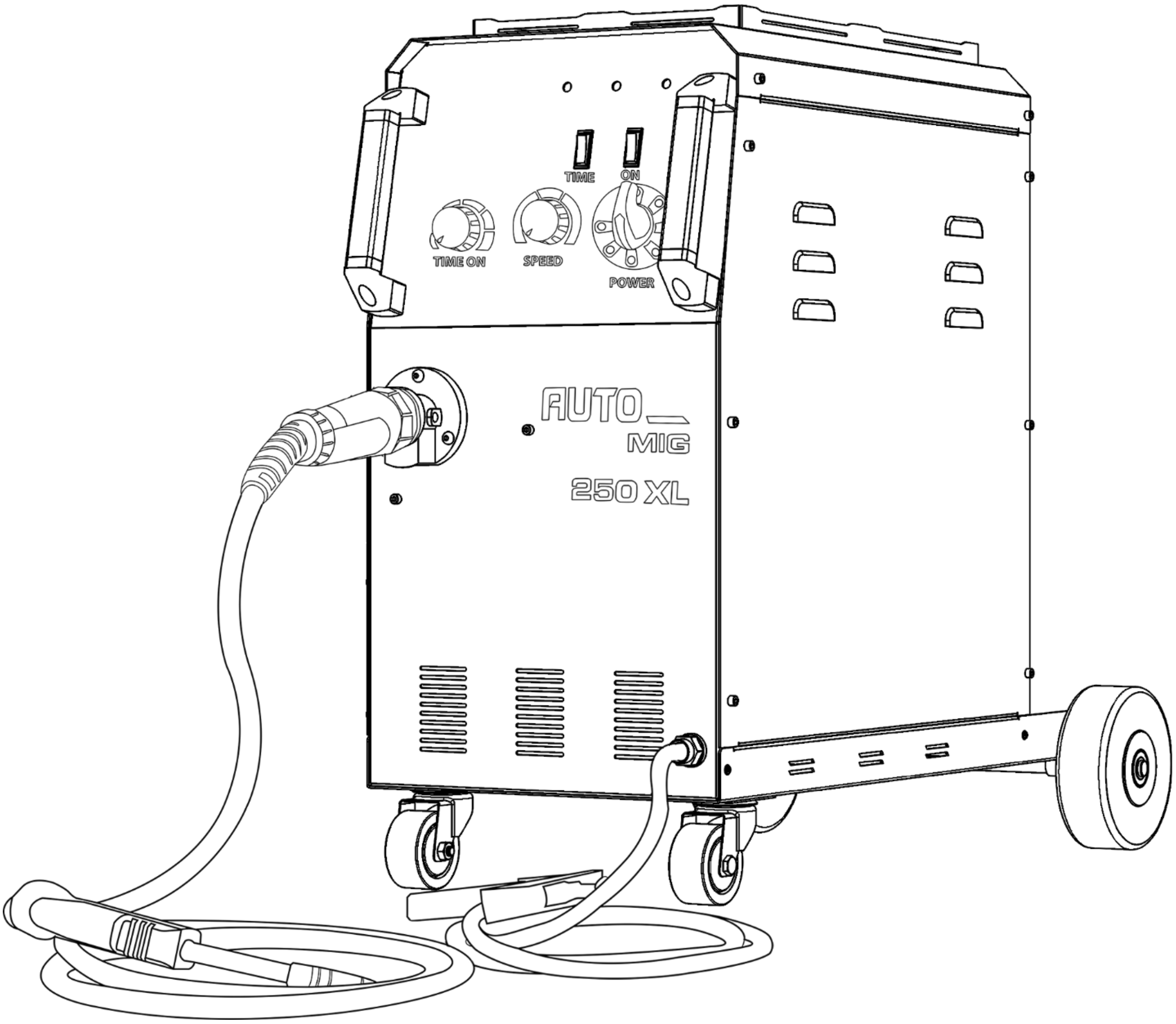
Operating Manual

AUTO MIG 250XL

MIG WELDING



INSTRUCTION: CAREFULLY READ THIS MANUAL BEFORE INSTALLING AND OPERATING THE MACHINE.

Contents

1. Introduction

This manual is addressed to the person responsible in charge and must release it to the personnel in charge of **AUTO MIG** installation, use and maintenance. He/she must check that the information is given in this manual and the enclosed documents have been read and understood. The manual should be kept in a well-known place, easy to reach, and must be looked up each time when any doubts should arise.

The **AUTO MIG** described in this manual is designed solely for professional use on factory sites not directly connected to high voltage mains intended for domestic applications. It may cause radio frequency interference. The **AUTO MIG** has been designed to be used by an operator employing the foreseen control devices.

NOTE: All modifications, even slight ones, are forbidden. They will invalidate the **AUTO MIG EC** certification and its warranty.

OUR COMPANY is not responsible for any damage to people, animals, things and to the **AUTO MIG** itself caused by either a wrong use or the lack or the superficial observance of the safety warnings stated on this manual, nor it is responsible for damages coming from even slight tampering or the use of not-suitable spare parts, or of spare parts other than the original ones. **The specification is subject to change without notice.**

IMPORTANT: BEFORE STARTING THE EQUIPMENT READ THE CONTENTS OF THIS MANUAL, WHICH MUST BE STORED IN A PLACE FAMILIAR TO ALL USERS FOR THE ENTIRE OPERATIVE LIFE-SPAN OF THE MACHINE THIS EQUIPMENT MUST BE USED SOLELY FOR WELDING OPERATIONS.

2. Safety Precautions

When operating this machine, follow basic precautions, including the following:

Warning / Note: It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death. Addresses practices not related to personal injury. Use this equipment only for its intended use.

Use of Gloves: The person must wear safety gloves. Avoid wearing rings, metal watches and clothes with either metal accessories or components.

Use of Goggles: The person must wear safety glasses or goggles. Make sure to use safety goggles when denting. Otherwise, the sparks might injure the eyes.

Electrical Hazards: All electrical connections must be made by a qualified electrician. Risk for electrical shock.

Thermal Warning: Do not touch the connectors or electrodes during or immediately after use.

Use of Boiler Suits: The person must wear a safety suit for avoiding sparks from the operation.

Use of Safety Shoes: The person must wear a safety shoe for avoiding sparks from the operation.

Read Manual: Read all instructions before using this machine and its attachments.

Pacemaker: Notice that this type of machine generates strong magnetic fields attracting metals and damage watches, magnetic cards and magnetic data storage media. Since these magnetic fields can affect pacemakers, the wearers must consult their doctor before approaching the weld area.

Protect the operator from possible spatters of melted material. Keep the AUTO MIG near the working area free from flammable materials. In case the material to be welded produces either smoke or fumes, install a proper fume extractor.

In addition to the information stated in this paragraph, always operate under all the relevant laws in force.

SAFETY MEASURES NOTES:

- Before using the machine, often check the cable and the plug. If any problems are noticed, do not operate the machine.
- Always consult a technician to identify or repair any faults in the machine. Do not attempt to fix it on your own.
- Before executing any repair works on the machine, make sure it is unplugged.
- It is advisable to wear protective goggles, safety shoes and work gloves while using the machine.
- Always remember to unplug the device that is not in use.
- Do not attempt to make any changes to the design of the machine.
- The machine generates strong magnetic fields and might damage clocks, magnetic cards and other carriers.
- People with pacemakers first must seek a physician’s opinion before approaching the vicinity of the working environment.

- Before using the device, the user should take an extra listen to remove jewellery, watches or any clothing that contains a high amount of metal that could heat up by induction.
- Do not touch the stud or worked surface until it cools.
- Do not operate the machine when its protective case is removed.

WARNING: Inhalation of toxic gases while operating the machine may cause discomfort or sickness

3. General

MIG welding is an arc welding process in which a continuous solid wire electrode is fed through a welding gun and into the weld pool, joining the two base materials together. Shielding gas is also sent through the welding gun and protects the weld pool from contamination. **MIG** stands for **Metal Inert Gas**. The technical name for it is a gas metal arc welding (or GMAW), and the slang name for it is wire welding.

Before tackling any welding project, you need to make sure that you have the proper safety apparel and any potential fire hazards are removed from the welding area. Basic welding safety apparel includes leather shoes or boots, cuff-less and full-length pants, a flame-resistant and long-sleeve jacket, leather gloves, a welding helmet, safety glasses and a bandana or skull cap to protect the top of your head from sparks and spatter.

Unlike stick and flux-cored electrodes, which have higher amounts of special additives, the solid MIG wire does not combat rust, dirt, oil or other contaminants very well. Use a metal brush or grinder and clean down to bare metal before striking an arc. Make sure your work clamp connects to clean metal. Any electrical impedance will affect wire feeding performance.

MIG welding is useful because you can use it to weld many different types of metals: carbon steel, stainless steel, aluminium, magnesium, copper, nickel, silicon bronze and other alloys. Here are some advantages of MIG welding:

- The ability to join a wide range of metals and thicknesses
- All position welding capability
- A good weld bead
- A minimum of weld splatter
- Easy to learn

The CO_2 gas shielded welding machine of our company is equipped with a unique electronic reactor circuit, precisely controlling the short-circuiting transfer and mixed transfer of welding, producing excellent welding characteristics. Compared with silicon controlled welding machines and welders with taps, our products have the following merits: stable wire feed rate, portable, and energy-saving, electromagnetic noise-free. Besides, our products have merits such as electric network fluctuation self-compensation function, little splatter, good arc starting, deep welding pool, high duty cycle etc.

Equipment's

- Power Source
- Wire Feed Unit
- MIG Torch
- Earth Clamp
- Shielding Gas

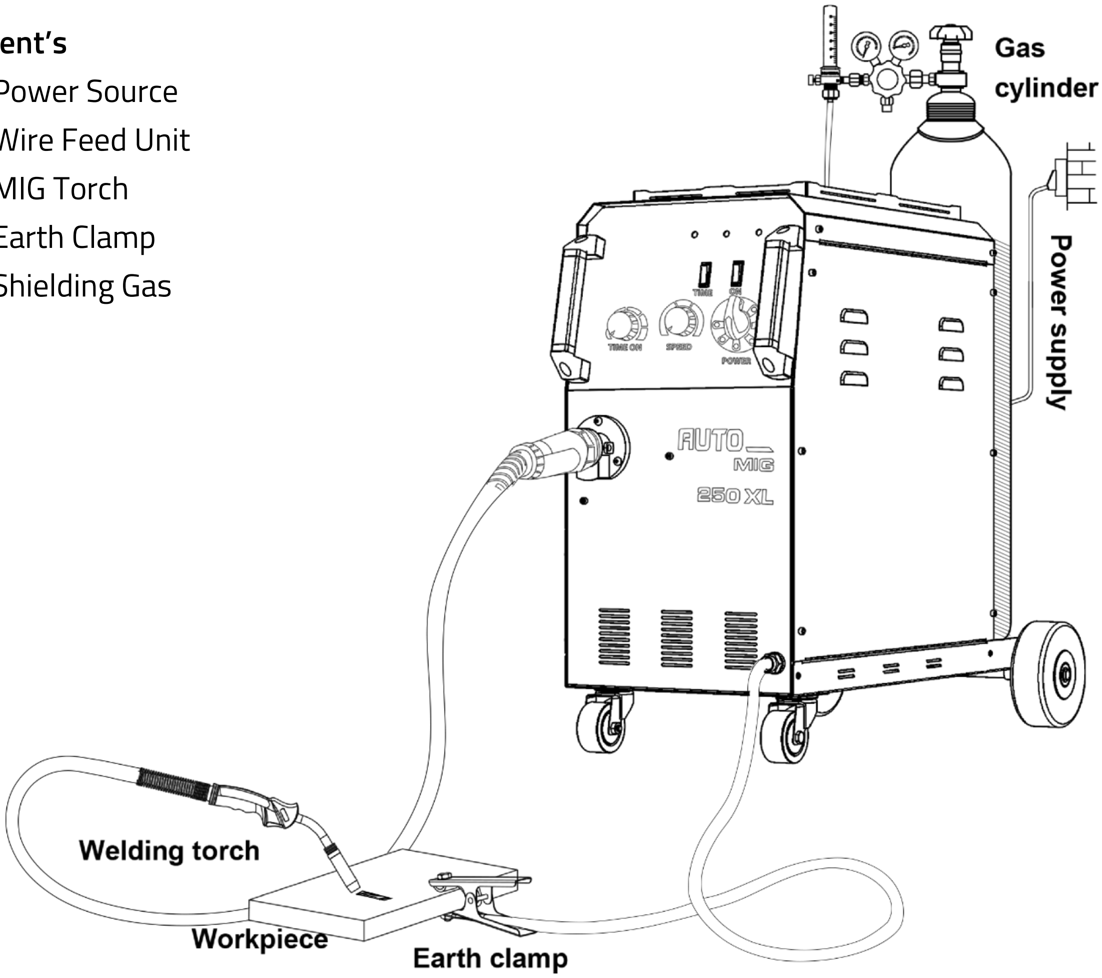


Figure 1 Assembled view of AUTO MIG 250XL

Power Source

MIG welding is carried out on DC electrode (welding wire) positive polarity (DCEP). However, DCEN is used (for a higher burn-off rate) with certain self-shielding and gas shield cored wires.

DC output power sources are of a transformer-rectifier design, with a flat characteristic (constant voltage power source). The most common type of power source used for this process is the switched primary transformer rectifier with constant voltage characteristics from both 3-phase 415V and 1-phase 240V input supplies.

The output of direct current after full-wave rectification from a 3-phase machine is very smooth. To obtain smooth output after full-wave rectification with a 1- phase machine, a large capacitor bank across the output is required. Because of the expense of this, many low-cost 1-phase machines omit this

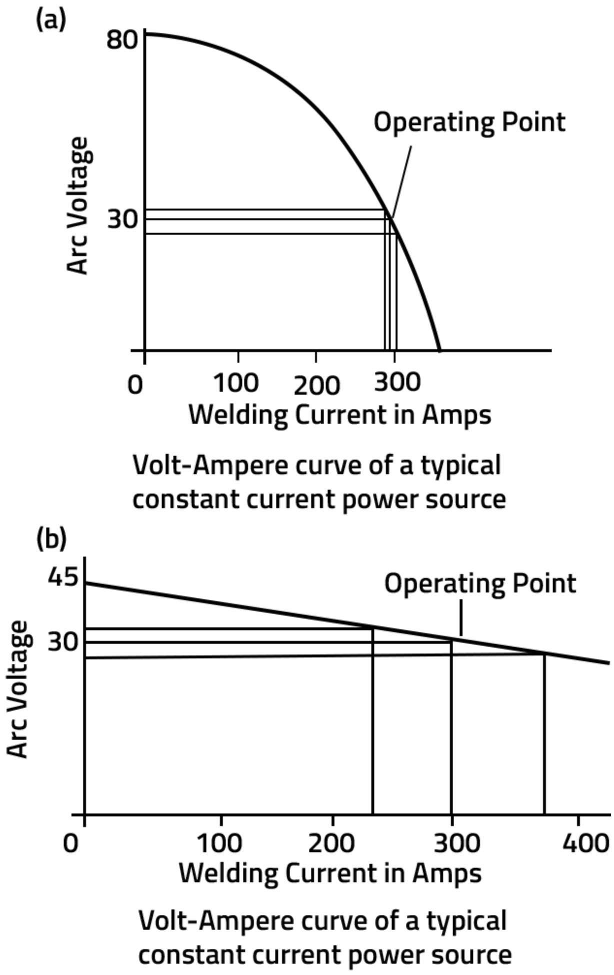
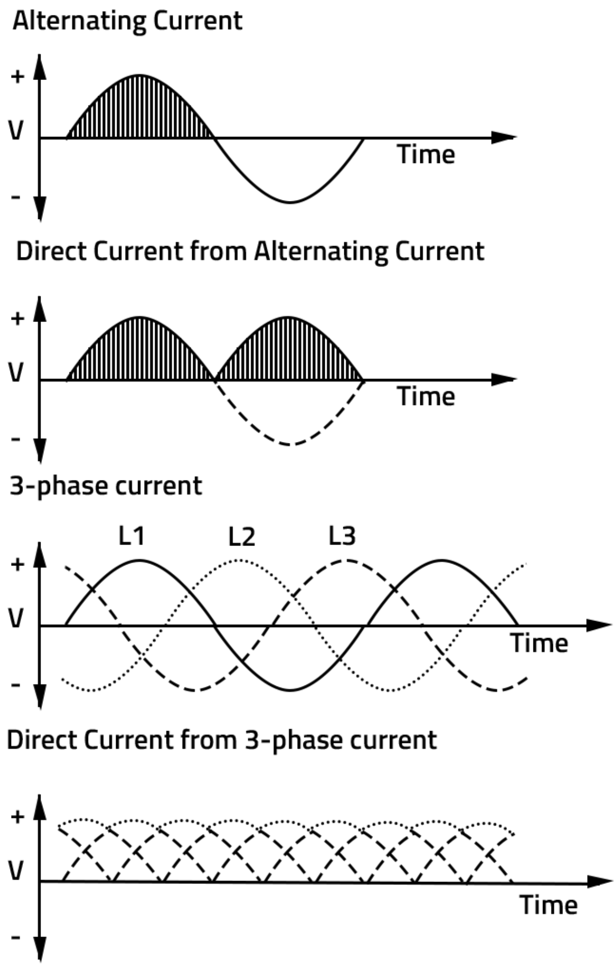


Figure 2 Volt-Ampere Curve

component and therefore provide a very poor welding characteristic. The switches of the main transformer primary winding provide the output voltage steps at the power source output terminals.

Another method of producing different voltages at the power source output terminals is to use a Thyristor or a Transistor rectifier instead of a simple diode rectifier. This system offers continuously variable output voltage, which can be particularly useful on robot installations and the cost of this type of rectifier can be partly offset with no need for primary voltage switch or switches and a single tapped main transformer primary winding.

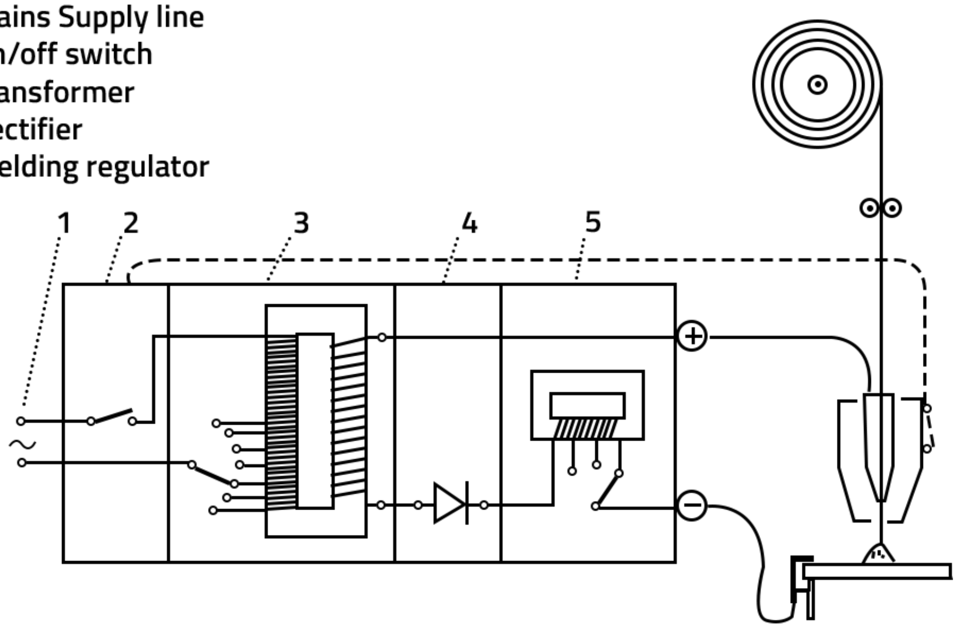
Most MIG power sources have a contactor or relay used to switch the output ON/OFF with operations of the trigger on the MIG torch. The switch-off operation of this contactor is normally delayed to allow the welding wire to Burn back out of the molten weld pool. A thermostat is fitted on the hottest point in the power source, in series with the contactor coil to provide thermal protection to the machine. Power source performance is measured by its ability to provide a certain current for a percentage of 10 minutes before "Thermal Cut Out". This is the "Duty Cycle".



Principal of rectification of Alternating Current

Figure 3

(1) Mains Supply line
(2) On/off switch
(3) Transformer
(4) Rectifier
(5) Welding regulator



CV Transformer Rectifier power source for GMAW

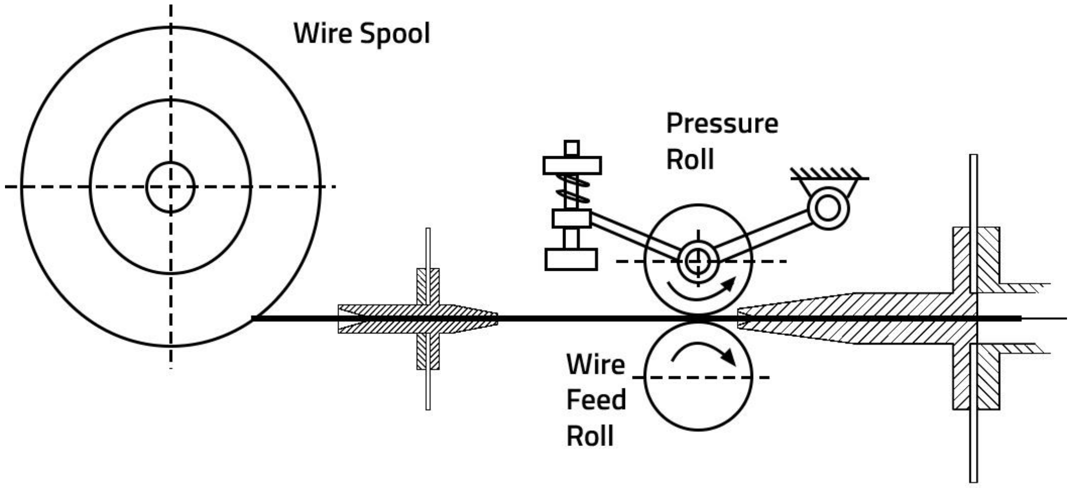
Figure 4

Wire Feed Unit

The wire-feed unit, or sub-assembly where this is mounted in the power source cabinet (known as a composite MIG), provides the controlled supply of welding wire to the point to be welded. According to the welding wire size and Arc voltage provided by the power source, a constant rate of wire-speed is required, in MIG welding the power source provides Arc voltage control and the wire feed unit provides welding wire speed control, (in MIG this equates to welding current).

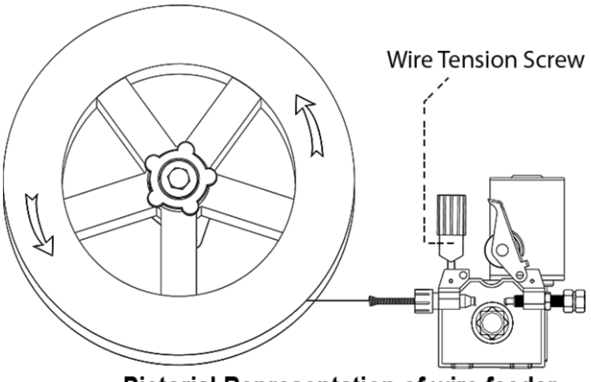
Most modern wire feed units control the wire feed speed via a DC motor and thyristor control PCB to provide continuous control of Armature volts and hence RPM of the motor.

The wire feed motor spindle has a feed roller fitted and another pressure roll, adjustable spring mounted to lightly grip the wire and push it up the length of the MIG torch.



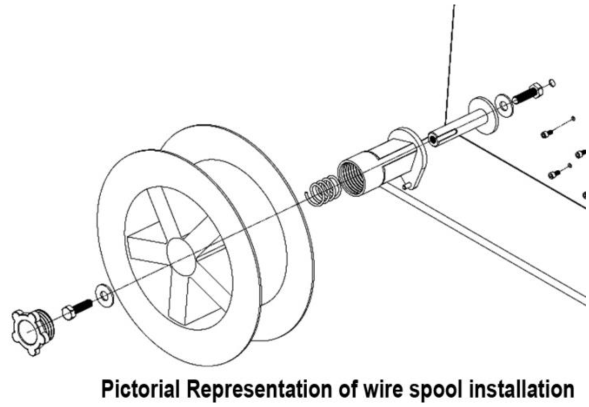
Schematic illustration of wire feeder with two roll

Figure 5



Pictorial Representation of wire feeder

Figure 6



Pictorial Representation of wire spool installation

Figure 7

MIG Torch

This provides the method of delivery from the wire feed unit to the point at which welding is required. The MIG torch could be air-cooled or water-cooled and most modern air-cooled torches have a single cable in which the welding wire slides through a Liner. Gas flows around the outside of this Liner and the tube the Liner sits in is the power braid and trigger wires. The outer insulation provides a flexible cover.

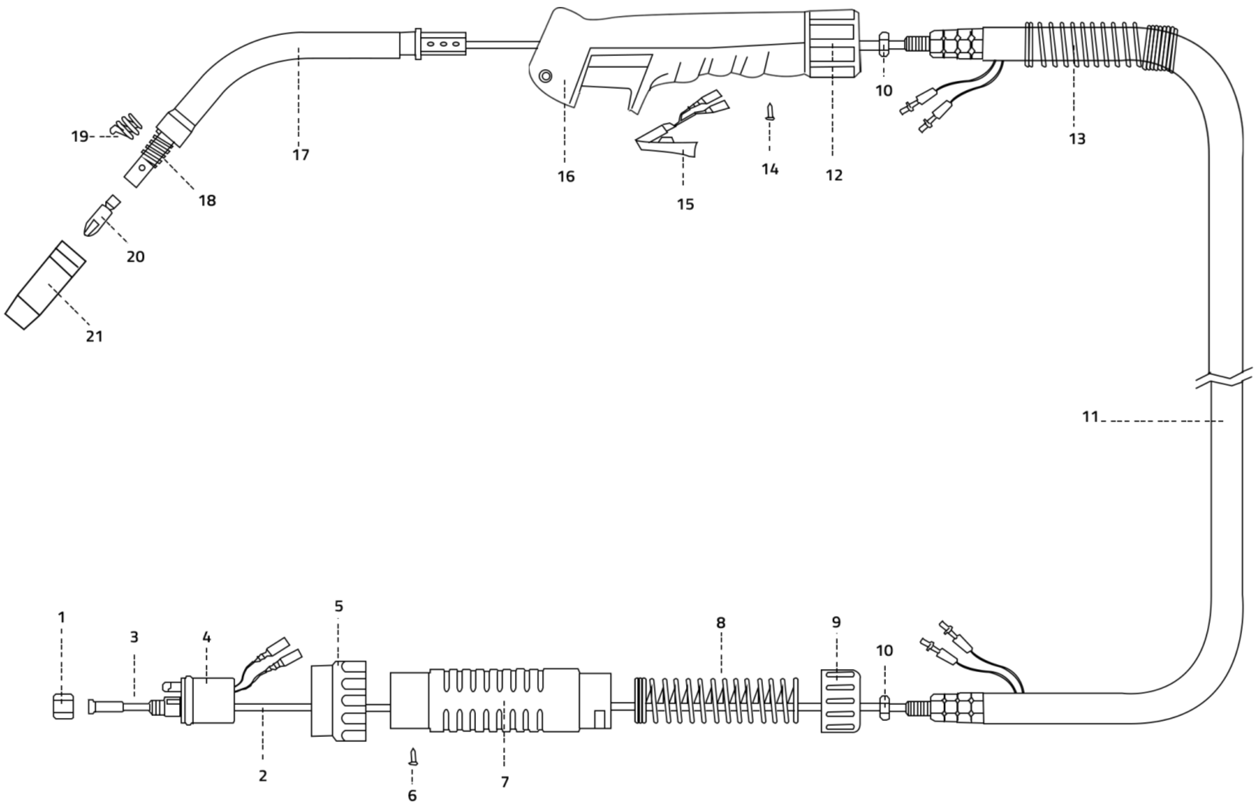


Figure 8

Parts of MIG Torch 15AK			
1	Liner Nut	12	Handle Cap
2	Liner	13	Handle Support Spring
3	O' Ring	14	Handle Screw
4	Euro End Adaptor (with Sleeve Screw)	15	Trigger Switch
5	Euro End Adaptor Sleeve Nut	16	Handle with Cap
6	Euro End Adaptor Sleeve Screw	17	Swan Neck
7	Adaptor Sleeve with Cap	18	Contact Tip Holder
8	Spring M/C End	19	Gas Nozzle Spring
9	Adaptor Sleeve Cap	20	Contact Tip
10	Lock Nut	21	Gas Nozzle
11	Power Cable Assembly for 3 meters		

Water-cooled in MIG torches are similar to the above, but gas hose, liner tube, power lead (including water return pipe), water flow pipe and trigger wires are all separate in an outer sleeve. Most industrial MIG equipment uses a standard European MIG torch connector for easy connection of torch, some low cost smaller units use individual manufacturer's fittings. The important areas of maintenance are: Liners are in good condition and correct type and size; Contact tips are lightly fitted, of the correct size and good condition.

Shielding Gas

This is a complicated area that has the availability of various mixtures, but the primary purpose of the shielding gas in the MIG process is to protect the molten weld metal and heat affected zone from oxidation and other contamination of the atmosphere. The shielding gas should also have a pronounced effect on the following aspects of the welding operation and the resultant weld.

- Arc Characteristics
- Mode of Metal Transfer
- Penetration and Weld Head Profile
- Speed of Welding
- Undercutting Tendency
- Cleaning Action
- Weld Metal Mechanical Properties

A basic position or starting point would be

Aluminium - Argon
Magnesium - Helium
Copper Alloys - Argon - Helium Mix
Steel - CO_2 not commonly used today, Ar-CO_2 mix is preferred

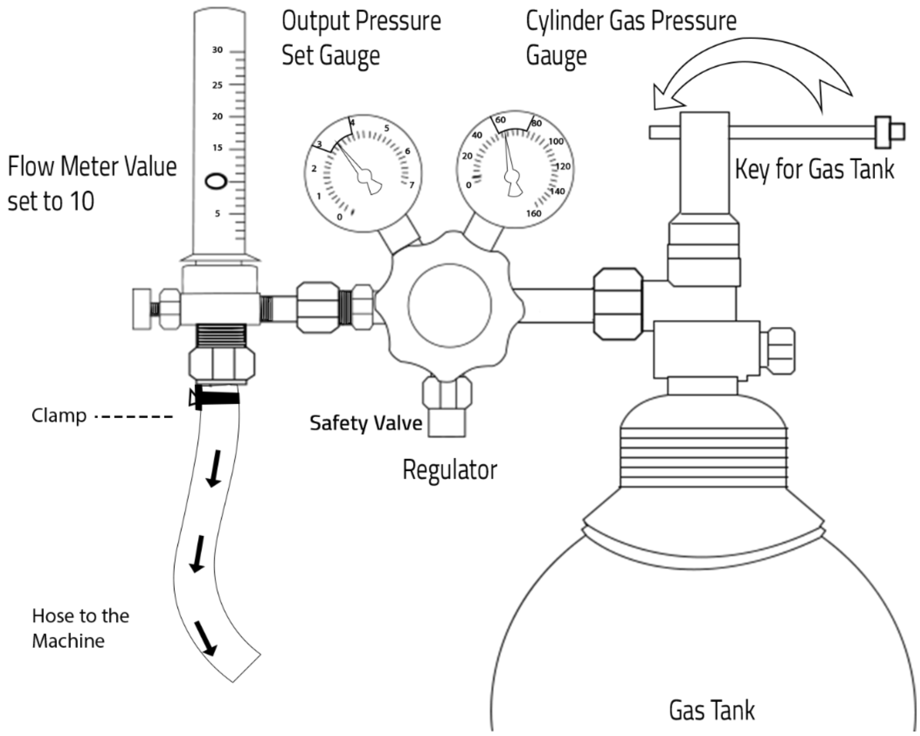


Figure 9

Assuming that you are using a shielding gas with your MIG welder and there will be a tank of gas behind the MIG. There is CO_2 or other mentioned gases in the tank. This gas shields the weld as it forms. Without the gas, your welds will look brown, splattered and not very nice.

Open the main valve of the tank and make sure that there is some gas in the tank. Your gauges should be reading between 0 and 1500 psi in the tank and the regulator should be set between 40 and 60 psi depending on how you like to set things up and the type of welding gun you are using.

Once the wire passes through the rollers it is sent down a set of hoses that lead to the welding gun. The hoses carry the charged electrode and the CO_2 or other mentioned gases.

Types of Shielding Gas

As mentioned before, different types of shielding gases are used in the MIG process, and the melting rate, bead profile and penetration of weld changes due to gas type. At the same time, the type of the shielding gas affects the spattering, welding speed and the mode of metal transfer and thus the overall mechanical properties of the weld metal.

Pure carbon dioxide or argon-carbon dioxide and argon-oxygen mixed gases are generally used for welding iron-based metals. For the same welding current the high melting rate, greater penetration, large and convex weld profile will be obtained when carbon dioxide is chosen as a shielding gas. When pure carbon dioxide shielding is used, a complex interaction of forces occurs around the metal droplets at the wire tip. These unbalanced forces cause large, unstable droplets to grow and transfer to the molten metal in a random action. This is the reason for an increase in spatter along with the weld bead. Also, pure carbon dioxide generates more fumes.

Argon, helium and argon-helium mixtures are used in many applications for welding non-ferrous metals and alloys. These inert gas mixtures provide a lower melting rate, smaller penetration and narrow bead contour. Argon is cheaper than helium and helium-argon mixtures and it also produces fewer spatters. Unlike argon, helium improves the weld bead penetration profile (higher melting rate, deeper penetration and convex surface profile). But, when helium is used, welding voltage rises for the same arc length and the consumption of shielding gas increases more than when argon is used.

Metal Transfer Across the Arc

The operating characteristics of MIG welding are described by the four basic modes of weld metal transfer from the electrode to the work:

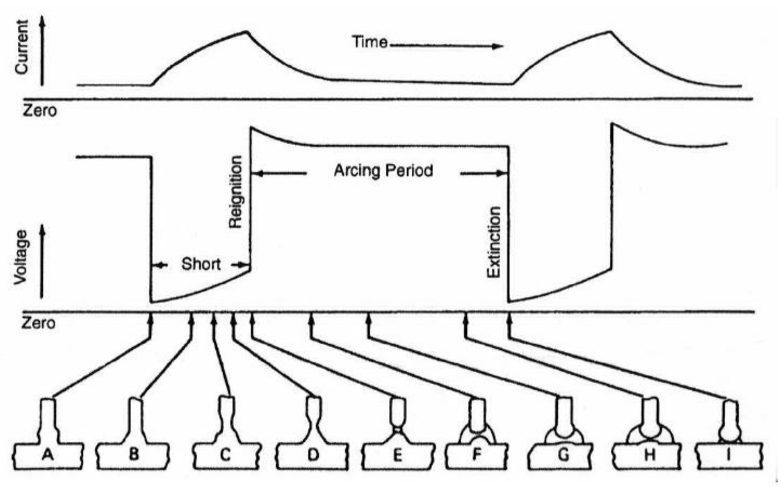
- Short-circuiting transfer
- Globular transfer
- Spray transfer
- Pulsed spray transfer

The mode of weld metal transfer is determined by the following:

- Welding current
- Electrode size
- Electrode composition
- Electrode sticks out
- Shielding gas

Short-Circuiting Transfer

Short-circuiting transfer uses the lowest welding currents and voltages, which continuously produces very low heat input. In this mode of welding, the metal is not transferred across the arc gap, but from the electrode to the work only during a short period when the welding wire is in contact with the weld pool. When the electrode wire tip touches the weld pool, the arc extinguishes, the voltage goes down and amperage rises. At this moment, metal is transferred from the melted electrode tip to the weld pool with the help of surface tension of the melted weld metal.



Short Circuit Weld Metal Transfer

Figure 10

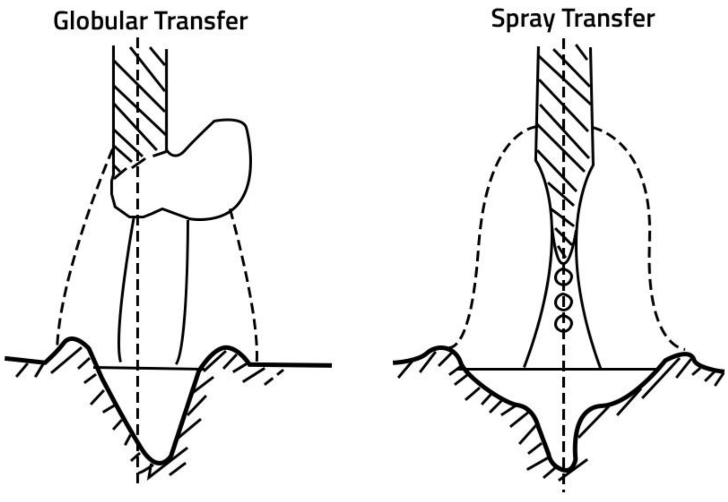
When the droplet from the tip of the wire passes to the weld pool there is no more metal connection and the arc is re-established. At the heat of the arc tip, the electrode is melted and as the wire is fed towards the weld pool the next short circuit occurs. The rate of current increase during the short circuit is controlled by the induction of the power source, whereas the re-ignition and the maintenance of the arc are provided by the energy stored in the inductor during the short-circuiting

The electrode contacts the weld pool at a random frequency, which ranges from 20 to 200 contacts per second depending on the current-voltage and amperage. The drop size and the short circuit duration are influenced by the composition of the shielding gas, which affects the surface tension of the molten metal. This mode of metal transfer in MIG is normally applied with CO_2-rich mixed shielding gas on ferrous metals.

A correctly set arc produces a small amount of spatter and a relatively small, fast freezing and easily controlled weld pool. Because of this, this model of metal transfer is well suited for thin sections, for off-position welding and for building up bridges on large root openings.

Globular Metal Transfer

Globular metal transfer occurs at relatively low operating currents and voltages but these are still higher than those used in the short-circuiting transfer. This metal transfer mode is characterised by a drop, two or three times larger in diameter than the wire, formed at the tip of the electrode. This droplet is detached



Weld Metal Transfer Characteristics

Figure 11

from the tip of the electrode by the effect of a pinch force and the transfer of the droplets in irregular form across the arc is aided by the effect of the weak electromagnetic and strong gravity forces. As the droplets grow on the tip of the wire electrode they wobble around and disturb the arc plasma stability. Consequently, the heat-affected zone in the work becomes narrow, penetration of the weld becomes small, and the weld deposit is irregular and large amounts of spatter takes place.

When the arc length is too short (low voltage) the droplets can touch the weld-pool and short out the circuit before detaching from the wire. This causes a considerable amount of spatter. Therefore the arc must be long enough to let the droplets detach freely from the electrode tip without touching the weld pool.

The globular metal transfer mode can be obtained with all types of shielding gas. With CO_2 shielding gas, the globular metal transfer occurs at most of the operating current, amperage and voltage levels. Large molten metal droplets are transferred across the welding arc mainly by the action of gravity. Therefore this model of working in MIG is applied to the welding of mild steel in a flat and horizontal position.

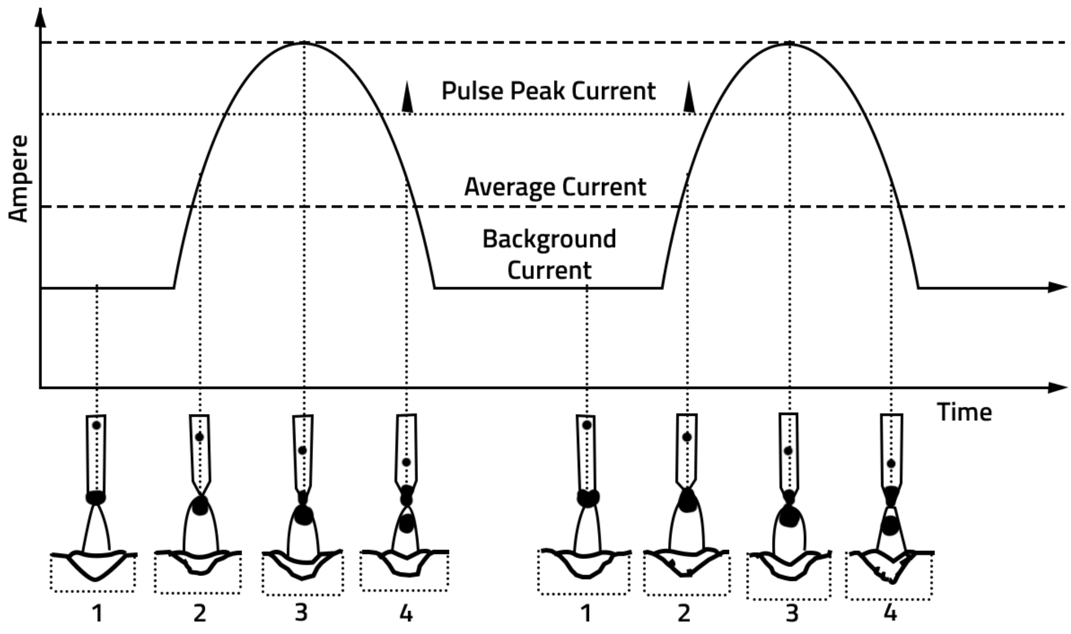
Spray Transfer

Under an argon-rich shielding gas, increasing the current and voltage causes a new mode of metal transfer to appear: the tip of the wire electrode is tapped, the sizes of the droplets become smaller and they are directed axially in a straight line from the wire to the weld pool. The current level above by which this mode of metal transfer begins is called transition current. The droplets are much smaller than the diameter of the wire and they detach with pinch force much more rapidly than with the globular transfer mode, there is very little spatter and the surface of the weld bead is smooth.

The rate of transfer of droplets can vary from less than one hundred times of a second up to several hundred times of a second. As the current increases the droplet size decreases and the frequency increases. If the current level in this mode of transfer is high enough the necking effect of the pinch force and the arc forces accelerate the droplets to velocities which overcome the gravity forces. Therefore spray transfer can be used under certain conditions in out-of-position welding. Although the high deposition rate produces a large weld pool, this cannot be supported only by the surface tension of the molten metal in vertical and overhead welding. This problem is overcome by a new technique called pulsed current transfer.

Pulsed Current (Spray) Transfer

The Pulsed mode of metal transfer in MIG is used for applications where a good penetration and reduced heat input are required. A pulsed current transfer is a spray type of transfer that occurs at regularly spaced intervals instead of constantly. This mode of metal transfer can only be produced if the power source can supply a pulsed current. The level of a welding current supplied by a pulsing type of power source varies between high and low levels.



Pulsed Spray Transfer
Figure 12

Where-as high level is above the transition current and produces the droplets, low level or background current has only sufficient energy to sustain the arc. In this system of transfer, the droplets have a size equal to the diameter of the wire electrode and theoretically, the machine can be set up so that one drop of molten metal can be transferred across the arc during each pulse of high current. There is no metal transfer at a low pulse level.

Merits of Pulsed Current Transfer:

- Droplets are transferred without short circuits and therefore with little spattering.
- Thicker solid wire electrodes can be used
- Flat weld beads can be obtained at low arc power

Limitations of Pulsed Current Transfer.

- High cost of pulsed current power sources
- The setting of optimum welding data is more complicated
- Only high argon shielding gas mixtures can be used with conventional pulsing current power sources.

Welding Process Variables

During a manual welding operation, the welder has to have control over the welding variables, which affect the weld penetration, bead geometry and the overall weld quality. A proper selection of welding variables will increase the chances of producing welds of satisfactory quality. However, these variables are not completely independent and changing one variable generally requires the changing of some of the others to achieve the desired result. When all these variables are in proper balance, the welder can deposit higher quality weld metal and produce sound welds.

The selection of the welding variables should be made after the base metal, filler metal and joint design have been determined. The welding process variables mainly affect the geometry of the weld bead such as the penetration, bead reinforcement, bead width and the deposition rate, which is the weight of the metal deposited per unit of time. Following are those variables:

- Welding Current
- Welding Voltage
- Travel Speed
- Wire Electrode Size
- Electrode Extension

Welding Current

The value of welding current used in MIG has the greater effect on the deposition rate, the weld bead size, shape and penetration. In MIG welding, metals are generally welded with direct current polarity electrode positive (DCEP, opposite to TIG welding), because it provides the maximum heat input to the work and therefore a relatively deep penetration can be obtained. The oxide removal effect of the DCEP, which is very important in the welding of aluminium and magnesium alloys, contributes to the cleanness of the weld deposit.

When all the other welding parameters are held constant, by increasing the current will increase the depth and the width of the weld penetration and the size of the weld bead. In a constant voltage system, the wire feed speed and welding current are controlled by the same knob. As the wire feed speed is increased the welding current also increases, resulting in increases in the wire melt-off rate and the rate of deposition.

Each electrode wire size and type has a minimum and maximum current range to give the best results. An excessively low welding current for a given electrode size produces a poor penetration and the pileup of the weld metal on the surface of the base metal transfer by the arc is sluggish, the bead is rough and reinforcement high. These current ranges for different sized wires.

If the current is very high, the size of the weld bead becomes large and the excessive deep penetration that wastes the filler metal causes burn-through and undercut. Too high or too low welding current also affects the mechanical properties of the weld metal and the tensile strength. The ductility is reduced and porosity, excessive oxides and impurities can be seen in the weld metal.

Welding Voltage

The arc length is one of the most important variables in MIG that must be held under control. When all the variables such as the electrode composition and sizes, the type of shielding gas and the welding technique are held constant, the arc length is directly related to the arc voltage. For example, normal arc voltage in carbon dioxide and helium is much higher than that obtained in argon. A long arc length disturbs the gas shield, the arc tends to wander and thus affects the bead surface of the bead and the penetration. In MIG the arc voltage has a decided effect upon the penetration, the bead reinforcement and bead width. By increasing the arc voltage the weld bead becomes flatter and wider, the penetration increases until an optimum value of the voltage is reached, at which time it begins to decrease.

High and low voltages cause an unstable arc. The excessive voltage may cause the formation of excessive spatter and porosity, in fillet welds it increases undercut and produces concave fillet welds subject to cracking. Low voltage produces narrower beads with greater convexity (high crown), but an excessively low voltage may cause porosity and overlap at the edges of the weld bead.

Travel Speed

The travel speed is the rate at which the arc travels along with the work-piece. It is controlled by the welder in semiautomatic welding and by the machine in automatic welding. The effects of the travel speed are just about similar to the effects of the arc voltage. The penetration is maximum at a certain value and decreases as the arc speed is varied.

For a constant given current, slower travel speeds proportionally provide larger beads and higher heat input to the base metal because of the longer heating time. The high heat input increases the weld penetration and the weld metal deposit per unit length and consequently results in a wider bead contour. If the travel speed is too slow, unusual weld build-up occurs, which causes poor fusion, lower penetration, porosity, slag inclusions and a rough uneven bead.

By increasing the travel speed shows opposite effects: Less weld metal gets deposited with lower heat input that produces a narrower bead with less penetration. Excessively high speeds cause high spatter and undercutting and the beads show an irregular form because of very little weld metal deposit per unit length of the weld.

The travel speed, which is an important variable in MIG, just like the wire speed (current) and the arc voltage, is chosen by the operator according to the thickness of the metal being welded, the joint design, joint fit-up and welding position.

Electrode Size

The electrode diameter influences the weld bead configuration (such as the size), the depth of penetration, bead reinforcement and bead width and has a consequent effect on the travel speed of welding. As a general rule, for the same welding current (wire feed speed setting) the arc becomes more penetrating as the electrode diameter decreases. A larger electrode in general requires a higher minimum current for the same characteristics. To get the maximum deposition rate at a given current, one should have the smallest wire possible that provides the necessary penetration of the weld. The larger electrode diameters create welds with less penetration but wider in width. The choice of the wire electrode diameter depends on the thickness of the work-piece to be welded, required weld penetration, the desired weld profile and deposition rate, the position of welding and the cost of the electrode wire.

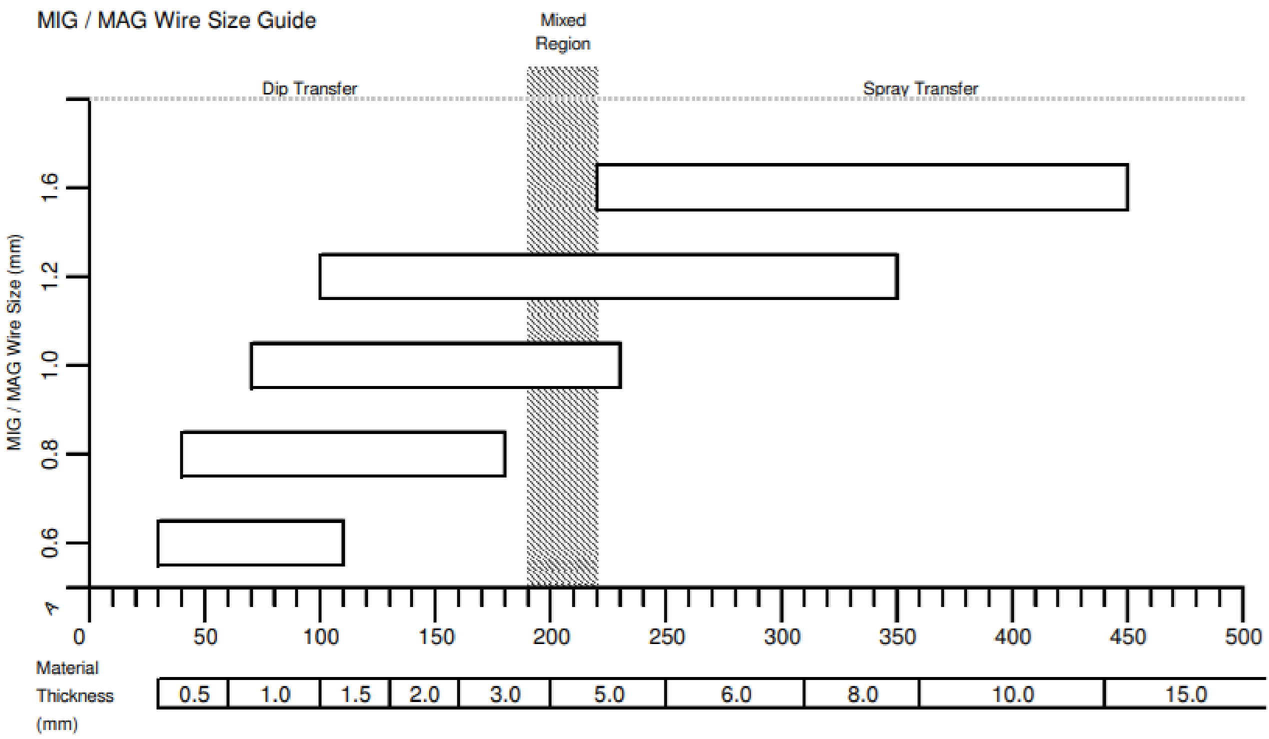


Figure 13

For many purposes, small diameter wires are good for thin sections for welding in vertical and overhead positions. Large diameter wires are desirable for heavy sections and hard surfacing and built-up works with low current applications because of less weld penetration.

Taking into account all the factors mentioned above – especially the fact that small diameter electrode wires cost more on a weight basis – one can find a wire size that will produce minimum welding costs for any welding application.

Electrode Extension

As shown in the illustration opposite, the electrode extension or stick out is the length of the filler wire between the end of the contact tip and the end of the electrode. This is the only section of the wire electrode that conducts the welding current. Therefore an increase of the extension increases its electrical resistance and also causes the electrode temperature to rise because of the resistance heating.

This preheat can reach a temperature value approaching the melting point of the electrode so that an arc heat of small intensity will be enough for

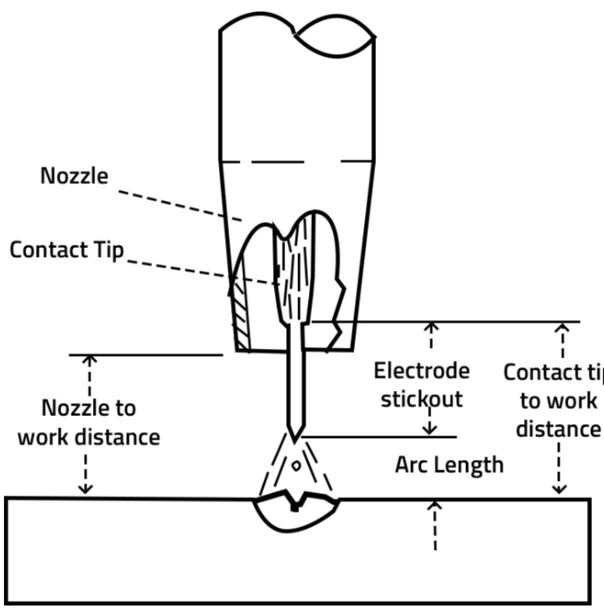


Figure 14

it to become molten at the point of welding. In a constant voltage power source, the increase of the resistance of the sickout produces a greater voltage drop from the contact tip to the work. The CV power source compensates for the higher voltage drop by decreasing the current, which produces a smaller arc resulting in a narrow, high-crowned weld bead with shallow penetration.

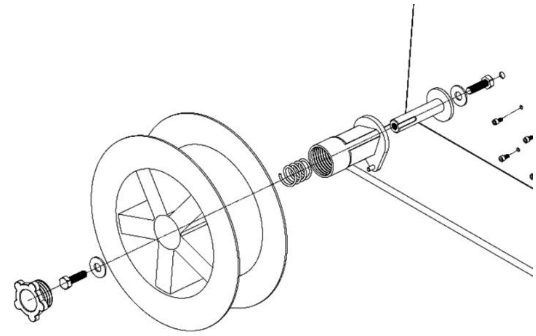
Decreasing the sickout shows just the opposite effect, preheating of the wire is reduced, the voltage drop is not as high and the power source provides more current than the heat input to the work-piece which causes an increase in the penetration.

Typical electrode extensions range from 6 to 13mm (1/4 - 1/2 in) for short-circuiting transfers and from 13 to 25 mm (V2 - I in.) for other types of metal transfers. Longer extensions are used for flux-cored electrodes.

The welder can increase the electrode extension, which reduces the welding current and the penetration to make adjustments in the characteristic of the weld bead to compensate for changes over a short length of the weld such as an area where the root is opening is excessively wide or narrow.

4. Installation of AUTO MIG 250XL

STEP1 - Mounting of Wire Spool



Pictorial Representation of wire spool installation

Figure 15

- Set the wire reel onto the spool holder or shaft and ensure that the turns are not crossed on one another on the reel and that they can easily unwind.
- Fit the washer, spring and knob back into place as pictured to the left.

STEP2 - Key Points for Feeding the Welding Wire

- It is critical that, you choose the right size wire feed roller size.
- Feed the wire from the spool to the Roller as shown below.

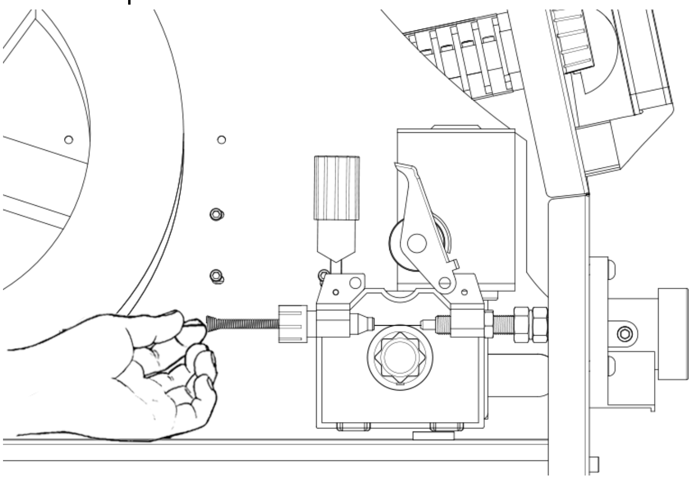


Figure 16

- Usage of an incorrect wire feed roller will result in issues such as inconsistent feeding of wire or irregular welding.
- You can change this roller by removing the roller cap screw on the wire feed roller bracket and followed by the wire feed roller.
- You can see a stamp marked like '0.8/1.0/1.2mm' etc. on either side of the roller. Always ensure that the welding wire size matches the wire feed roller size.
- It is critical that, during the welding operations or even in idle conditions too, you have to ensure, sufficient tension is there on the Wire Feed Roller. While performing welding, if the tension between the **Wire Feed Roller** and the **Wire Tension Bearing** is insufficient, you will experience issues such as inconsistent feed & speed of the wire which may cause irregular welding. You can adjust the tension of the wire by tightening or loosening the **Wire Tension Screw** as shown below.

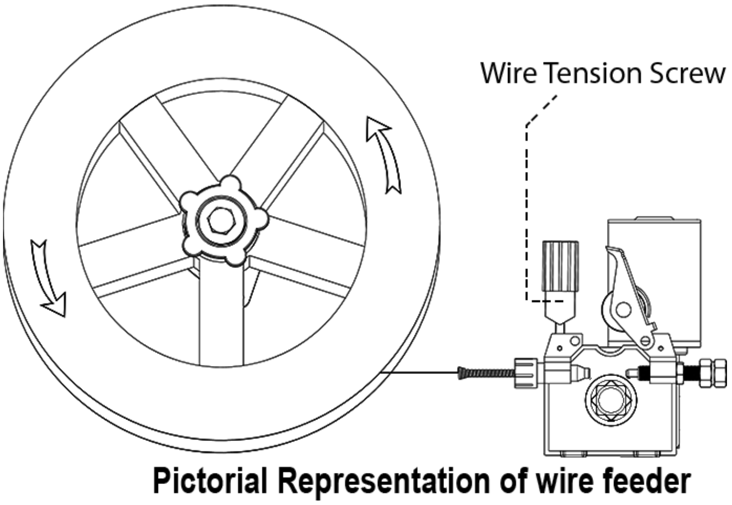


Figure 17

STEP3 - Key Points to make sure while Feeding Wire through MIG Torch

- Connect the MIG Torch to the machine as shown below.

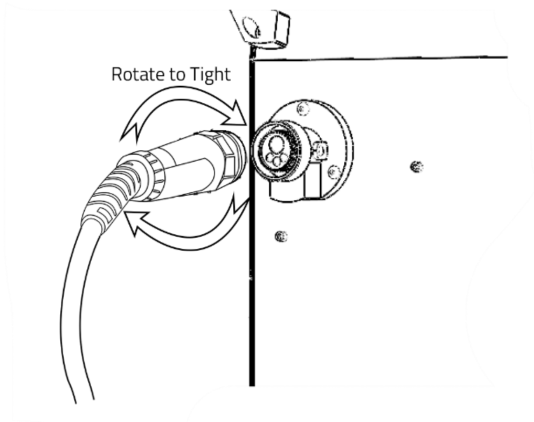


Figure 18

- Always ensure that you always extend the welding torch lead to enable the MIG wire to pass through the welding torch lead inner tube.

- The inner liner allows the MIG wire to pass between the MIG welder and the welding torch without creating drag.
- Ensure that the torch lead is not curled up or tightly wound as this can cause the welding wire to pierce through the inner tube and protrude through the outer protective layer of the torch lead.

STEP4 - Fitting the Gas Cylinder with Machine

- Place the correct size Cylinder on the Cylinder tray on the Machine and ensure the safety of the Cylinder by fastening the Cylinder Safety Chain as shown below.

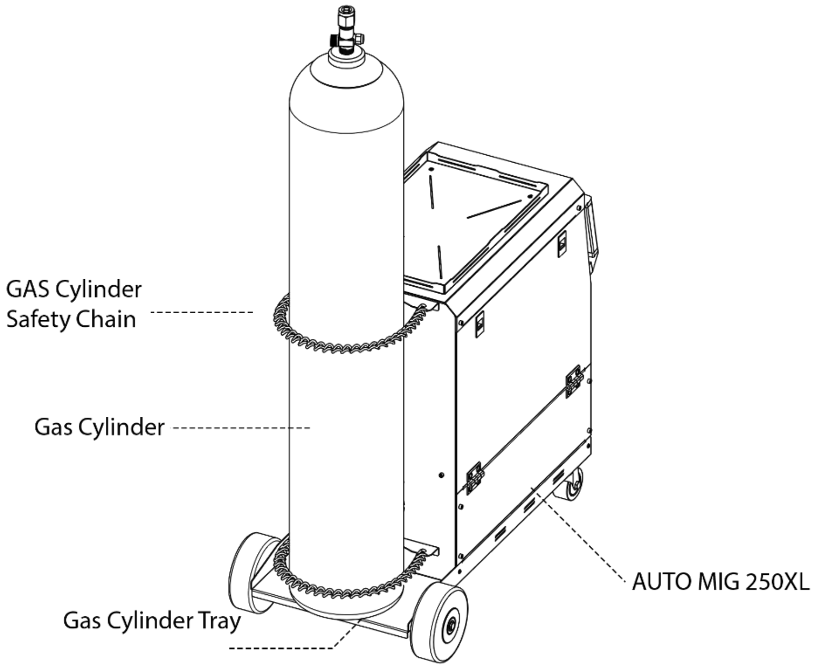


Figure 19

- Attach the appropriate regulator to the cylinder as shown in figure 20. Then, gently open the gas knob for a few seconds to release some amount of the gas. By this, we can remove any dust or foreign particles that remain inside the regulator.

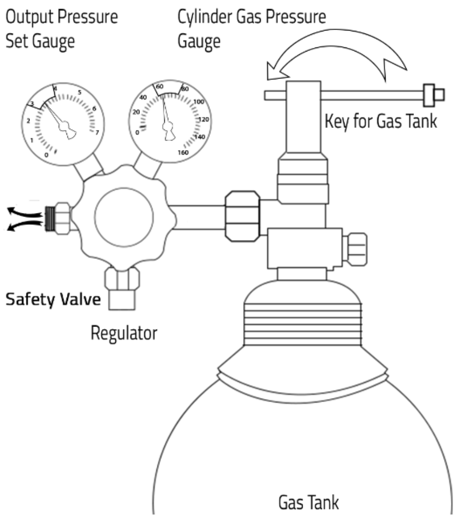


Figure 20

- Connect the Gas Flow Meter with Regulator and make sure that the connection nipple from the flow meter should be in the correct size like the gas hose of the machine.

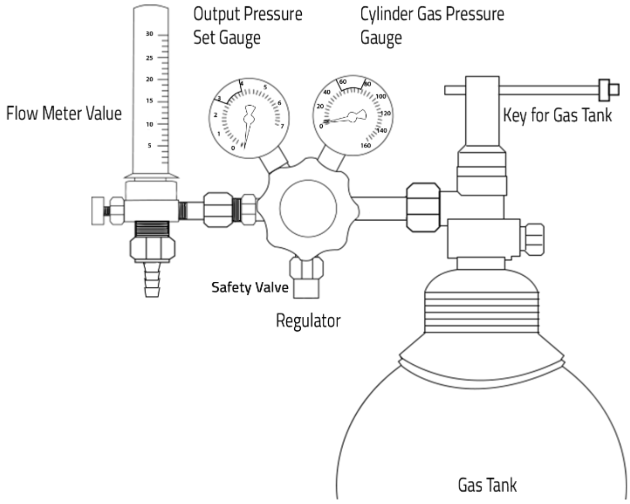


Figure 21

- Connect the gas hose with the flow control valve and tighten the screw of the hose clamp.

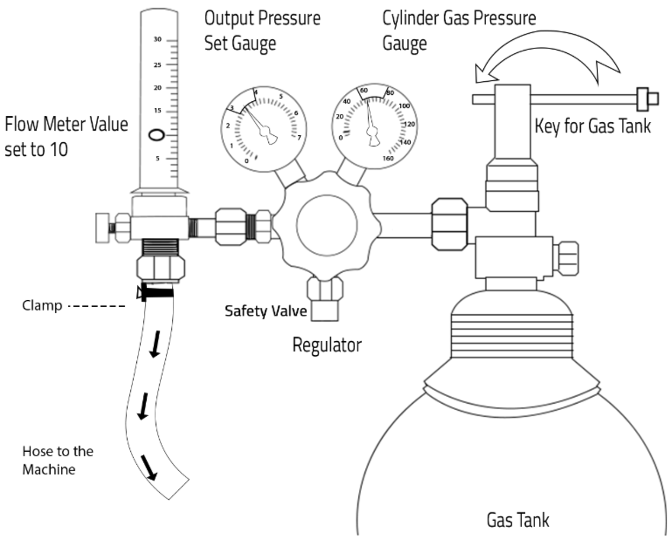


Figure 22

- Open the gas cylinder key and set the pressure between 2 to 4 bar.
- Please make sure that the regulator has not been affected with any type of leaks, for that apply soap solution or any other gas detecting solutions. If any leak is found, rectify it before operating the machine.
- Trigger the machine to set the flow of gas and set the gas between 5 to 12 LPM with the help of a flow control valve.

NOTES: WELD WIRE PREPARATIONS

- ALWAYS EXTEND THE MIG TORCH LEAD FULLY WHEN FEEDING THE WIRE THROUGH THE TORCH TIP.
- ALWAYS CUT THE WELDING WIRE WITH A FLAT END TO AVOID DAMAGES WHILE FEEDING (please refer to figure 23 for details).

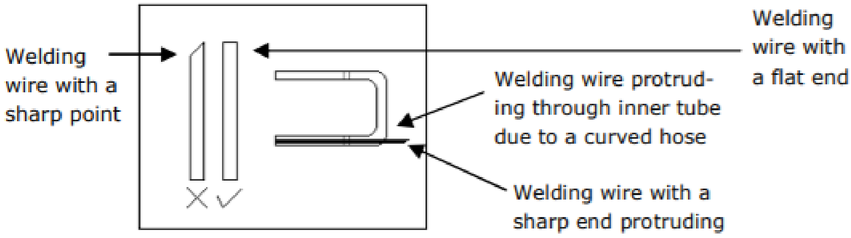


Figure 23

- ALWAYS REMOVE THE MIG TORCH CONTACT TIP BEFORE FEEDING THE WIRE THROUGH THE TORCH.

5. Ideal Working Conditions

The device is to be used for the sole purpose of removing dents and shrinking. Using the machine for other purposes is not advised and may cause it to malfunction.

- Stable line voltage of 440V.
- The fusing element must be strong and not loosely connected.
- Extension cable must be short in length and 2.5 sq.mm in size.
- The weld area should be clean and out of oil, dirt etc.
- Use proper tools for right welding.

NOTE: The dent puller must be installed in an area fulfilling the following conditions.

- Under a covered roof.
- Proper ventilation.
- Free from dust.
- Steam/Chemical fumes free.
- Good lighting.
- Normal humidity (Below 98).
- Temperature 0-55 degree Celsius.
- Free from inflammable materials.
- Good ground level.

6. Electrical Installation

First, check that the machine is of the right class in comparison with the working environment. This must be carried out by skilled personnel. All connections must be carried out under current regulations and in full observance of safety laws.

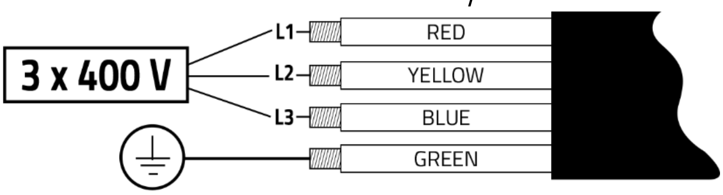


Figure 24

Extension cords of up to 30m must have a cross-section of at least 2.5 mm^2

- Arrange the machine in the proper setup. The machine should be kept on a clean surface.
- The device must be installed on public mains at high voltages meant for domestic buildings as it may cause electromagnetic interference and avoid the use of extension boards.
- Use a power supply socket (3 phase) and MCB with a rating of 16 Amps. If the workplace is available with ELCB that should be not below 32 Amps.
- Before the main connection check the power remains off and the power is low.
- Place the machine on the levelled floor to keep the machine out of rolling.

The resistance welding equipment is not intended to be used on a low-voltage public network which supplies domestic premises. It may cause radio frequency interference. Installation must be carried out by specialized personnel, aware of all safety rules. This unit can be supplied for different power supply versions. Before connecting the unit to the power line, check if the voltage shown on the features plate corresponds to the one of your power supply.

Refer to the **"Technical Data"** table to determine the cables section to be used, according to their length. **Fuses** must be delayed-type. To facilitate the maintenance operation, we recommend you to a cut-off electrical supply to the **AUTO MIG** machine using the mains disconnecting switch.

7. Know Our Machine

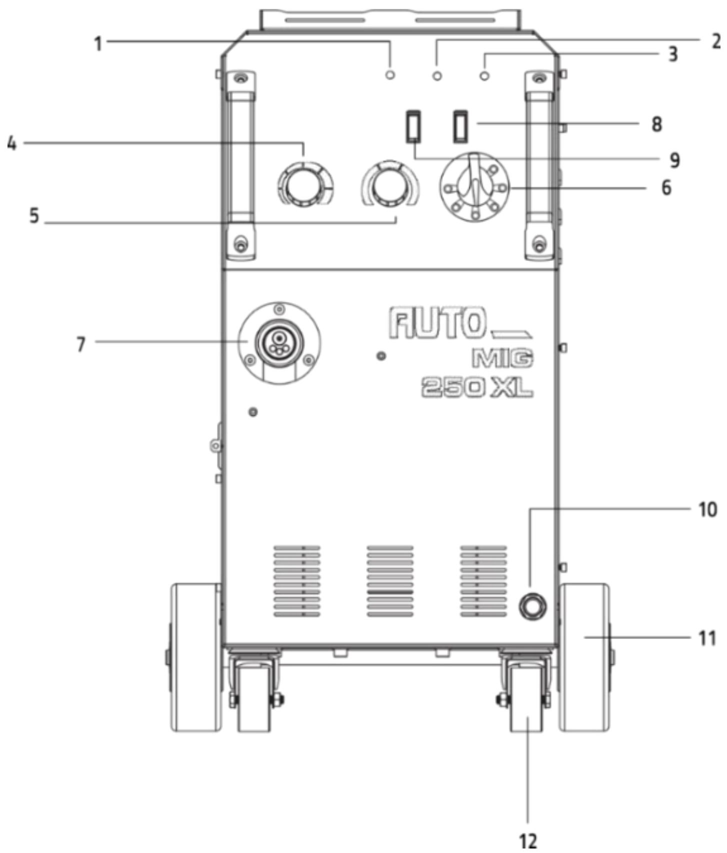


Figure 25

Sl. No.	Item	Description
1	Time ON LED Indicator	This LED notifies the operator when it is working under Time Mode.
2	Temperature LED Indicator	This LED notifies the operator when it is working under overheating conditions.
3	Power ON LED Indicator	This LED indicates the power on/off condition of the machine.
4	Time Knob	This knob helps the operator to adjust the time from 0 to 100%.
5	Speed Knob	This knob helps the operator to adjust the speed from 0 to 100%.
6	7 Step Voltage Selector	This helps the operator to select the voltages between 1-7 steps.
7	Torch Connector	This helps the operator to connect the MIG Torch to the machine.
8	Rocker Switch ON/OFF	This switch can be used to power on/off the machine.
9	Rocker Switch Mode Selection	By placing this switch upwards the operator can select Normal Mode and by placing it downwards the operator can select Time Mode.
10	Negative Cable Gland	This carries the earth cable & protects the cable from wear & tear.
11	Rear Wheels	This helps to control the movement of the machine.
12	Castor Wheels	This helps to control the direction of the machine’s movement.

Technical Data

Description	AUTO MIG 250XL
Input Voltage and Frequency	440 V / 50 Hz [Three Phase]
Current Range	40 - 250 A
Voltage Steps	7
Open Circuit Voltage	35V
Cable (Input)	2.5 mm^2 x 6 M x 4 core
Cable (Earth)	2.5 mm^2 x 3 M
Wire Coil	5 - 15 kg
Wire Coil Dia	300 mm
Wire Feed Speed	2 - 15 m/min
Spot Time	0.15 - 5 sec
Fuses	1 A
Protection class	IP 21
Dimensions and Weight	800 mm x 400 mm x 600 mm
	70 kg

8. Operating Parameters

Wire Dia (mm)	Sheet – Gauge	Power – Amp
0.8	22 (0.8 mm)	45-55 Amp
0.8	20 (0.9 mm)	50-60 Amp
0.8	18 (1.2 mm)	70-80 Amp
0.8	16 (1.6 mm)	90-110 Amp
0.8	14 (2 mm)	120-130 Amp
1.2	1/8" (3.2 mm)	140-150 Amp
1.2	3/16" (4.8 mm)	160-170 Amp
1.2	1/4" (6.49 mm)	180-190 Amp
1.2	5/16" (7.9 mm)	200-210 Amp
1.2	3/8" (9.5 mm)	220-250 Amp

9. Daily Routine Check-up

1. Always keep the machine and accessories clean.
2. Clean the Torch Nozzle daily.
3. Use the Nozzle Gel Regularly.
4. Before starting the welding, make sure that the weld role has not to get rusted.
5. Make sure the gas pressure and flow are specified.
6. Take attention to electrical input and output connections.
7. Should have a visible examination on the condition of the input and output cables and make sure that, are not damaged.
8. When the welder is not in use, definitely close the gas cylinders valve and zero out the regulator.

10. Parts List

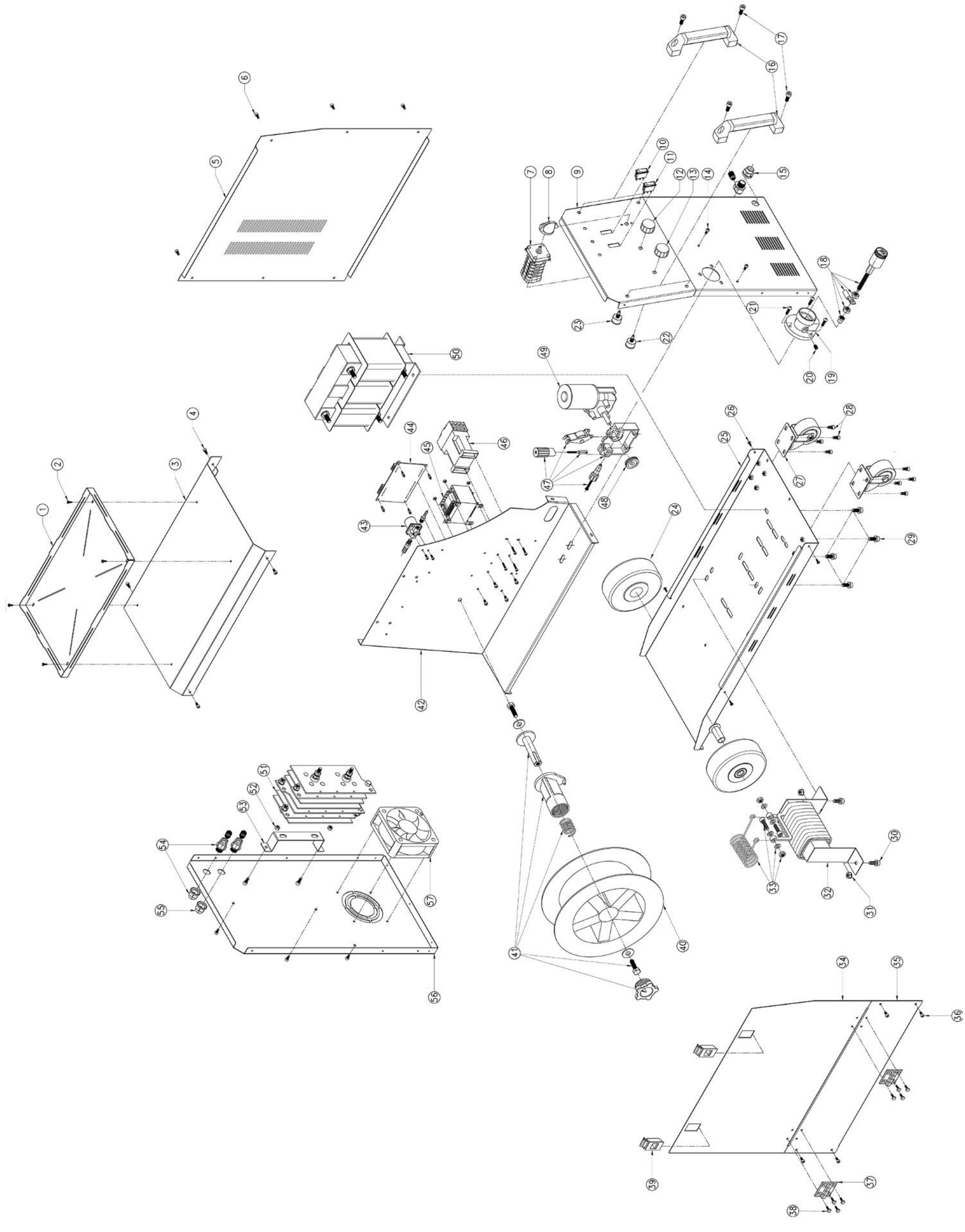


Figure 26 Dismantled View of AUTO MIG 250XL

Sl No.	Items' Description	Qty
1	Accessories Tray	1
2	Screw for Accessories Tray	4
3	Body Top Cover	1
4	Allen Bolt for Top Cover	4
5	Body Side Cover	1
6	Allen Bolt for Side Cover	1
7	Power Selector Switch	6
8	Power Selector Switch Knob	1
9	Body Front Pannel	1
10	Rocker Switch On/ Off	1
11	Rocker Switch Time On	1
12	Knob for Potential Meter (Speed)	1
13	Knob for Potential Meter (Time)	1
14	Allen bolt for Middle Pannel	5
15	Earth Cable Gland	1
16	Handle Assembly	2
17	Allen bolts for Handle	4
18	Euro Adaptor Assembly	1
19	Cover Holder for Euro Adaptor	1
20	Grub Screw for Euro adaptor	1
21	Button head Screw for Euro adaptor	3
22	Potential Meter for Time	1
23	Potential Meter for Speed	1
24	Rear Wheels	2
25	Bottom Pannel	1
26	Bottom Panel Screws	4
27	Castor Wheels	2
28	Allen bolts for Castor Wheels	8
29	Allen Bolts for Weld Transformer	4
30	Allen Bolts for Choke Coil	2
31	Hexagonal Nuts for Choke Coil	2
32	Choke Coil	2
33	Balancing Spring Assembly	
34	Side Door	1
35	Bottom Side Panel	1
36	Allen Bolts for Bottom Side Pannel	4
37	Side Door Hinges	2
38	Hexagonal Bolts for Hinges	8
39	Door Lock Clip	2
40	Weld Spool	1
41	Spool Holder Assembly	
42	Middle Panel	1
43	Solenoid Valve Assembly	1
44	PCB Assembly	1
45	Transformer for Control Card	1
46	Electrical Contactor	1
47	PMDC Bracket Assembly	
48	Wire Roller	1
49	PMDC Motor	1
50	Weld Transformer	1
51	Diode	1
52	Hexagonal Nut for Diode	2
53	Bracket for Diode	1
54	Cable Gland assembly (Gas)	1
55	Cable Gland assembly (Input Cable)	1
56	Back Panel	1
57	Exhaust Fan	1

9. Wiring Diagram

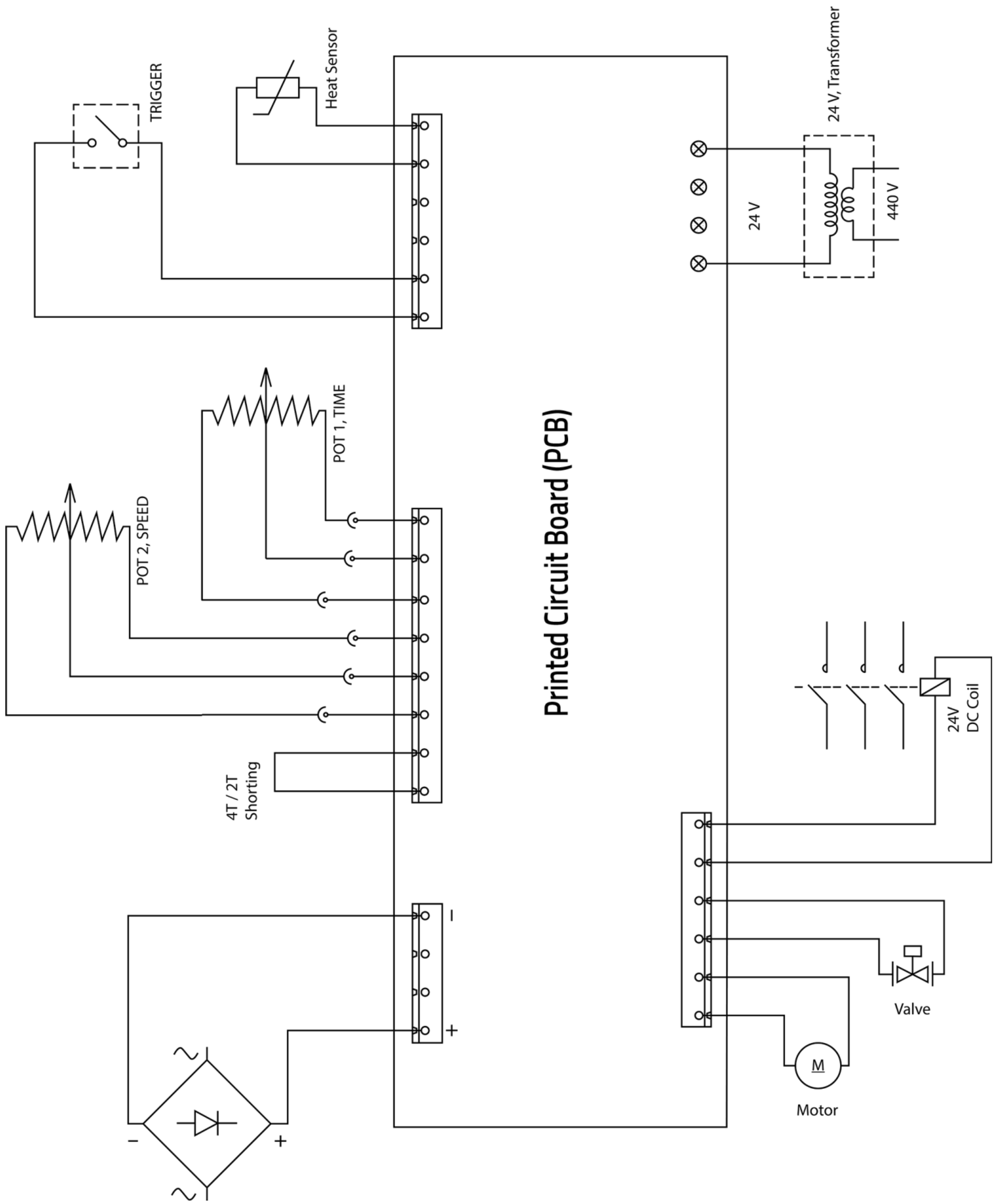


Figure 27

10. Maintenance and Service

Sl. No.	Symptoms	Causes	Remedy
1	Power Switch not ON	No input or faulty switch	1. Check Power Supply 2. Check Switch
2	Power Switch is ON but it's not working	1. Faulty Power Switch 2. Fuse is blown off 3. Faulty PCB 4. Trigger mechanism fail 5. Faulty Selection Switch	1. Check Power Supply 2. Check Fuse 3. Replace PCB 4. Check Trigger Switch and wire 5. Check or replace Switch
3	ELCB or MCB falling while machine powered ON	1. Internal electrical short 2. Faulty input connection	1. Call a technician 2. Check wire of Input Power Supply
4	Too much noise with electrical disturbance	Faulty PCB	Call a technician
5	Machine not producing enough Power	1. One electrical phase may not be received by the machine. 2. Very Low Welding Voltage. 3. Plate thickness is very high. 4. Internal loose contact between output and input cable connections. 5. Earth connection with Work Panel is weak. 6. Too long Input Power cord. 7. Dusty or Rusty Work area. 8. Internal dia of contact tip too large.	1. Check electrical input 2. Increase Welding Voltage 3. Correct the thickness of the plate 4. Check the connections properly 5. Inspect and rectify earth connection. 6. Reduce the length. 7. Clean work area 8. Check Contact Tip
6	Too much Spatter	1. Wire Feed Motor Speed is too high. 2. Internal dia of contact tip too large. 3. Internal loose contact between output and input cable connections.	1. Check the wire feed. 2. Check the Contact Tip. 3. Check the connections properly.

7	Wire sticking with contact tip.	1. Rusty wire. 2. Wire-feed pressure is too low. 3. Worn-out wire feed roller. 4. Internal dia of the contact tip is too large. 5. Faulty PCB.	1. Check the wire, if necessary replace the wire. 2. Check the wire feed pressure. 3. Replace the roller. 4. Replace the contact tip. 5. Call a technician.
8	Welding not getting properly while doing spot or pulse weld.	1. Using un-recommended gases. 2. Gas mixes with natural or other gases. 3. Very low gas flow. 4. Gas nozzle blocked. 5. Gap between the contact tip and workpiece is too large.	1. Change the gas. 2. Check or replace if necessary. 3. Increase the gas flow. 4. Clean the gas nozzle. 5. Clear the gap and try to keep it 6mm.

The placing in service of the **AUTO MIG** after an emergency condition must be carried out only by qualified personnel trained to accomplish all the machine necessary tests. After an emergency condition, the machine operations must be restored only by trained personnel capable of carrying out all the machine necessary tests. This chapter states the necessary maintenance operations to be carried out for:

1. Keeping the welding unit safe operating and preserving its efficiency;
2. Avoid the most common causes of malfunctioning and deteriorating quality.

ELECTRICAL CIRCUIT

Electric circuit maintenance must be carried out only by specialized personnel trained to accomplish it under safety conditions.

Disconnect the electric mains before carrying out the following instructions as discharges coming from the supply can be lethal.

- Periodically check ground condition.
- Periodically check the control condition: devices, micro switches, cables, connectors, etc.

In case of emergency, switch off the AUTO MIG using the switch. If there is any water leakage that could enter the AUTO MIG immediately disconnect the electric supply. In case of fire do not use water but proper fire extinguishers.

11. Warranty Claiming

OUR COMPANY subject to the terms and conditions described below, warrants to its original retail purchaser that new **OUR COMPANY** equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by **OUR COMPANY**.

THIS WARRANTY IS EXPRESSLY INSTEAD OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS. OUR COMPANY PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF THE EQUIPMENT.

OUR COMPANY honour valid warranty claims on warranted equipment for **ONE YEAR** in the event of such a failure within the warranty period. All warranty periods start on the delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to a distributor or retail customer. Within the applicable warranty period, **OUR COMPANY** will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. **OUR COMPANY** must be notified in writing within thirty (30) days of such defect or failure, at which time **OUR COMPANY** will provide instructions on the warranty claim procedures to be followed.

OUR COMPANY's Limited Warranty shall **NOT** apply to:

1. Consumable components or parts that fail due to normal wear.
2. Items furnished by **OUR COMPANY** but manufactured by others. These items are covered by the manufacturer's warranty if any.
3. Equipment that has been modified by any party other than **OUR COMPANY**, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at **OUR COMPANY**'s option:

1. Repair,
2. Replacement,
3. The reasonable cost of repair or replacement by an authorized **OUR COMPANY** service representative (where authorized in writing by **OUR COMPANY** in appropriate cases), or
4. Payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. **OUR COMPANY**'s option of repair or replacement will be F.O.B., Factory, or F.O.B. at an **OUR COMPANY**'s

authorized service representative as determined by **OUR COMPANY**. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

This Limited Warranty provides specific legal rights, and other rights may be available but may vary from province to province.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MM BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, CONCERNING ANY AND ALL EQUIPMENT FURNISHED BY OUR COMPANY IS EXCLUDED AND DISCLAIMED BY OUR COMPANY.

12. Test Report

Serial Number	:		
Input Voltage	:		**V**
Input Current	:		**A**
Output Voltage	:		**V**
Output Current	:		**A**

Date of Test :	Signature :

Remarks :

COMPANY DETAILS OR OTHER INSTRUCTIONS