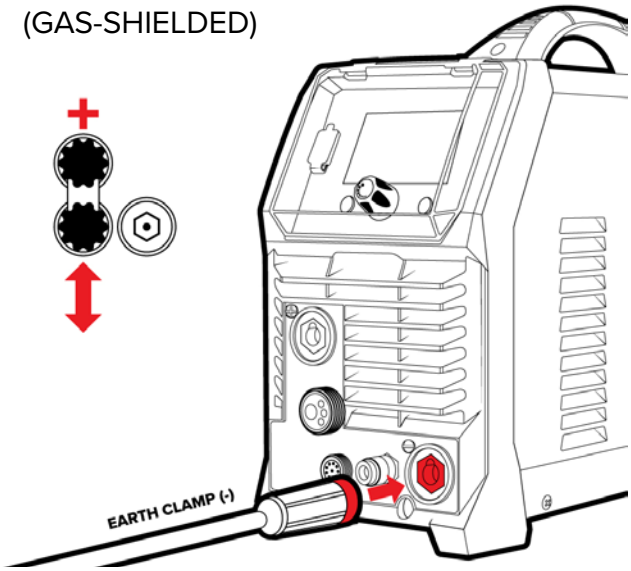
Based on what type of wire you wish to run, you need to set the machine up in either DC Electrode (+) or DC Electrode (-).

5. For DCEP **(+)** start by putting the polarity connector to positive. Inside the machine loosen the polarity connector knobs, and orientate the polarity bar vertically, then re-tighten the knobs. Twist the earth clamp into the negative **(-)** dinse port.

6. For DCEN **(-)** start by putting the polarity connector to negative. Inside the machine loosen the polarity connector knobs, and orientate the polarity bar horizontally, then re-tighten the knobs. Twist the earth clamp into the positive **(+)** dinse port.

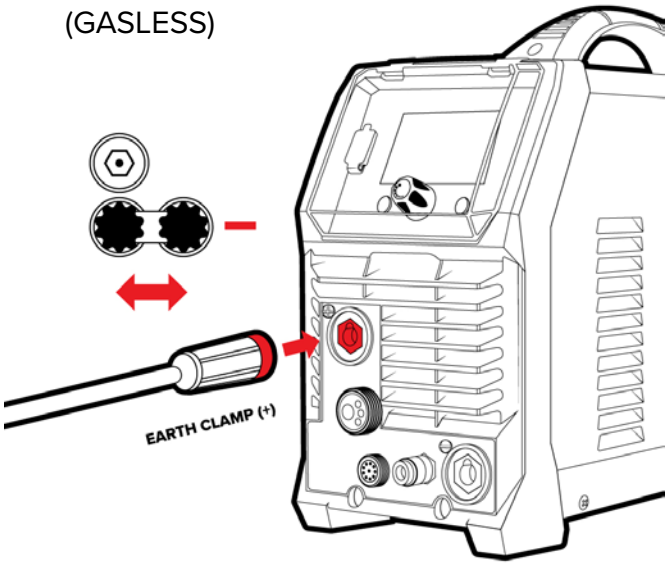
DC+ ELECTRODE

(GAS-SHIELDED)

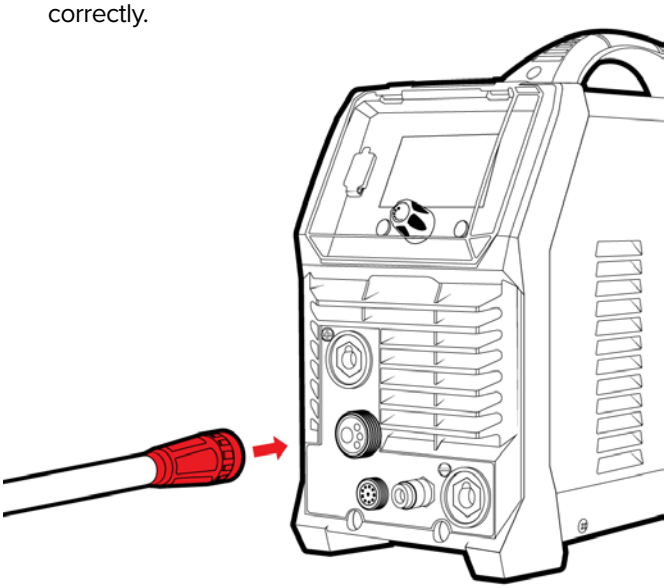


DC- ELECTRODE

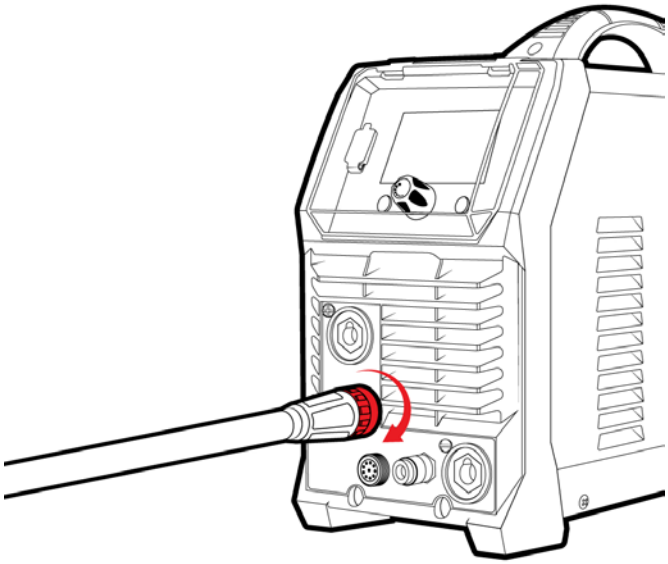
(GASLESS)



7. With the polarity connectors and the earth clamp installed into the correct dinse ports for the polarity you wish to run, now install the MIG torch into the Euro Connect Port. Ensure you line up the internal ports correctly.



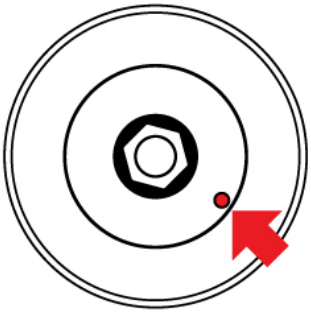
8. With the torch correctly lined up and pressed inwards, twist the locking nut to finish the torch installation.



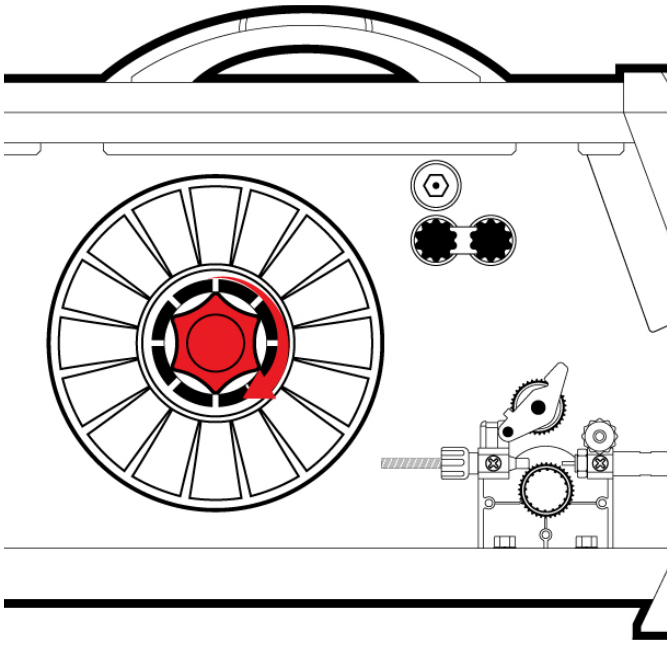
WARNING! Maintain positive control of the loose end of the wire or leave it tensioned into the catch hole on the side of the spool at all times. If the wire becomes too unravelled, the spool of wire can become unusable.

9. After ensuring the required setup has been completed for the wire you wish to run it is now time to install the wire. You can begin to install the spool by loosening and removing the spool holder retainer nut (anti-clockwise to loosen).

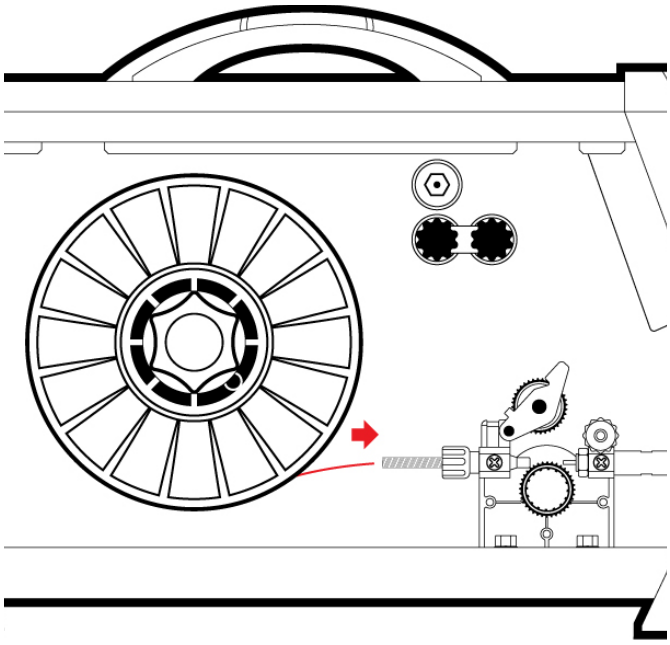
10. With the spool holder retainer nut removed, slide the spool onto the spool holder. Ensure you line up the key hole on the spool with the key on the base of the spool holder.



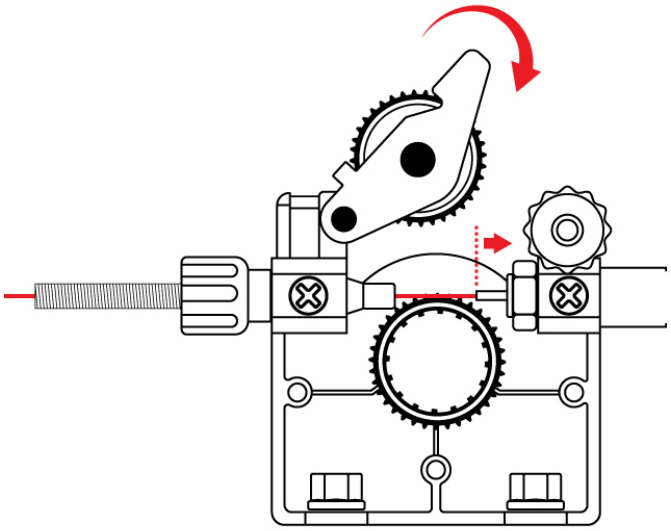
11. You can now lock the spool of wire in place by reinstalling the spool holder retainer nut (clockwise to tighten).



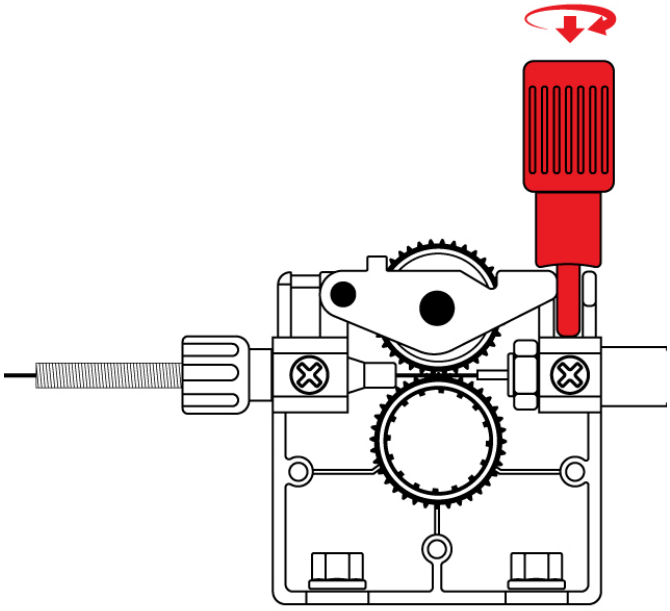
12. With the wire spool installed, begin feeding the wire into the inlet wire guide. Maintain positive control of the wire at all times as it is coiled under tension. Ensure the upper roller assembly is in the upright position.



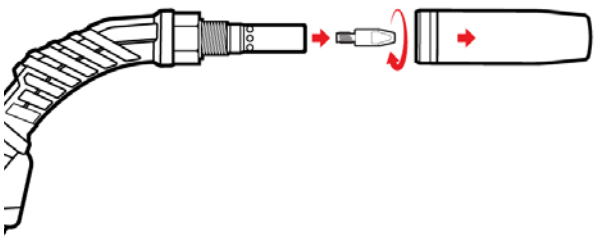
13. Slide the wire across the top of the drive roller and feed it into and just past the guide tube. You can now lock the upper drive roller assembly down.



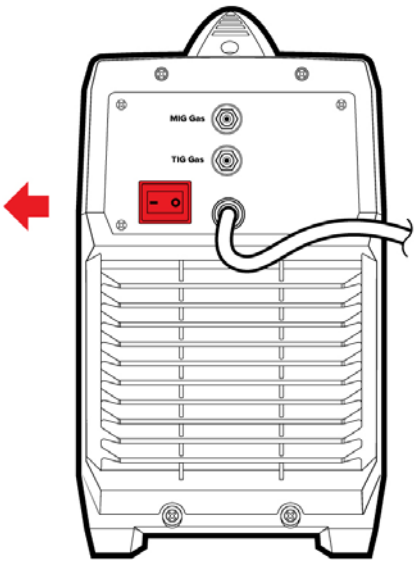
14. With the upper drive roller assembly down, lift the tensioner knob upwards. Provide extra tension by twisting it if it doesn't stay locked upwards.



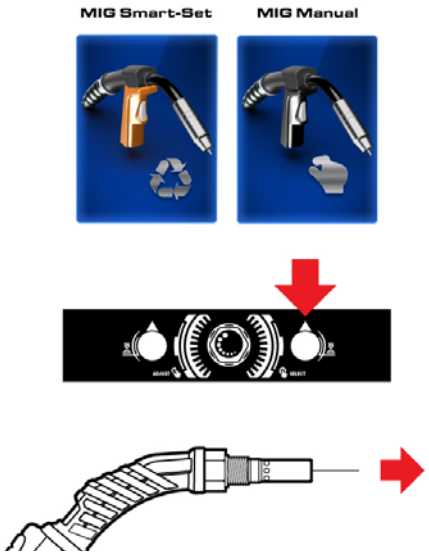
15. Prepare the torch to have wire fed through by removing the gas nozzle and unscrewing the contact tip.



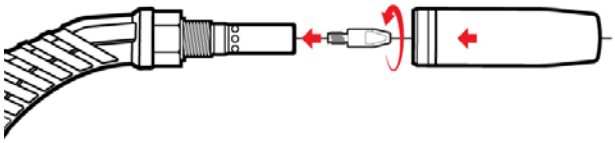
16. Connect the plug into a power point, then switch the machine ON.



17. You can now feed the wire through the torch. While on on the main menu, scroll over to either MIG Smart-Set or MIG Manual. Then hold down the Right Action Button to feed the wire. Maintain positive control of the torch and point it away from you, ensuring any part of your persons is not near the tip.



18. Feed extra wire out of the tip of the torch. Then slide the contact tip along the wire back into place, screwing it in to secure it. Then slide the gas nozzle back into place. Cut the excess wire off just past the gas nozzle.

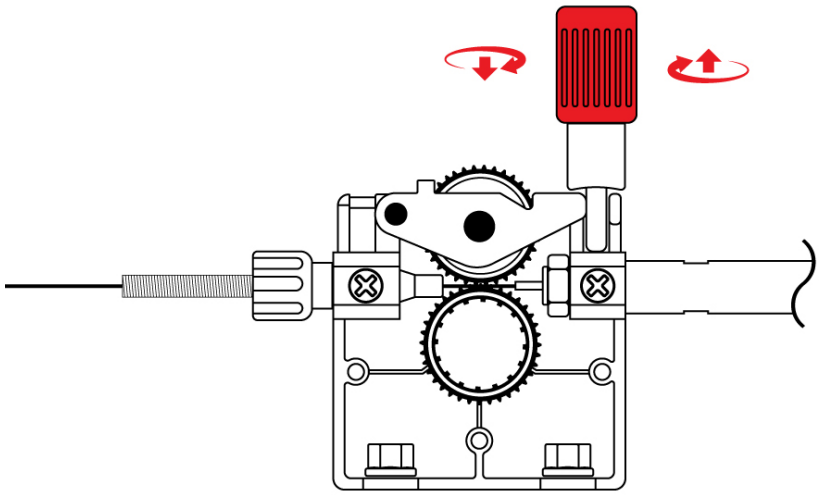


19. Check the tension by pinching the sides of the wire past the tip of the torch while wearing a glove. Feed the wire while applying light pressure with your fingers. You want the tension to be set just past slippage, so adjust the tension knob accordingly. Too little pressure and you will experience slippage. Too much pressure and you might experience wire birdnesting or feeding issues. Too much pressure can also deform the wire.

WARNING!

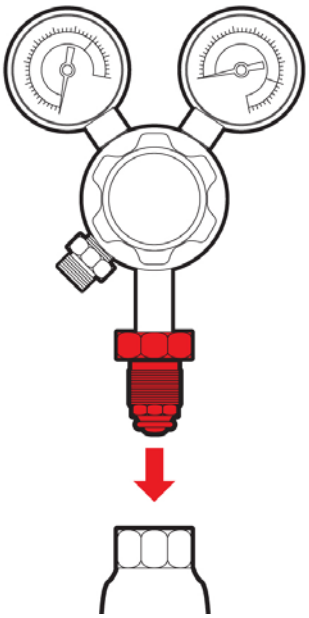
WEAR GLOVES AND DO NOT ATTEMPT TO PINCH THE TIP OF THE WIRE.

KEEP HANDS CLEAR OF DRIVE ROLLERS WHEN IN MOTION.

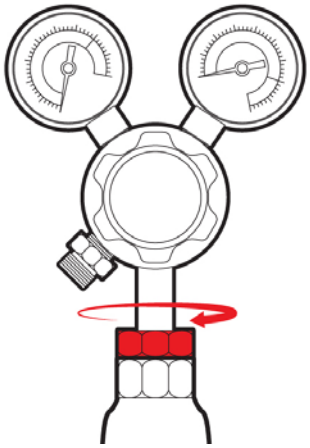


FOR FLUX-CORED GASLESS WIRE SKIP TO STEP 25

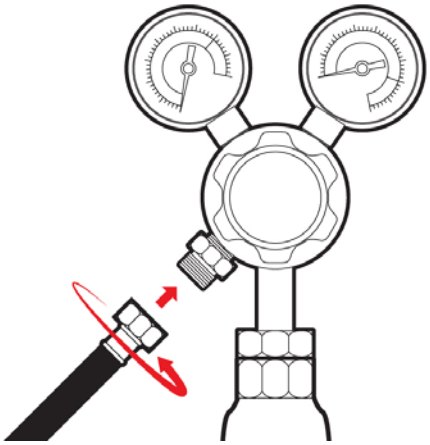
20. Screw in the supplied Twin Gauge Argon Regulator into your chosen gas bottle.



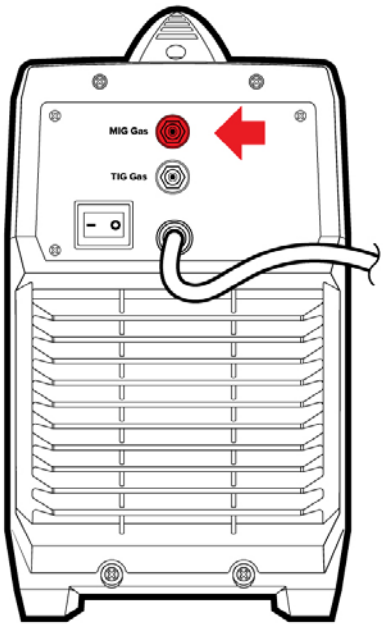
21. Tighten securely with wrench.



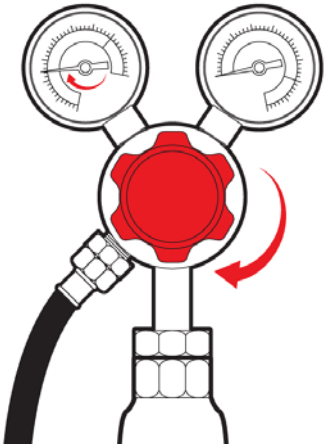
22. Screw in the supplied gas hose to the outlet port of the regulator.



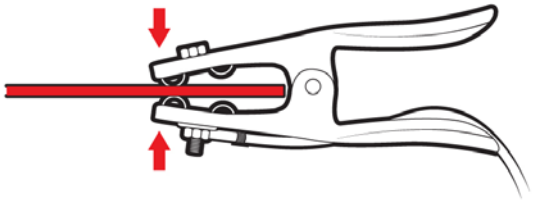
23. Plug the quick connect end of the gas hose to the port on the back of the machine.



24. Turn gas bottle on, and adjust gas flow to 8-12L/min.

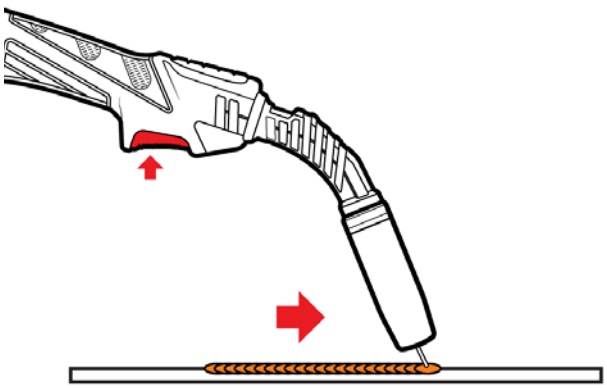


25. Connect earth clamp to your workpiece.



26. From the home screen, choose either MIG Smart-Set or MIG Manual mode to begin MIG welding. Enter your desired settings to suit your project needs.

27. Line up the torch with your workpiece, then pull the trigger to initiate the weld. For gas-shielded MIG, the push method is recommended for optimum weld quality. Release trigger to end the weld.



15. MIG Welding Further Explained

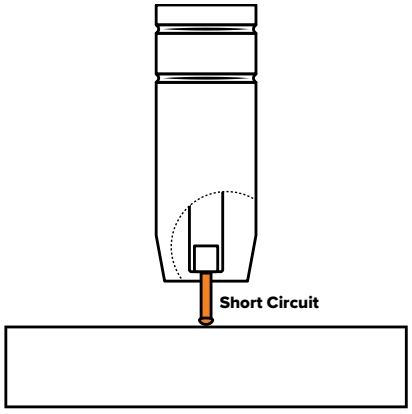
MIG (Metal Inert Gas) Welding

MIG (Metal Inert Gas) welding, also known as GMAW (Gas Metal Arc Welding) or MAG (Metal Active Gas Welding), is a semi-automatic arc welding process in which a 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.

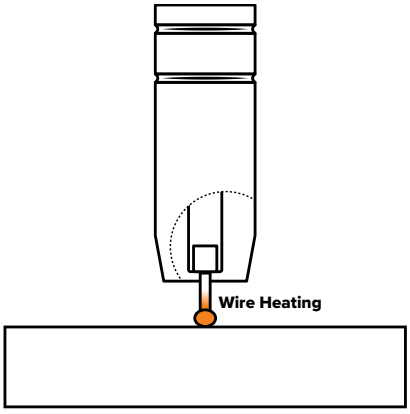
There are four primary methods of metal transfer in MIG welding. Short circuit (also known as dip transfer), globular transfer, spray transfer and pulse spray, each of which has distinct properties and corresponding advantages and limitations. To perform MIG welding, the necessary equipment is a welding gun, a wire feed unit, a welding power supply, an electrode wire, and a shielding gas supply.

Short Circuit Transfer

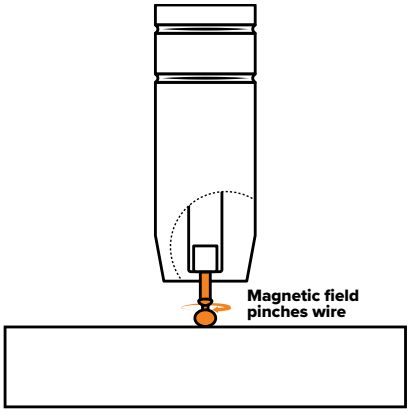
Short circuit transfer is the most commonly used method, whereby the wire electrode is fed continuously down the welding torch through to and exiting the contact tip. The wire touches the workpiece and causes a short circuit. The wire heats up and begins to form a molten bead, the bead separates from 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.



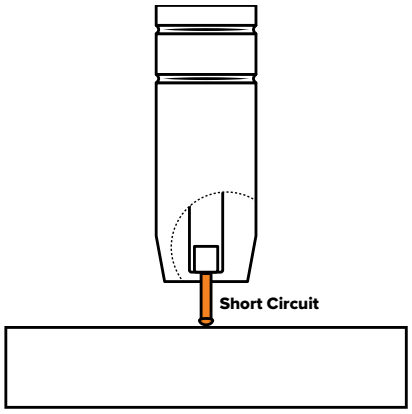
The wire approaches the workpiece and touches the work, creating a short circuit between the wire and the base metal, because there is no space between the wire and the base metal there is no arc and current flows through the wire.



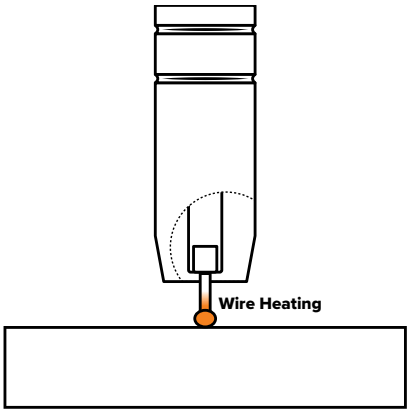
The wire cannot support all the current flow, resistance builds up and the wire becomes hot and weak and begins to melt.



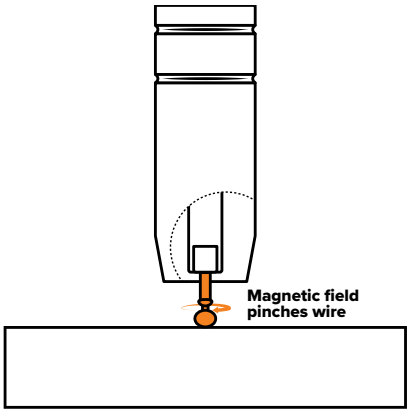
The current flow creates a magnetic field that begins to pinch the melting wire forming it into droplet.



The pinch causes the forming droplet to separate and fall towards the forming 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 depend on gun angle, the direction of travel, electrode extension (stick out), travel speed, the 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

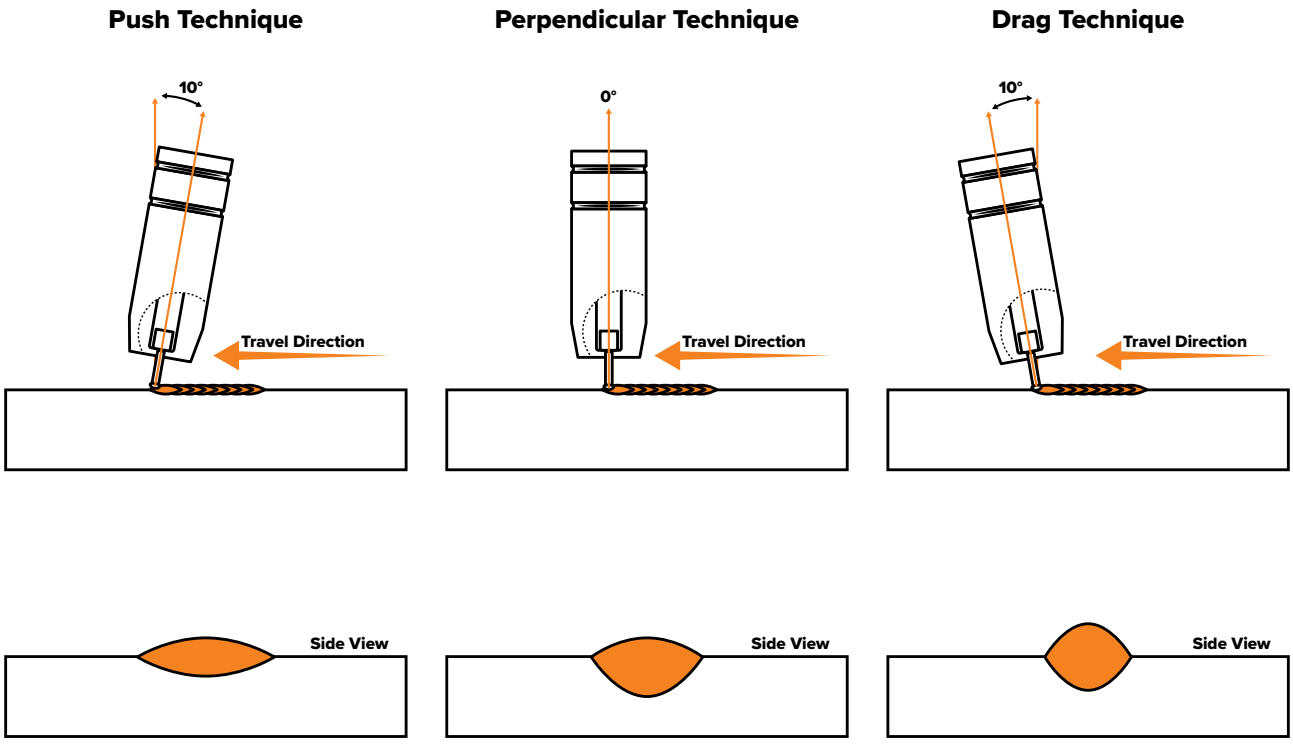
The wire is located at the leading edge of the weld pool and pushed towards the un-melted work surface. This technique offers a better view of the weld joint and direction of the wire into the weld joint. Push technique directs the heat away from the weld puddle, allowing faster travel speeds providing 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 deeper penetration is achieved.

Pull/Drag Technique

The gun and wire are dragged away from the weld bead. The arc and heat are 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.



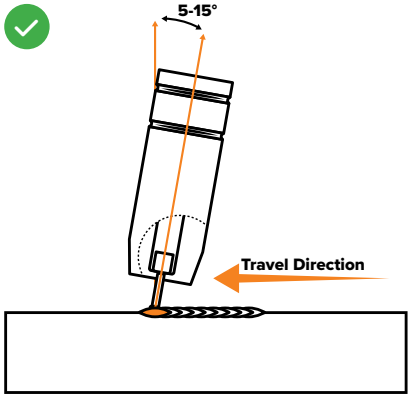
Flat, even weld profile, light penetration.

Narrower weld profile, even penetration.

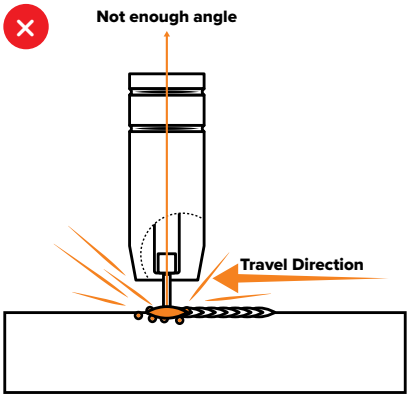
Narrower and higher weld profile, more penetration.

Travel Angle

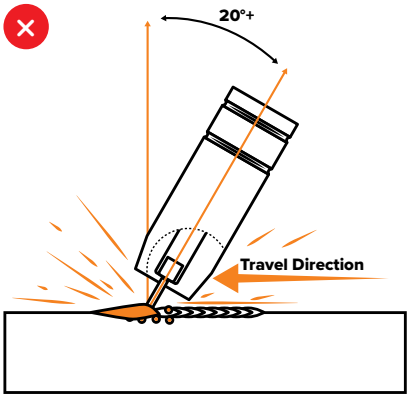
The travel angle is the right to left, relative to the direction of welding. A travel angle of 5°- 15° is ideal and produces the right level of control over the weld pool. A travel angle higher than 20° will give an unstable arc condition with poor weld metal transfer, less penetration, high levels of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



Good level of control over the weld pool, even flat weld.



Less control over the weld pool, more spatter.

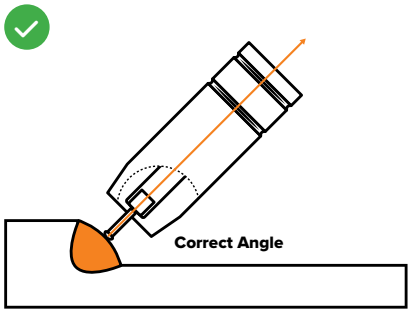


Poor control, unstable arc, less penetration, lots of spatter.

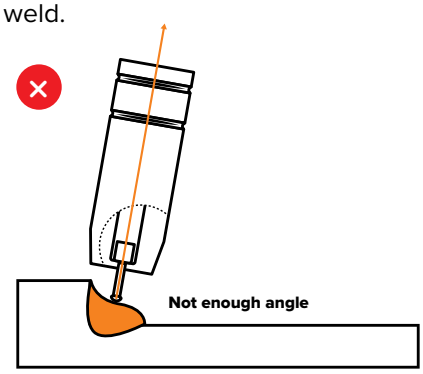
Work Angle

The work angle is the up and down angle of the gun relative to the workpiece.

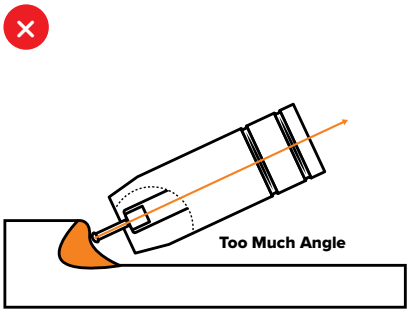
The correct work angle provides good bead shape, prevents undercut, uneven penetration, weak gas shielding and a poor quality finished weld.



Good level of control over the weld pool, even flat weld.



Less control over the weld pool, more spatter.

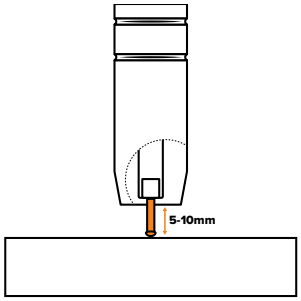


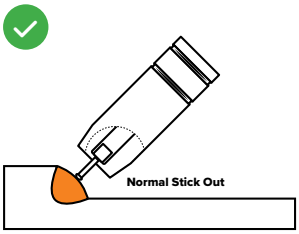
Poor control, unstable arc, less penetration, lots of spatter.

Stick Out

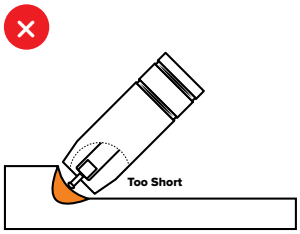
Stick out is the length of the unmelted wire protruding from the end of the contact tip.

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 a stick out will cause an unstable weld pool, produce spatter and overheat the contact tip. Too long of a stick out will cause an unstable arc, lack of penetration, lack of fusion, and increase spatter.

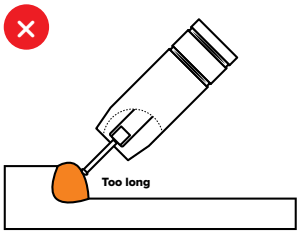




Even arc, good penetration even fusion, good finish.



Unstable arc, spatter, over heat contact tip.



Unstable arc, spatter, poor penetration and fusion.

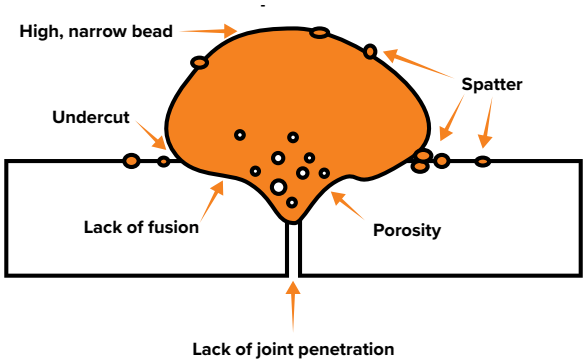
Travel Speed

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 welder's skill and is limited to the welder's ability to control the weld pool. The push technique allows faster travel speeds than the drag technique.

The gas flow must also correspond with the travel speed, increasing with faster travel speed and decreasing at a slower speed. Travel speed needs to match the amperage and will decrease as the material thickness and amperage increase.

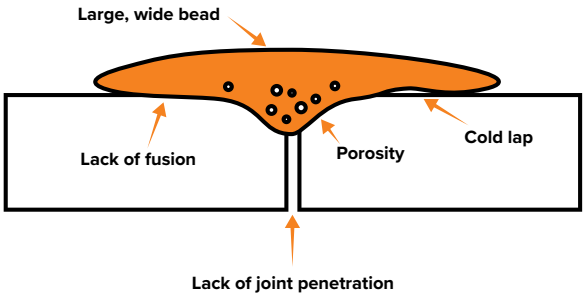
Travel Speed Too Fast

Too fast a 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 and 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.



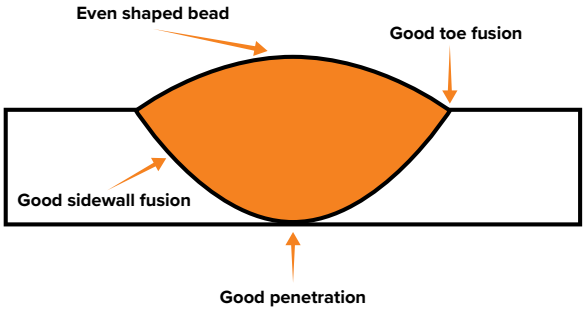
Travel Speed Too Slow

Too slow a travel speed produces a large weld with a 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.

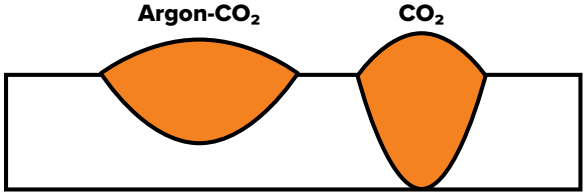


Gas Selection

The purpose of the gas in the MIG process is to 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 critical in protecting the welding zone from the atmosphere.
- Too low a flow will give inadequate coverage and result in weld defects and unstable arc conditions.
- Too high a flow can cause air to be drawn into the gas column and contaminate the weld zone.

Use the correct shielding gas. CO_2 is suitable for steel and offers good penetration characteristics; the weld profile is narrower and slightly more raised than the weld profile obtained from Argon CO_2 mixed gas. Argon CO_2 mix gas offers better weldability for thin metals and has a wider range of setting tolerance on the machine. Argon-CO_2 5/2 is a good all-round mix suitable for most applications.



Wire Types and Sizes

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

Using poor quality milled wire can result in poor performance and appearance. To ensure optimal performance when welding, use standards approved wire such as UNIMIG HYPERMIG wire.

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 your machine.

Refer to the welding guide located on the door inside the machine.

Drive Roller Selection

The importance of smooth, consistent wire feeding during MIG welding cannot be emphasised enough. The smoother the wire feed, the better the welding will be. Feed rollers or drive rollers are used to feed the wire mechanically along the length of the welding gun.

Drive rollers are designed to be used for certain types of welding wire, and they have different types of grooves machined in them to accommodate the different types of wire. The wire is held in the groove by the top roller of the wire drive unit and is referred to as the pressure roller. Pressure is applied by a tension arm that can be adjusted to increase or decrease the pressure as required. The type of wire will determine how much pressure can be applied and what type of drive roller is best suited to obtain optimum wire feed.

Solid Hard Wire (V Groove)

Steel or stainless steel require a drive roller with a **V** shape groove for optimum grip and drive capability. Solid wires can have more tension applied to the wire from the top pressure roller that holds the wire in the groove, and the V shape groove is more suited for this.

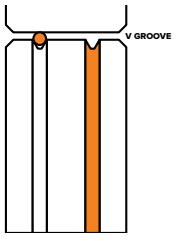
Aluminium (U Groove)

Aluminium requires a **U** shape groove. Aluminium wire has a lot less column strength, can bend easily and is, therefore, more difficult to feed. Soft wires can easily buckle at the wire feeder where the wire is fed into the inlet guide tube of the torch. The U-shaped roller offers more surface area grip and traction to help feed the softer wire. Softer wires also require less tension from the top pressure roller to avoid deforming the shape of the wire, too much tension will push the wire out of shape, causing feed issues.

Flux-Cored/Gasless Wire (Knurled/F Groove)

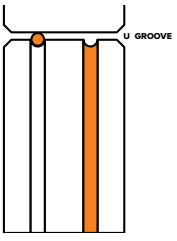
These wires are made up of a thin metal sheath that has fluxing, and metal compounds layered onto it and then rolled into a cylinder to form the finished wire. The wire cannot take too much pressure from the top roller as it can be crushed and deformed if too much pressure is applied. A **Knurled/F** groove drive roller has been developed, and it has small serrations in the groove. The serrations grip the wire and assist in driving it without too much pressure from the top roller. The downside to the knurled wire feed roller on flux-cored wire is it will slowly eat away at the surface of the welding wire, and these small pieces will eventually go down into the liner. This will cause clogging in the liner and added friction that will lead to welding wire feed problems.

Roller Diameter Size: 30/22



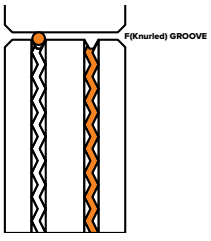
V Groove Roller (Steel Wire)

Size mm	Part Number
0.6 - 0.8	0.6-0.8V30/22
0.8 - 1.0	0.8-1.0V30/22
0.9 - 1.2	0.9-1.2V30/22
1.0 - 1.2	1.0-1.2V30/22



U Groove Roller (Aluminium Wire)

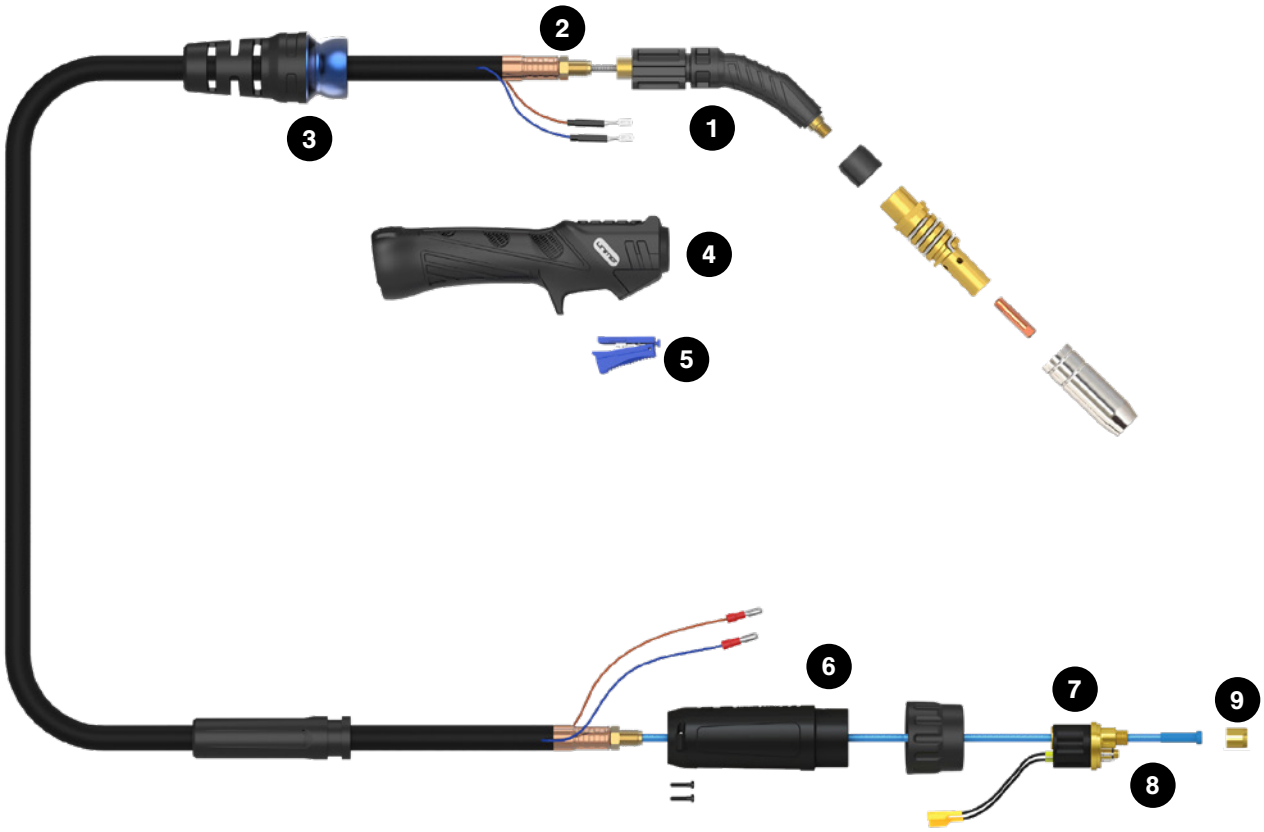
Size mm	Part Number
0.6 - 0.8	0.6-0.8U30/22
0.8 - 1.0	0.8-1.0U30/22
0.9 - 1.2	0.9-1.2U30/22
1.0 - 1.2	1.0-1.2U30/22



Knurled/F Groove Roller (Flux-Cored Wire)

Size mm	Part Number
0.8 - 0.9	0.8-0.9F30/22
0.9 - 1.2	0.9-1.2F30/22

M15 BINZEL Style MIG Torch



TORCH SPARES		
1	U41012	M15 Swan Neck
2	AM1505	Lock Nut
3	AM1514	Handle Cable Support C/W Ball Joint
4	AM2514	Handle Kit
5	AM2516	Trigger
6	AM2578/S	Gun Plug Housing
7	UC1528	Hybrid Gun Plug Body C/W Spring Pins
8	UB1524	Gun Plug 'O' Ring
9	UB1525	Liner Nut

TORCH LENGTHS			
Length	3m	4m	5m
SKU	U41004	U41005	U4

TECHNICAL DATA	
Cooling Method	Air Cooled
Duty Cycle - CO2	60% @ 180A
Duty Cycle - MIxed Gas	60% @ 150A
Wire Size	0.6-1.0mm
Standard	EN60974-7

M15 MIG Torch Consumables

SKU	Description	QTY
PCTH15	TIP HOLDER	2

SKU	Description	QTY
PGNS15	NOZZLE SPRING	2

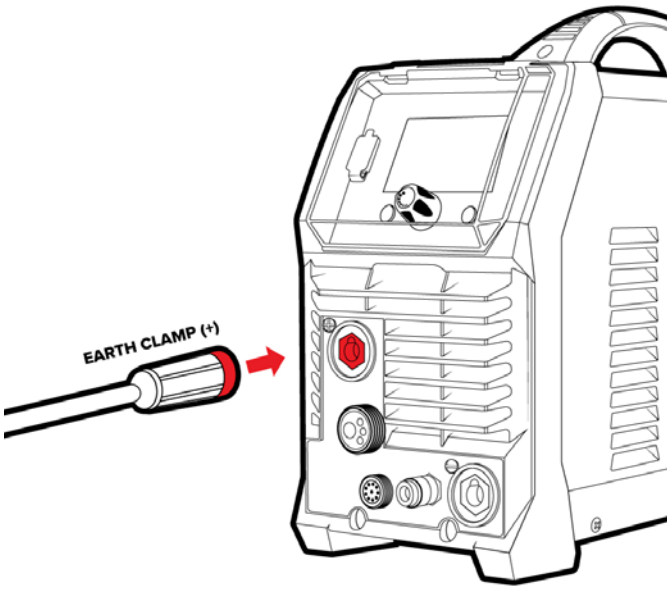
SKU	Description	QTY
PCT0008-06	CONTACT TIPS - Steel 0.6mm	10
PCT0008-08	CONTACT TIPS - Steel 0.8mm	10
PCT0008-09	CONTACT TIPS - Steel 0.9mm	10
PCT0008-10	CONTACT TIPS - Steel 1.0mm	10
PCT0008-12	CONTACT TIPS - Steel 1.2mm	10
PCTAL0008-09	CONTACT TIPS - Aluminium 0.9mm	10
PCTAL0008-10	CONTACT TIPS - Aluminium 1.0mm	10
PCTAL0008-12	CONTACT TIPS - Aluminium 1.2mm	10

SKU	Description	QTY
PGN15CON	GAS NOZZLE - Conical	2
PGN15CYL	GAS NOZZLE - Cylindrical	2
PGN15SPOT	GAS NOZZLE - Spot	2
PGN15TAP	GAS NOZZLE - Tapered	2

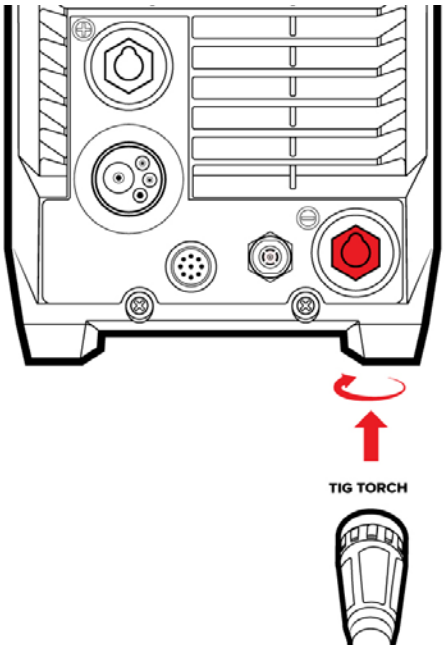
SKU	Description	Wire Size
SLB3M	Blue Steel Liner 3 Metre	0.6 - 0.8mm
SLB4M	Blue Steel Liner 4 Metre	0.6 - 0.8mm
SLB5M	Blue Steel Liner 5 Metre	0.6 - 0.8mm
SLR3M	Red Steel Liner 3 Metre	0.9 - 1.2mm
SLR4M	Red Steel Liner 4 Metre	0.9 - 1.2mm
SLR5M	Red Steel Liner 5 Metre	0.9 - 1.2mm
TLB3M	Blue Aluminium Liner 3 Metre	0.6 - 0.8mm
TLB4M	Blue Aluminium Liner 4 Metre	0.6 - 0.8mm
TLR3M	Red Aluminium Liner 3 Metre	0.9 - 1.2mm
TLR4M	Red Aluminium Liner 4 Metre	0.9 - 1.2mm
NKSTL	Neck Spring for Aluminium	

16. TIG: Machine Setup

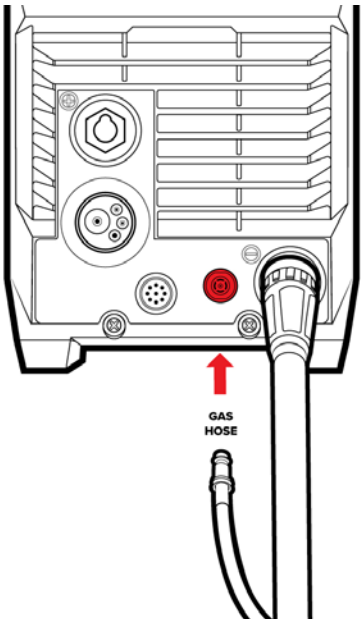
1. For DCEN **(-)** start by connecting the earth clamp connector into the positive **(+)** dinse port. Align the notch, press it in, then twist to lock the torch in place.



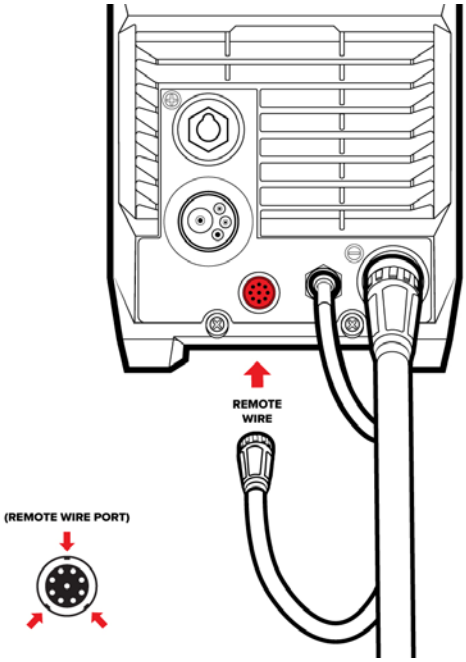
2. Connect the TIG torch into the negative **(-)** dinse port. Align the notch, press it in, then twist to lock the torch in place.



3. Install the gas hose by pressing the line coming from the torch into the quick connect port located on the front panel. You will hear a click, meaning the hose is now locked in place.

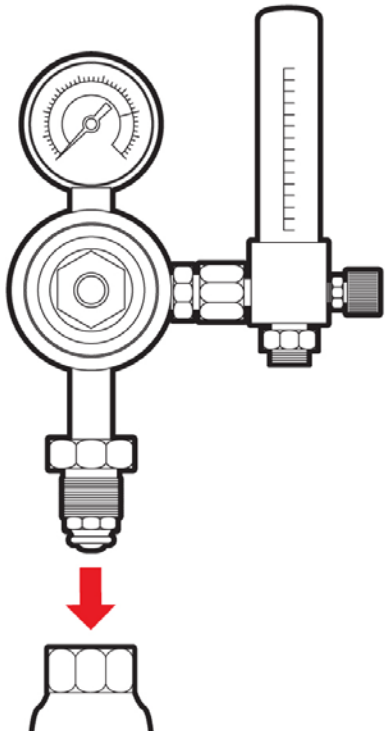


4. Install the remote wire plug by aligning the grooves first. Gently slide the connector inwards, then twist the locking nut clockwise until it is tight.

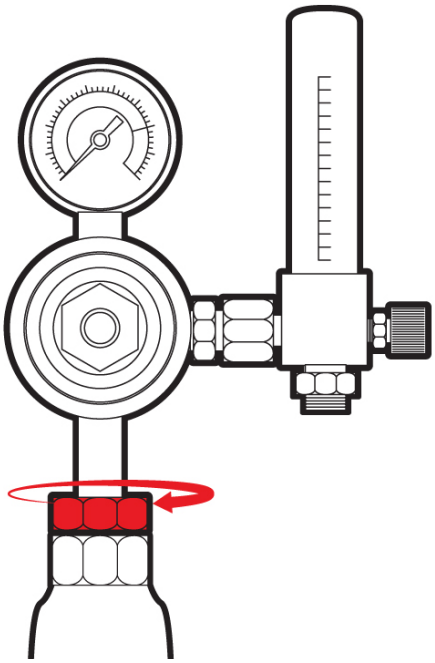


NOTE: *FOR TIG WELDING WE RECOMMEND USING AN ARGON FLOWMETER*

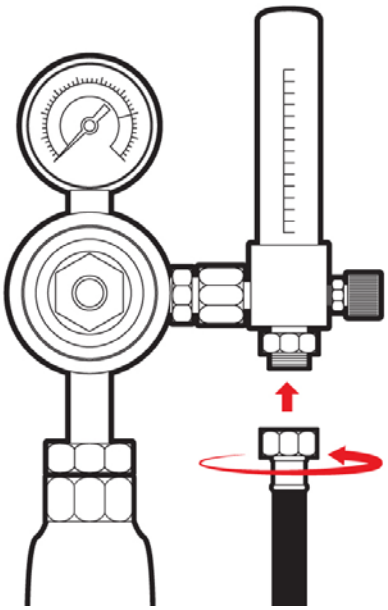
5. Place Argon Flowmeter Regulator into your gas outlet.



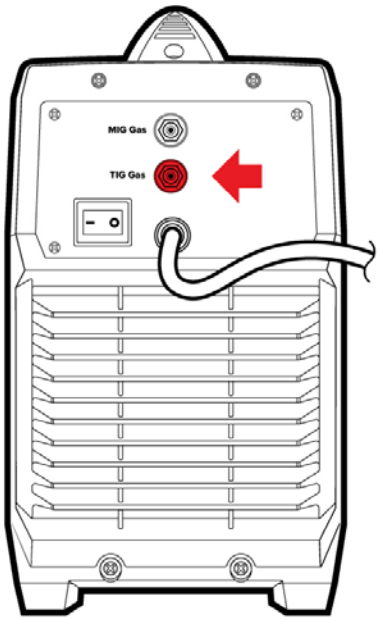
6. Tighten securely with wrench.



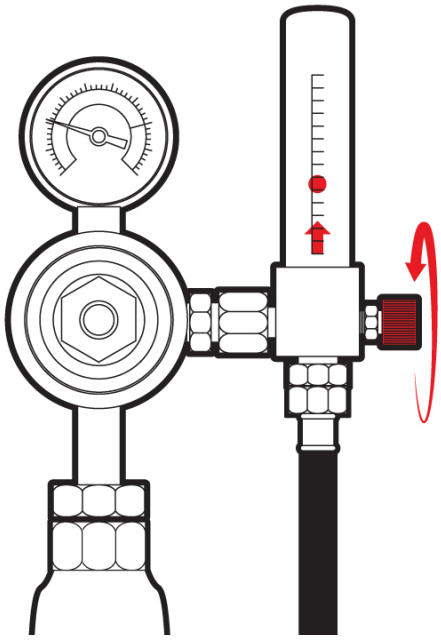
7. Connect gas hose to the flowmeter outlet using the twist nut to tighten the fitting securely.



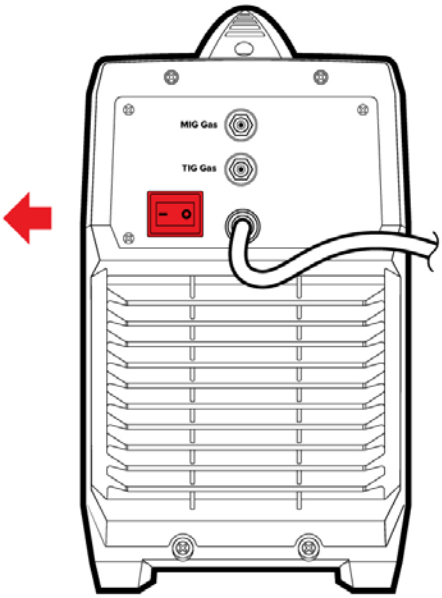
8. Connect the other end of the gas hose to the gas inlet on the back of the machine.



9. Turn gas bottle on and twist the knob to adjust gas flow to 8-12L/min.

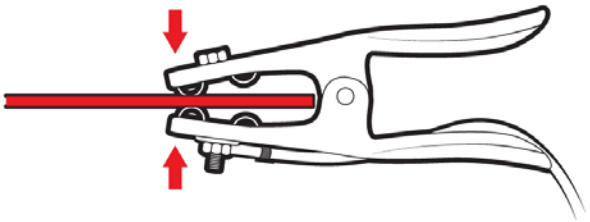


10. Connect the plug into a power point, then switch the machine ON.

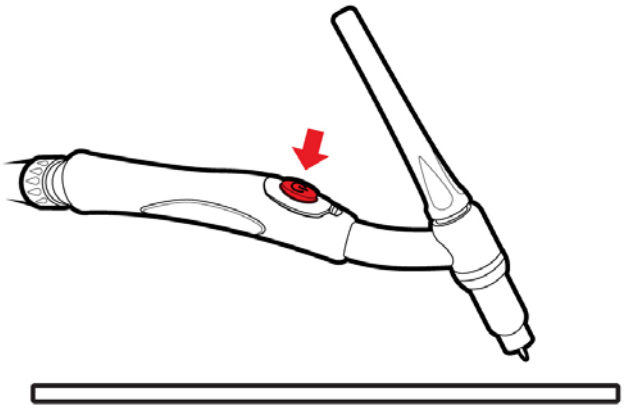


11. From the main menu, select your preferred TIG welding process and input your settings based on what you are welding. (Smart-Set TIG, HF TIG, or Lift TIG)

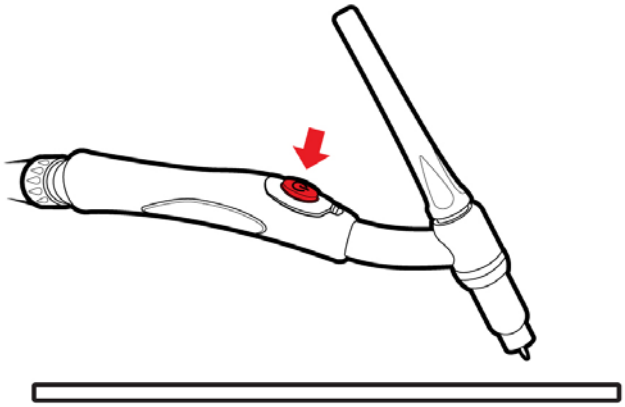
12. Connect earth clamp to your workpiece.



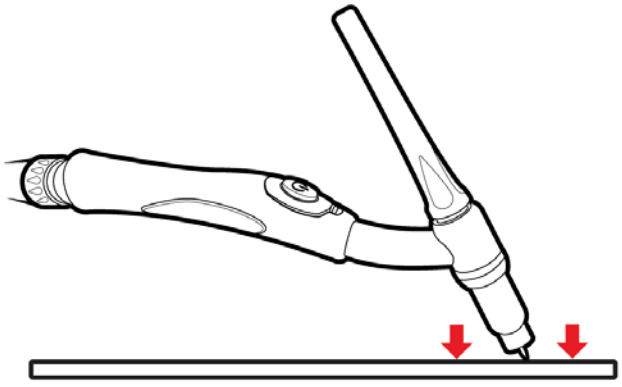
13. For High Frequency TIG weld start, adjust the tip of the tungsten so it is floating a few milimeters above the workpiece, press the button on the torch to initiate the arc and begin welding. After your pre-gas timer (if activated) has run, the arc will initiate.



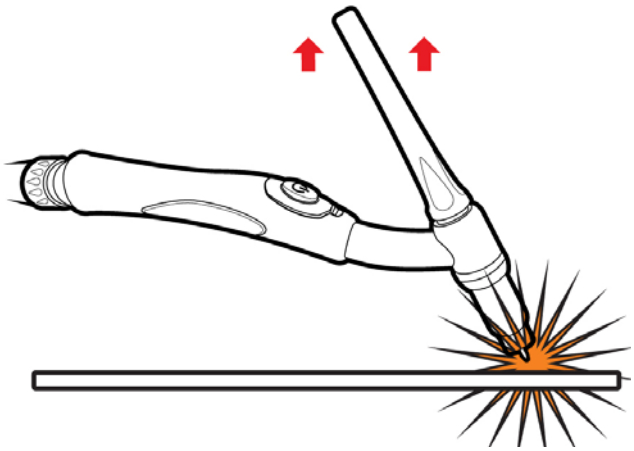
14. For Lift TIG, begin with the tungsten off the workpiece, Press the button on the torch to initiate the gas flow.



15. Gently touch the tip of the tungsten to the workpiece.



16. After your desired pre-gas amount has run, lift the torch up slightly to initiate the arc.



17. If you have the machine setup in 2T mode, you will need to hold the trigger for the remainder of the weld. To end the weld, let go of the trigger and hold the torch there for the length of the post gas to ensure the weld has gas coverage while cooling.

18. If you have the machine setup in 4T mode, you can release the trigger after initiating the arc. To end the weld press the trigger again and hold the torch there for the length of the post gas.

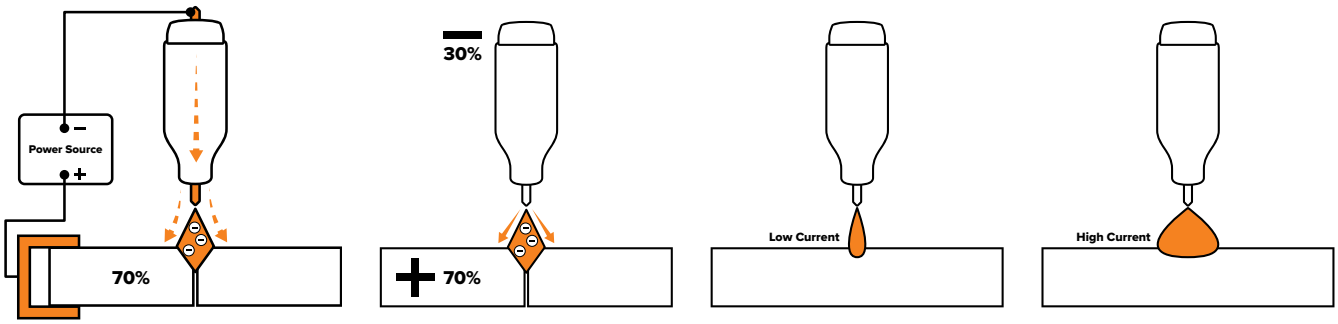
17. TIG Welding Guide

DC TIG Welding

The DC power source uses what is known as DC (direct current), in which the main electrical component known as electrons flow in only one direction from the negative pole (terminal) to the positive pole (terminal). In the DC electrical circuit, there is an electrical principle at work which should always be taken into account when using any DC circuit. With a DC circuit, 70% of the energy (heat) is always on the positive side. This needs to be understood because it determines what terminal the TIG torch will be connected to (this rule applies to all the other forms of DC welding as well).

DC TIG welding is a process in which an arc is struck between a tungsten electrode and the metal workpiece. The weld area is shielded by an inert gas flow to prevent contamination of the tungsten, molten pool and weld area. When the TIG arc is struck, the inert gas is ionised and superheated, changing its molecular structure, which converts it into a plasma stream. This plasma stream flowing between the tungsten and the workpiece is the TIG arc and can be as hot as 19,000°C. It is a very pure and concentrated arc which provides the controlled melting of most metals into a weld pool. TIG welding offers the user the highest amount of flexibility to weld the widest range of material thickness and types. DC TIG welding is also the cleanest weld with no sparks or spatter.

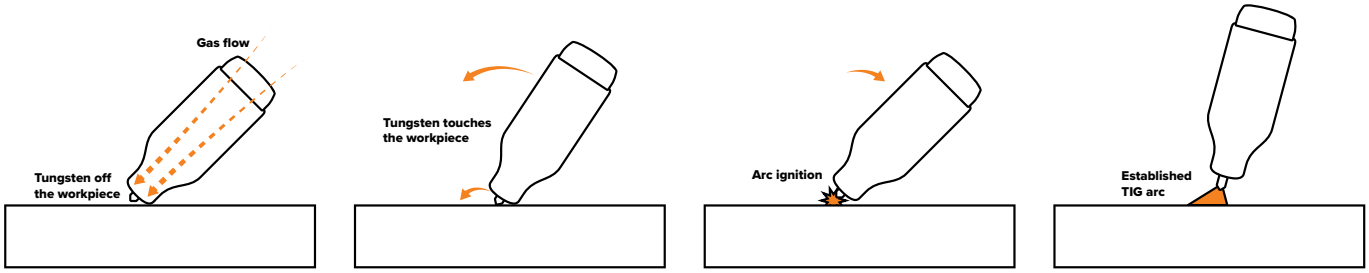
The intensity of the arc is proportional to the current that flows from the tungsten. The welder regulates the welding current to adjust the power of the arc. Typically thin material requires a less powerful arc with less heat to melt the material, so less current (amps) is required. Thicker material requires a more powerful arc with more heat, so more current (amps) is necessary to melt the material.



Lift Arc Ignition for TIG Welding

Lift Arc is a form of arc ignition where the tungsten electrode is touched to the workpiece and then pulled upwards to initiate an arc. When the machine detects that the tungsten has left the surface and a spark is present, it immediately (within microseconds) increases power, converting the spark to a full arc. It is a simple, safe, lower-cost alternative arc ignition process to HF (high frequency) and a superior arc start process to scratch start.

Lift Arc ignition allows the arc to be started easily in DC TIG by simply touching the tungsten to the workpiece and lifting it to start the arc. This prevents the tungsten tip from sticking to the workpiece and breaking the tip from the tungsten electrode. There is a particular technique called “rocking the cup” used in the Lift Arc process that provides easy use of the Lift Arc function.



Lay the nozzle on the job without the tungsten touching the work.

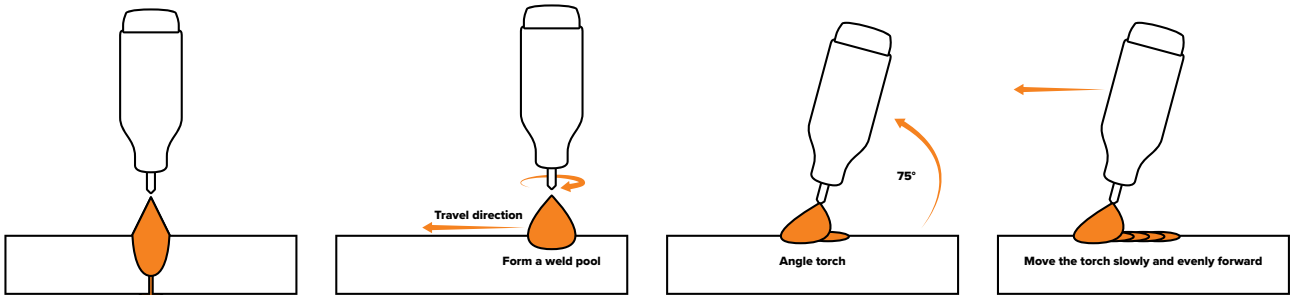
Rock the torch sideways so that the tungsten touches the work & hold momentarily.

Rock the torch back in the opposite direction, the arc will ignite as the tungsten lifts off the work.

Lift the torch to maintain the arc.

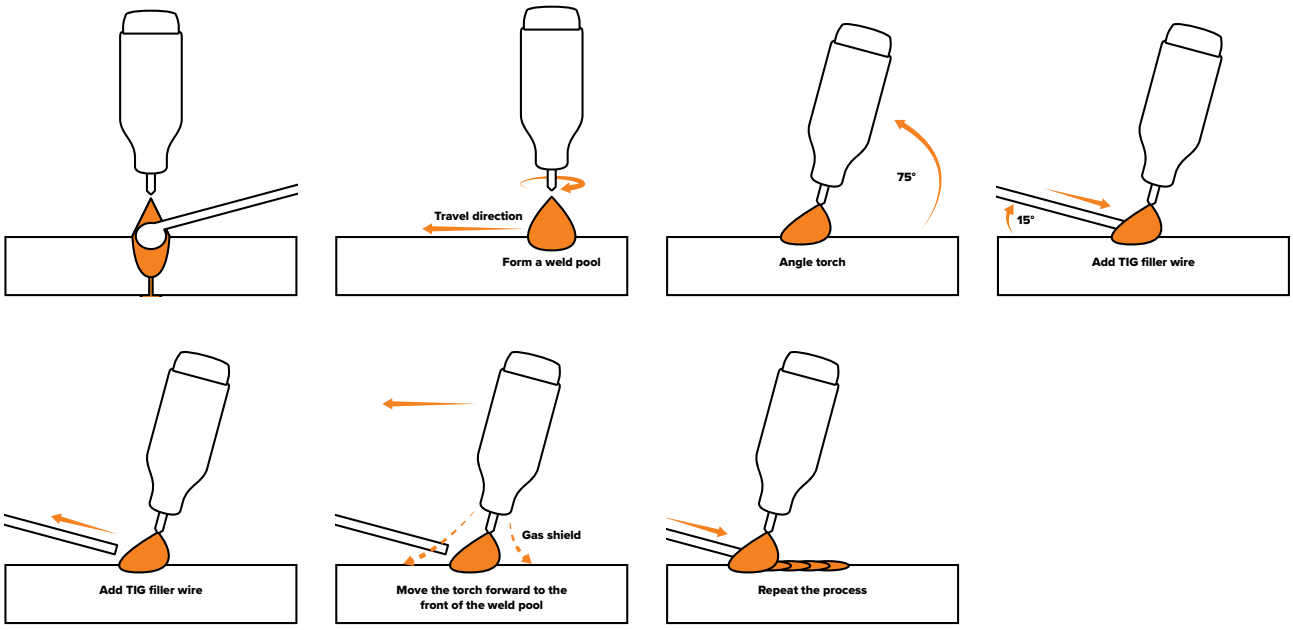
TIG Welding Fusion Technique

Manual TIG welding is often considered the most difficult of all the welding processes. Because the welder must maintain a short arc length, great care and skill are required to prevent contact between the electrode and the workpiece. Similar to Oxygen Acetylene torch welding, TIG welding typically requires two hands and in most instances requires the welder to manually feed a filler wire into the weld pool with one hand while manipulating the welding torch in the other. However, some welds combining thin materials can be accomplished without filler metal, such as edge, corner, and butt joints. This is known as Fusion welding where the edges of the metal pieces are melted together using only the heat and arc force generated by the TIG arc. Once the arc is started, the torch tungsten is held in place until a weld pool is created, a circular movement of the tungsten will assist in creating a weld pool of the desired size. Once the weld pool is established, tilt the torch at about a 75° angle and move smoothly and evenly along the joint while fusing the materials together.



TIG Welding with Filler Wire Technique

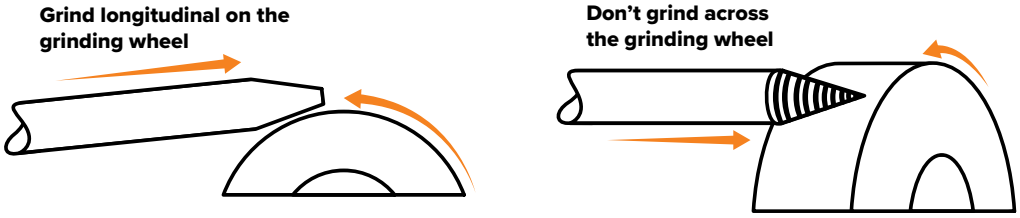
It is necessary for many situations with TIG welding to add a filler wire into the weld pool to build up weld reinforcement and create a strong weld. Once the arc is started, the torch tungsten is held in place until a weld pool is created, a circular movement of the tungsten will assist in creating a weld pool of the desired size. Once the weld pool is established, tilt the torch at about a 75° angle and move smoothly and evenly along the joint. The filler metal is introduced to the leading edge of the weld pool. The filler wire is usually held at about a 15° angle and fed into the leading edge of the molten pool. The arc will melt the filler wire into the weld pool as the torch is moved forward. Also, a dabbing technique can be used to control the amount of filler wire added. The wire is fed into the molten pool and retracted in a repeating sequence as the torch is moved slowly and evenly forward. It is essential during the welding to keep the molten end of the filler wire inside the gas shield as this protects the end of the wire from being oxidised and contaminating the weld pool.



Tungsten Preparation

Always use DIAMOND wheels when grinding and cutting, and be weary of breathing the dust created by the tungsten. While tungsten is a tough material, the surface of a diamond wheel is harder, and this makes for smooth grinding. Grinding without diamond wheels, such as aluminium oxide wheels, can lead to jagged edges, imperfections, or poor surface finishes not visible to the eye that will contribute to weld inconsistency and weld defects.

Always ensure to grind the tungsten in a longitudinal direction on the grinding wheel. Tungsten electrodes are manufactured with the molecular structure of the grain running lengthwise and thus grinding crosswise is "grinding against the grain." If electrodes are ground crosswise, the electrons have to jump across the grinding marks, and the arc can start before the tip and wander. Grinding longitudinally with the grain causes the electrons to flow steadily and easily to the end of the tungsten tip. The arc starts straight and remains narrow, concentrated, and stable.



Electrode Tip/Flat

The shape of the tungsten electrode tip is an important process variable in precision arc welding. A good selection of tip/flat size will balance the need for several advantages. The bigger the flat, the more likely arc wander will occur and the more difficult it will be to arc start. However, increasing the flat to the maximum level that still allows arc starts and eliminates arc wander will improve the weld penetration and increase the electrode life. Some welders still grind electrodes to a sharp point, which makes arc starting easier. However, they risk decreased welding performance from melting at the tip and the possibility of the point falling off into the weld pool.

Electrode Included Angle/Taper - DC

Tungsten electrodes for DC welding should be ground longitudinally and concentrically with diamond wheels to a specific included angle in conjunction with the tip/flat preparation. Different angles produce different arc shapes and offer different weld penetration capabilities. In general, blunter electrodes that have a larger included angle provide the following benefits:

- Last longer
- Have better weld penetration
- Have a narrower arc shape
- Can handle more amperage without eroding

Sharper electrodes with smaller included angle provide:

- Offer less arc weld
- Have a wider arc
- Have a more consistent arc

The included angle determines the weld bead shape and size. Generally, as the included angle increases, penetration increases and bead width decreases.

TIG Tungsten Selection Guide

	 LANTHANATED (GOLD)	 ZIRCONIATED (WHITE)	 THORIATED (RED)	 RARE EARTH (PURPLE)	 CERIATED (GREY)
AC CURRENT	✓	✓		✓	✓
DC CURRENT	✓		✓	✓	✓
ALUMINIUM	✓	✓		✓	✓
MILD STEEL	✓		✓	✓	✓
STAINLESS STEEL	✓		✓	✓	✓
TITANIUM / COPPER ALLOYS	✓		✓	✓	✓
ARC IGNITION	●●●●●	●●●●●	●●●●●	●●●●○	●●●●○
TUNGSTEN LIFE	●●●●○	●●●○○	●●●●●	●●●●○	●●●●○
ARC STABILITY	●●●●○	●●●●●	●●●●●	●●●●○	●●●●○
RESISTANCE TO CONTAMINATION	●●●○○	●●●●●	●●●●●	●●●●○	●●●○○
AC PERFORMANCE	●●●●○	●●●●●	N/A	●●●○○	●●●○○

This information is intended to act as a guide only, individual results may vary depending on technique, skill and material.

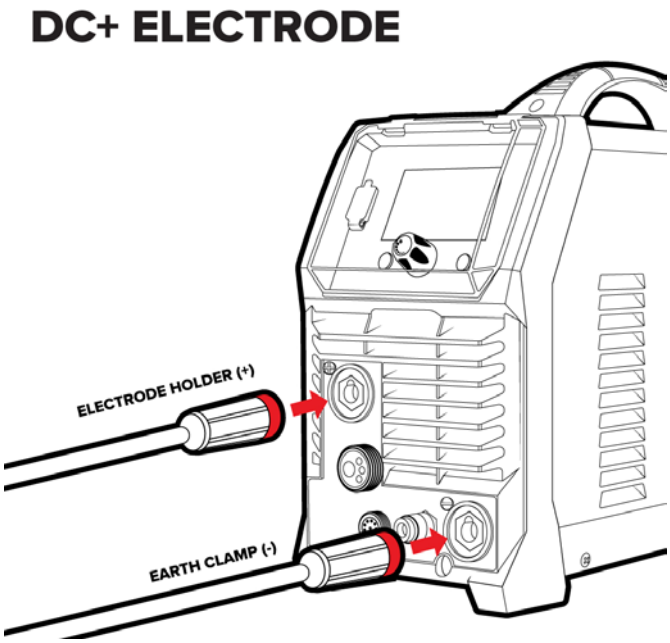
Tungsten Electrodes Rating for Welding Currents

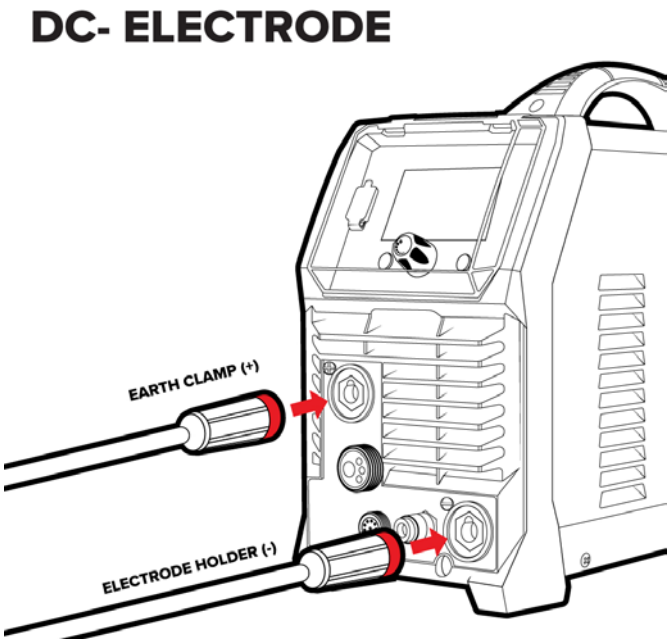
Tungsten Diameter (mm)	Diameter at the Tip (mm)	Constant Included Angle (°)	Current Range (Amps)	Current Range (Pulsed Amps)
1.0mm	0.25	20	5 - 30	5 - 60
1.6mm	0.5	25	8 - 50	5 - 100
1.6mm	0.8	30	10 - 70	10 - 140
2.4mm	0.8	35	12 - 90	12 - 180
2.4mm	1.1	45	15 - 150	15 - 250
3.2mm	1.1	60	20 - 200	20 - 300
3.2mm	1.5	90	25 - 250	25 - 350

18. MMA: Machine Setup

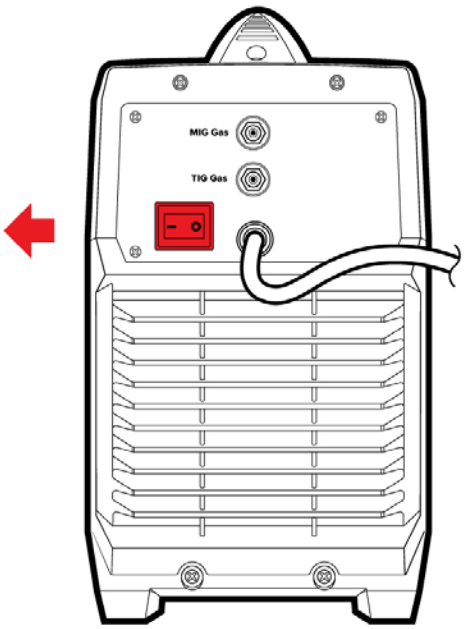
1. For DCEP electrodes, connect the earth clamp to the **(-)** dinse connection, and the electrode holder to the **(+)** dinse connection.

2. For DCEN electrodes, connect the earth clamp to the **(+)** dinse connection, and the electrode holder to the **(-)** dinse connection.



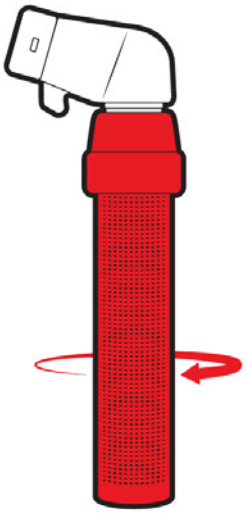


3. Connect the plug into a power point, then switch the machine ON.

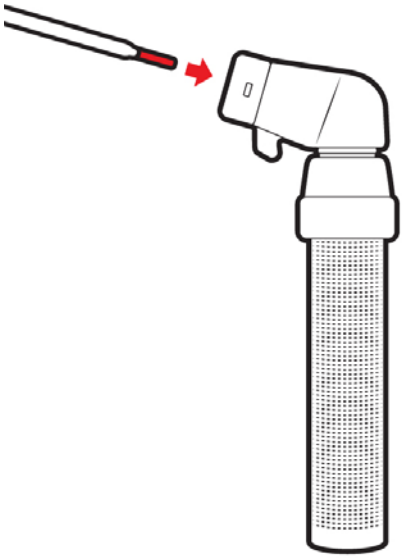


4. Navigate to the MMA screen on the main menu and press the selector knob in to enter MMA mode. Then set your desired settings to suit the job.

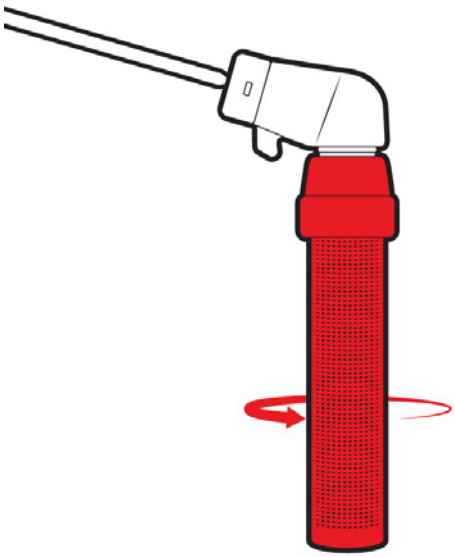
5. Twist electrode holder to loosen grip.



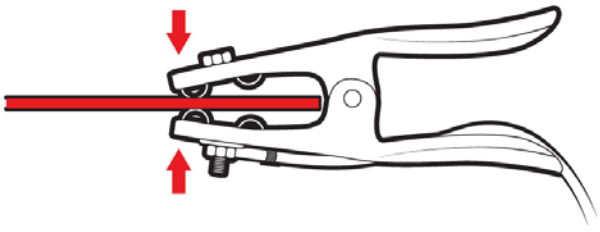
6. Place electrode into electrode holder.



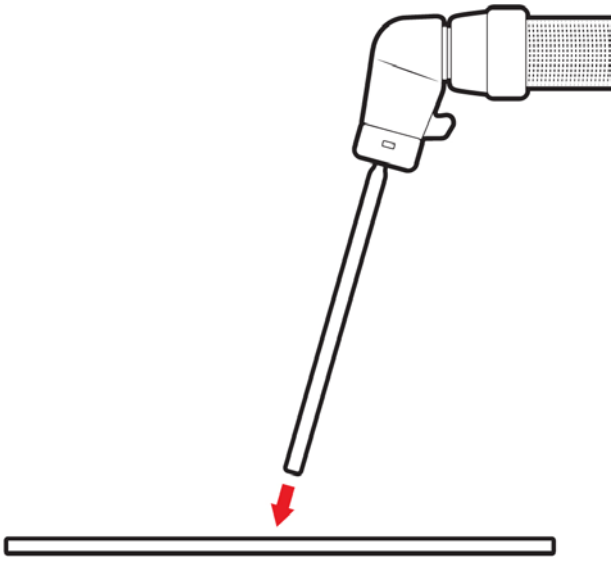
7. Twist electrode holder to tighten and securely grip electrode.



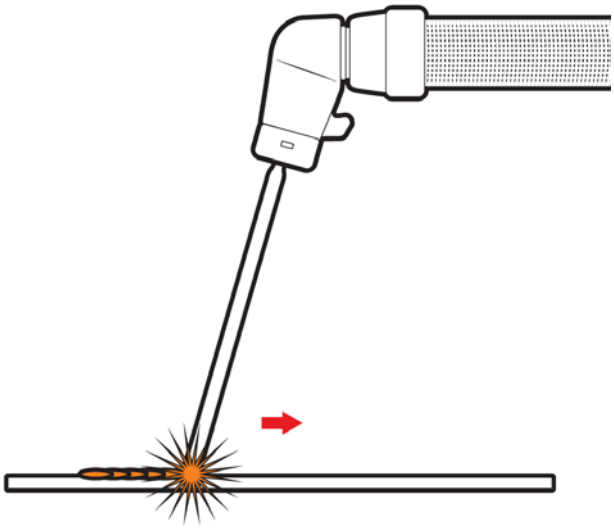
8. Connect earth clamp to your workpiece.



9. Strike electrode to the workpiece to initiate arc.

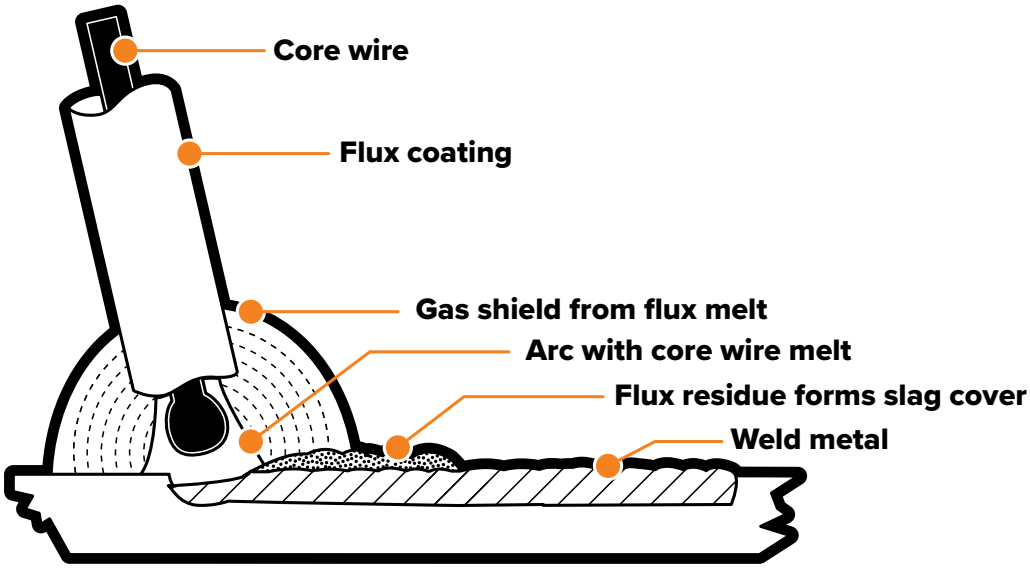


10. Drag along workpiece to weld. Pull the electrode away from the workpiece to finish weld.



19. MMA: Welding Guide

One of the most common types of arc welding is Manual Metal Arc welding, also known as MMA welding. An electric current is used to strike an arc between the base material and a consumable electrode rod or 'stick'. The electrode rod is made of a material that is compatible with the base material being welded. They are covered with a flux that gives off gaseous vapours that serve as a shielding gas and provide a layer of slag, both of which protect the weld area from atmospheric contamination. The electrode core itself acts as filler material. The residue from the flux that forms a slag covering over the weld metal must be chipped away after welding.



- The arc is initiated by momentarily touching the electrode to the base metal.
- The heat of the arc melts the surface of the base metal to form a molten pool at the end of the electrode.
- The melted electrode metal is transferred across the arc into the molten pool and becomes the deposited weld metal.
- The deposit is covered and protected by a slag which comes from the electrode coating.
- The arc and the immediate area are enveloped by an atmosphere of protective gas.

Manual Metal Arc (stick) electrodes have a solid metal wire core and a flux coating. These electrodes are identified by the wire diameter and by a series of letters and numbers. The letters and numbers identify the metal alloy and the intended use of the electrode.

The metal wire core works as a conductor of the current that maintains the arc. The core wire melts and is deposited into the welding pool.

The covering on a shielded metal arc welding electrode is called flux. The flux on the electrode performs many different functions.

These include:

- Producing a protective gas around the weld area.
- Providing fluxing elements and de-oxidisers.
- Creating a protective slag coating over the weld as it cools.
- Establishing arc characteristics.
- Adding alloying elements.

Covered electrodes serve many purposes in addition to adding filler metal to the molten pool. These additional functions are provided mainly by the covering on the electrode.

Electrode Selection

As a general rule, the selection of an electrode is straight forward, in that it is only a matter of selecting an electrode of similar composition to the parent metal. However, for some metals, there is a choice of several electrodes, each of which has particular properties to suit specific classes of work.

The size of the electrode generally depends on the thickness of the section being welded, and the thicker the section, the larger the electrode required. The table gives the maximum size of electrodes that may be used for various thicknesses of section based on using a general-purpose type 6013 electrode.

Average Thickness of Material	Maximum Recommended Electrode Diameter
1.0 - 2.0mm	2.5mm
2.0 - 5.0mm	3.2mm
> 5.0mm	4.0mm

Correct current selection for a particular job is an important factor in arc welding. With the current set too low, it is difficult to strike and maintain a stable arc. The penetration is reduced and beads with a distinct rounded profile will be deposited. Too high a current is accompanied by overheating of the electrode, resulting in undercut, burning through of the base metal and producing excessive spatter.

Electrode Size (ø mm)	Current Range (Amps)
2.5mm	60 - 100
3.2mm	90 - 150
4.0mm	140 - 200

Arc Length

To strike the arc, the electrode should be gently scraped on the work until the arc is established. There is a simple rule for the proper arc length; it should be the shortest arc that gives a good surface to the weld. An arc too long reduces penetration, produces spatter and gives a rough surface finish to the weld. An excessively short arc will cause sticking of the electrode and result in poor quality welds. The general rule of thumb for down hand welding is to have an arc length no greater than the diameter of the core wire.

Electrode Angle

The angle that the electrode makes with the work is important to ensure a smooth, even transfer of metal. When welding in down hand, fillet, horizontal or overhead, the angle of the electrode is generally between 5 and 15 degrees towards the direction of travel. When vertical up welding, the angle of the electrode should be between 80 and 90 degrees to the workpiece.

Travel Speed

The electrode should be moved along in the direction of the joint being welded at a speed that will give the size of run required. At the same time, the electrode is fed downwards to keep the correct arc length at all times. Excessive travel speeds lead to poor fusion, lack of penetration, etc., while too slow a rate of travel will frequently lead to arc instability, slag inclusions and poor mechanical properties.

Material and Joint Preparation

The material to be welded should be clean and free of any moisture, paint, oil, grease, mill scale, rust or any other material that will hinder the arc and contaminate the weld material. Joint preparation will depend on the method used include sawing, punching, shearing, machining, flame cutting and others. In all cases, edges should be clean and free of any contaminates. The chosen application will determine the type of joint.

20. MIG Trouble Shooting

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 8-12 L/min flow rate. Check hoses and fittings for holes, leaks etc.

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 8-12 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.
- **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 feed speed set too high:** Decrease the wire feed speed.

4. Lack of fusion - Failure of weld metal to fuse completely with base metal or a proceeding weld bead

- **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 or 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.

7. No wire feed

- **Wrong mode selected:** Check that the TIG/MMA/MIG selector switch is set to MIG position.
- **Wrong torch selector switch:** Check that the STANDARD/SPOOL GUN selector switch is set to STANDARD position for MIG welding and SPOOL GUN when using the spool gun.

8. 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 STICK 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 aluminium don’t feed well through long torch leads - replace the torch with a shorter 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 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.

21. TIG Troubleshooting

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 oxidised after weld is finished:** Keep shielding gas flowing 10-15 seconds after arc stoppage.

2. Contaminated tungsten

- **Touching tungsten into the weld pool:** Keep tungsten from contacting weld puddle. Raise the torch so that the tungsten is off of 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 colour

- **Wrong gas / poor gas flow / gas leaks:** Use pure argon. Gas is connected, check hoses, gas valve and torch are not restricted. Set the gas flow between 8-12 L/min. Check hoses and fittings for holes, leaks etc.
- **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 & discoloured tungsten

- **Incorrect gas:** Use pure argon gas.
- **Inadequate gas flow:** Set the gas flow between 8-12 L/min flow rate.
- **Alumina gas nozzle too small:** Increase the size of the alumina gas nozzle.

5. Unstable arc during 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 welding

- **Poor gas flow:** Check and set the gas flow between 8-12 L/min flow rate.
- **Amperage too low:** Increase the amperage.
- **Incorrect arc length:** Lower torch so that the tungsten is off of 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 the tungsten.
- **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, oil, or moisture from filler metal.

7. Arc difficult to start or will not start 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 8-12 L/min 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 workpiece wherever possible.

22. MMA (STICK) Troubleshooting

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 supply.

2. Porosity - Small cavities or holes resulting from gas pockets in weld metal

- **Arc length too long:** Shorten the arc length.
- **Workpiece dirty, contaminated or moisture:** Remove moisture and materials like paint, grease, oil, and dirt, including mill scale, from base metal.
- **Damp electrodes:** Use only dry electrodes.

3. Excessive spatter

- **Amperage too high:** Decrease the amperage or choose a smaller 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 smaller electrode.
- **Workpiece dirty, contaminated or moisture:** Remove moisture and materials like paint, grease, oil, and dirt, including mill scale, from base 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 smaller 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. Seek assistance for the correct joint design and fit up.

6. Excessive penetration - Burn through

- **Excessive heat input:** Reduce the amperage or use a larger 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, practise your technique.

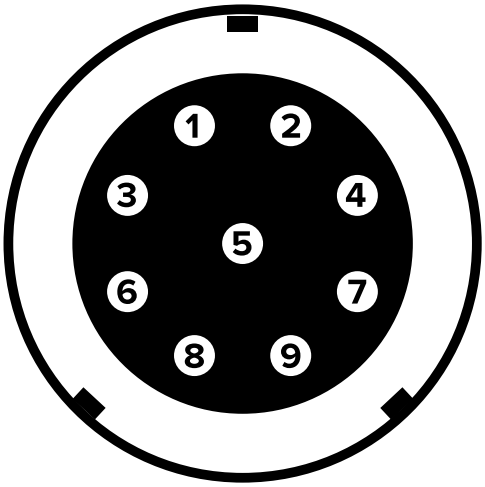
8. Distortion - Movement of base metal during welding

- **Excessive heat input:** Reduce the amperage or use a larger 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.

23. Remote Port Wiring Diagram



(FRONT VIEW)
TIG & Spool Gun

PIN 1 — Power Supply to Spool GUN (–)

PIN 2 — Power Supply to Spool GUN (+)

PIN 3 — Potentiometer Minimum

PIN 4 — Potentiometer Maximum

PIN 5 — Potentiometer Common

PIN 6 — TIG Trigger Signal

PIN 7 — TIG Trigger Signal Ground

UNLISTED PIN NUMBERS ARE UNUSED

Notes

Notes

Notes

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