TitanMig160 Syn Pro

OPERATING MANUAL

Operating manual EN

Brugsanvisning DA

Gebrauchsanweisung DE

Manual de instrucciones ES

Käyttöohje FI

Manuel d'utilisation FR

Manuale d'uso IT

Gebruiksaanwijzing NL

Bruksanvisning NO

Instrukcja obsługi PL

Manual de utilização PT

Инструкции по эксплуатации RU

Bruksanvisning SV

操作手册 CN

English

SAFETY RULES

These general safety norms cover both arc welding machines and plasma cutting machines unless otherwise noted.

DANGER! indicates immediate and real danger. If it is not avoided, death or serious injury will result.

WARNING! indicates a potentially dangerous situation. Death or serious injury may result if appropriate precautions are not taken.

CAUTION! indicates a situation where damage or injury could occur. If it is not avoided, minor injury and/or damage to property may result.

NOTE! indicates a risk of flawed results and possible damage to the equipment

The equipment must only be used for the purpose it was designed for. Using it in any other way could result in damage or injury and in breach of the safety rules. Only suitably trained and competent persons should use the equipment. Operators should respect the safety of other persons.

Prevention against electric shock

The equipment should be installed by a qualified person and in accordance with current standards in operation. It is the user's responsibility to ensure that the equipment is connected to a suitable power supply. Consult with your utility supplier if required.

If earth grounding of the work piece is required, ground it directly with a separate cable.

Do not use the equipment with the covers removed.

Do not touch live electrical parts or parts which are electrically charged.

Turn off all equipment when not in use.

Cables (both primary supply and welding) should be regularly checked for damage and overheating. Do not use worn, damaged, under sized, or poorly jointed cables.

Ensure that you wear the correct protective clothing, gloves, head and eye protection.

Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work ground.

Never touch the electrode if you are in contact with the work ground, or another electrode from a different machine.

Do not wrap cables over your body.

Ensure that you take additional safety precautions when you are welding in electrically hazardous conditions such as damp environments, wearing wet clothing, and metal structures. Try to avoid welding in cramped or restricted positions.

Ensure that the equipment is well maintained. Repair or replace damaged or defective parts immediately. Carry out any regular maintenance in accordance with the manufacturer's instructions.

Safety against fumes and welding gases

Locate the equipment in a well-ventilated position.

Keep your head out of the fumes. Do not breathe the fumes.

Ensure the welding zone is in a well-ventilated area. If this is not possible provision should be made for suitable fume extraction.

If ventilation is poor, wear an approved respirator. Read and understand the Material Safety Data Sheets (MSDS's) and the manufacturer's instructions for metals, consumable, coatings, cleaners, and de-greasers.

Do not weld in locations near any de-greasing, cleaning, or spraying operations. Be aware that heat and rays of the arc can react with vapours to form highly toxic and irritating gases.

Do not weld on coated metals, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings on many metals can give off toxic fumes if welded.

Prevention against burns and radiation

Arc rays from the welding process produce intense, visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin.

Wear an approved welding helmet fitted with a proper shade of filter lens to protect your face and eyes when welding or watching

Wear approved safety glasses with side shields under your helmet.

Never use broken or faulty welding helmets.

Always ensure there are adequate protective screens or barriers to protect others from flash, glare and sparks from the welding area. Ensure that there are adequate warnings that welding or cutting is taking place.

Wear suitable protective flame resistant clothing. The sparks and spatter from welding, hot work pieces, and hot equipment can cause fires and burns

Welding on closed containers, such as tanks, drums, or pipes, can cause them to explode.

Accidental contact of electrode to metal objects can cause arcs, explosion, overheating, or fire.

Check and be sure the area is safe and clear of inflammable material before carrying out any welding.

Protection against noise

Some welding and cutting operations may produce noise.

Wear safety ear protection to protect your hearing.

Protection from moving parts

When the machine is in operation, keep away from moving parts such as motors and fans.

Moving parts, such as the fan, may cut fingers and hands and snag garments.

Protections and coverings may be removed for maintenance and controls only by qualified personnel, after first disconnecting the power supply cable.

Replace the coverings and protections and close all doors when the intervention is finished, and before starting the equipment.

Take care to avoid getting fingers trapped when loading and feeding wire during set up and operation.

When feeding wire be careful to avoid pointing it at other people or toward your body.

Always ensure machine covers and protective devices are in operation.

Precautions against fire and explosion

Avoid causing fires due to sparks and hot waste or molten metal

Ensure that appropriate fire safety devices are available near the cutting / welding area.

Remove all flammable and combustible materials from the cutting / welding zone and surrounding areas.

Do not cut/weld fuel and lubricant containers, even if empty. These must be carefully cleaned before they can be cut/welded.

Always allow the cut/welded material to cool before touching it or placing it in contact with combustible or flammable material.

Do not work in atmospheres with high concentrations of combustible fumes, flammable gases and dust.

Always check the work area half an hour after cutting to make sure that no fires have begun

Risks due to magnetic fields

The magnetic fields created by high currents may affect the operation of pacemakers or electronically controlled medical equipment.

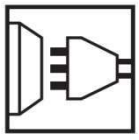
Wearers of vital electronic equipment should consult their physician before beginning any arc welding, cutting, gouging or spot welding operations.

Do not go near welding equipment with any sensitive electronic equipment as the magnetic fields may cause damage.

RF Declaration

Equipment that complies with directive 2004/108/EC concerning electromagnetic compatibility (EMC) and the technical requirements of EN60974-10 is designed for use in industrial buildings and not those for domestic use where electricity is provided via the low voltage public distribution system. Diffculties may arise in assuring class A electromagnetic compatibility for systems installed in domestic locations due to conducted and radiated emissions.

In the case of electromagnetic problems, it is the responsibility of the user to resolve the situation. It may be necessary to shield the equipment and fit suitable filters on the mains supply.



LF Declaration

Consult the data plate on the equipment for the power supply requirements.

Due to the elevated absorbance of the primary current from the power supply network, high power systems affect the quality of power provided by the network. Consequently, connection restrictions or maximum impedance requirements permitted by the network at the public network connection point must be applied to these systems.

In this case the installer or the user is responsible for ensuring the equipment can be connected, consulting the electricity provider if necessary.

Materials and their disposal

The equipment is manufactured with materials, which do not contain any toxic or poisonous materials dangerous to the operator.

When the equipment is scrapped, it should be dismantled separating components according to the type ofmaterials.

Do not dispose of the equipment with normal waste. The European Directive 2002/96/EC on Waste Electrical and Electronic Equipment states the electrical equipment that has reached its end of life must

be collected separately and returned to an environmentally compatible recycling facility.

Handling of Compressed gas cylinders and regulators

All cylinders and pressure regulators used in welding operations should be handled with care.

Never allow the electrode, electrode holder or any other electrically “hot” parts to touch a cylinder.

Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

Always secure the cylinder safely.

Never deface or alter any cylinder

Contents

1 PREFACE

1.01 General

Congratulations on choosing TitanMig160 Syn Pro welding machine. Used correctly, our products can significantly increase the productivity of your welding, and provide years of economical service.

This operating manual contains important information on the use, maintenance and safety of our product. Please read the manual carefully before using the equipment for the first time.

For your own safety and that of your working environment, pay particular attention to the safety instructions in the manual.

For more information on our products, contact us, consult an authorised dealer, or visit our website.

The specifications presented in this manual are subject to change without prior notice.

Important notes

Items in the manual that require particular attention in order to minimise damage and personal harm are indicated with the **'NOTE!'** notation. Read these sections carefully and follow their instructions.

Disclaimer

While every effort has been made to ensure that the information contained in this guide is accurate and complete, no liability can be accepted for any errors or omissions. We reserve the right to change the specification of the product described at any time without prior notice.

1.02 Introduction

The TitanMig160 Syn Pro welding machine offers many benefits of a professional welding machine in a compact, portable, easy to use and affordable self-contained single phase welding inverter. With Quick Set Plate Thickness Pre-Sets installed the guess work is now taken out of the set up, to allow excellent welding results. Plate thickness setting allows you to set up in a flash. There is no guessing the welding parameters. Use the Quick Set feature to set the machine to the correct plate thickness you are welding. You can check the plate thickness with a measuring device, such as a ruler or vernier caliper. If two different plate thickness are to be joined then, add the two together and divide by 2 and use the average plate thickness as your setting guide.

The TitanMig160 Syn Pro welding machine is ideal for people who want to do light fabrication, maintenance and repairs or DIY around the home, workshop, worksite, or farm, without compromising on quality or safety. These welding inverters can perform MIG (Gas Shielded and Gasless) welding process, Lift TIG, MMA.

The TitanMig 160Syn Pro welding machine is equipped with a standard 230V x 16Amp plug, and a digital meter which displays, welding wire size, plate thickness, wire feed speed, amps and voltage. Additionally, the digital display also allows you to fine tune the Wire Feed Speed and Trim the Voltage off the factory Pre-Sets to suit individual welding jobs and circumstances.

The TitanMig160 Syn Pro provide excellent welding performance across a broad range of applications when used with the correct welding consumables and procedures. The following instructions detail how to correctly and safely set up the machine and give guidelines on gaining the best efficiency and quality from the power sources. Please read these instructions thoroughly before using the units

Package Item

- TitanMig160 Syn Pro Inverter Power Source
- 3m Lead with Work Clamp
- 3m MIG gun
- 3m gas hose
- Operating Manual

Features

- Innovative IGBT Inverter Technology
- MIG/MAG with Gas and Gasless wire function
  - Synergic programs for 0.6/0.8 / 0.9/1.0 Mild Steel
- DC TIG
  - Lift Arc ignition (prevents tungsten sticking during arc ignition)
- Stick Electrode (MMA) Function
  - VRD (Voltage Reduction Device), ON/OFF could be chosen
  - Hot start (improves electrode starting)
- LED Digital Display

1.03 Technical Specifications

	TitanMig160 Syn Pro
Power Supply / Phases (V-Ph)	230VAC± 15%
Duty Cycle@40°c	30%@140A MMA 100%@76.7A MMA
	30%@160A TIG 100%@87.6A TIG
	30%@160A MIG 100%@87.6A MIG
Output Current Range MIG	20A/15V~160A@22A
Output Current Range TIG	10A/10.4V~160A/16.4V
Output Current Range MMA	10A/20.4V~140A~25.6V
Rated Power MIG	5.9 KVA
Power factor	0.7
I Max MIG	25.7 Amps
TIG	19.2 Amps
MMA	26.2 Amps
I eff MIG TIG MMA	14.1 Amps 10.5 Amps 14.4 Amps
Wire Feeder Type	Gear Driven 2 Roll
Protection Class	IP 21S
Insulation Class	F
Dimensions Power Source (LxWxH)	490x195x380mm
Weight Power Source	11.3 Kgs

Table 1-1: Specifications

NOTE 1

Due to variations that can occur in manufactured products, claimed performance, voltages, ratings, all capacities, measurements, dimensions and weights quoted are approximate only. Achievable capacities and ratings in use and operation will depend upon correct installation, use, applications, maintenance and service.

NOTE 2

The Effective Input Current should be used for the determination of cable size & supply requirements

NOTE 3

Motor start fuses or thermal circuit breakers are recommended for this application. Check local requirements for your situation in this regard.

NOTE 4

Minimum Generator Recommendation at the Maximum Output Duty Cycle. Due to large variations in performance and specifications of different brands and types of generators, We cannot guarantee full welding output power or duty cycle on every brand or type of generator.

Some small generators incorporate low cost circuit breakers on their outputs. These circuit breakers usually will have a small reset button, and will trip much faster than a switchboard type circuit breaker. This may result in not being able to achieve full output or duty cycle from the power source / generator combination. For this reason we recommend a generator that incorporates switchboard type circuit breakers.
We recommends that when selecting a generator, that the particular power source / generator combination be adequately trialled to ensure the combination performs to the users expectations.

NOTE 5

We reserves the right to change product performance and specifications without notice.

NOTE 6

If an extension lead is required to be used it is recommended to use a 2.5mm2 Heavy Duty Extension Lead. Longer extension leads may impact welding performance and operation.

2 INSTALLATION

2.01 Environment

These units are designed for use in environments with increased hazard of electric shock.

A. Examples of environments with increased hazard of electric shock are: 1. In locations in which freedom of movement is restricted, so that the operator is forced to perform the work in a cramped (kneeling, sitting or lying) position with physical contact with conductive parts.
    1. In locations in which freedom of movement is restricted, so that the operator is forced to perform the work in a cramped (kneeling, sitting or lying) position with physical contact with conductive parts.
    2. In locations which are fully or partially limited by conductive elements, and in which there is a high risk of unavoidable or accidental contact by the operator.

A. Environments with increased hazard of electric shock do not include places where electrically conductive parts in the near vicinity of the operator, which can cause increased hazard, have been insulated.

2.02 Location

Be sure to locate the welder according to the following guidelines:

A. In areas, free from moisture and dust.
B. Ambient temperature between -10° C to 40° C.
C. In areas, free from oil, steam and corrosive gases.
D. In areas, not subjected to abnormal vibration or shock.
E. In areas, not exposed to direct sunlight or rain.
F. Place at a distance of 300mm or more from walls or similar that could restrict natural air flow for cooling.

2.03 Ventilation

Since the inhalation of welding fumes can be harmful, ensure that the welding area is effectively ventilated.

2.04 Mains Supply Voltage Requirements

The Mains Supply Voltage should be within ± 15% of the rated Mains Supply Voltage. If actual Mains Supply Voltage is outside this range Welding Current may not be available and may cause internal components to fail.

Refer to Specifications for Supply Voltage information.

The Welding Power Source must be:

• Correctly installed, if necessary, by a qualified electrician.
• Correctly earthed (electrically) in accordance with local regulations.
• Connected to the correct size power point and fuse as per the Specifications.

IMPORTANT NOTE!
This product has been fitted with a supply plug as indicated in Section 2.10. Note that the welding output range applicable with the fitted supply plug is detailed in Section 2.10.

WARNING
Any electrical work must be carried out by a qualified Electrical Tradesperson.

2.05 Extension Leads

If an extension lead is required to be used it is recommended to use a m 2.5mm² Heavy Duty Extension Lead. Longer extension leads may impact welding performance and operation.

2.06 Electromagnetic Compatibility

WARNING

Extra precautions for Electromagnetic Compatibility may be required when this Welding Power Source is used in a domestic situation

A. Installation and Use - Users Responsibility
The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing the welding circuit, see **NOTE** below. In other cases it could involve constructing an electromagnetic screen enclosing the Welding Power Source and the work, complete with associated input filters. In all cases, electromagnetic disturbances shall be reduced to the point where they are no longer troublesome.

B. Assessment of Area
Before installing welding equipment, the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account

1. Other supply cables, control cables, signalling and telephone cables; above, below and adjacent to the welding equipment.
2. Radio and television transmitters and receivers.
3. Computer and other control equipment.
4. Safety critical equipment, e.g. guarding of industrial equipment.
5. The health of people around, e.g. the use of pacemakers and hearing aids.
6. Equipment used for calibration and measurement.
7. The time of day that welding or other activities are to be carried out.
8. The immunity of other equipment in the environment: the user shall ensure that other equipment being used in the environment is compatible: this may require additional protection measures.
   The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

C. Methods of Reducing Electromagnetic Emissions

1. Mains Supply
   Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply.
   Consideration should be given to shielding the supply cable of permanently installed welding equipment in metallic conduit or equivalent. Shielding should be electrically continuous throughout it's length. The shielding should be connected to the Welding Power Source so that good electrical contact is maintained between the conduit and the Welding Power Source enclosure.
2. Maintenance of Welding Equipment
   The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilising devices should be adjusted and maintained according to the manufacturer's recommendations.
3. Welding Cables
   The welding cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.
4. Equipotential Bonding
   Bonding of all metallic components in the welding installation and adjacent to it should be considered. However. Metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching the metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.
5. Earthing of the Workpiece
   Where the workpiece is not bonded to earth for electrical safety, nor connected to earth because of it's size and position, e.g. ship's hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.
6. Screening and Shielding
   Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening the entire welding installation may be considered for special applications.

3 OPERATION

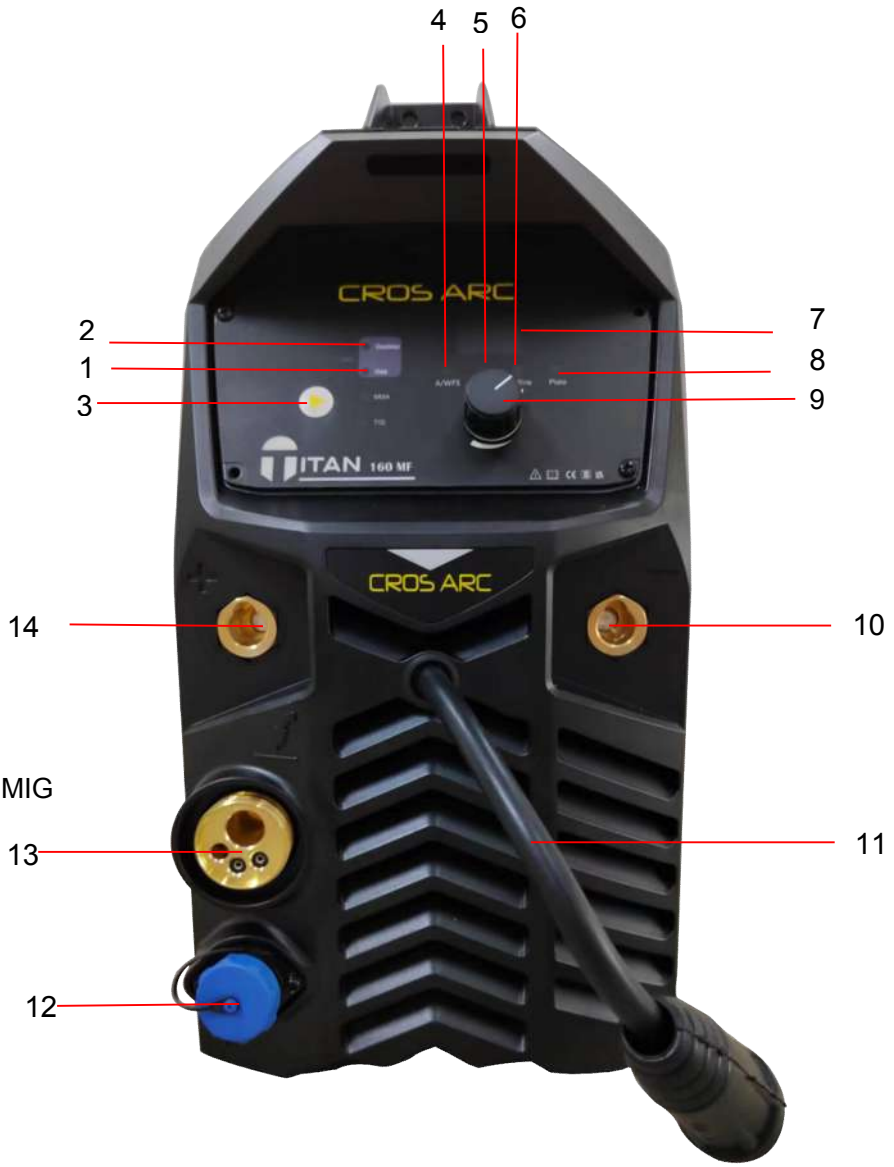
3.01 Overview of machine

Standard operating procedures apply when using these Welding machines, i.e. connect work lead directly to workpiece with the spring loaded clamp. The MIG wire is fed from the spool through the feed roller system and into the MIG Gun (consult the dealer or the electrode wire manufacturers information for the correct polarity). The welding amperage range (plate thickness pre-set) values should be used as a guide only. Current delivered to the arc is dependent on the Wire Feed Speed and welding arc voltage, and as welding arc voltage varies between different classes of MIG wire, welding current at given settings could vary accordingly to the type of MIG wire in use. The operator should use the wire diameter and plate thickness pre-set welding current values as a guide, if necessary, then finally adjust the current setting to suit the application, by fine tuning the WFS / Amps and Volts settings.

Overview of machine

Front View

1. Welding with Gas Shielded
2. MIG (FCAW) Welding with Gasless
3. Process selection control
4. Current/wire feed speed indicator
5. Voltage control
6. Wire diameter
7. Digital Meter
8. Thickness of plate
9. Control knob
10. “—” output terminal
11. Gas/Non gas selector
12. Push Pull control Socket
13. Euro connector of the welding torch in MIG
14. “ ＋” output terminal

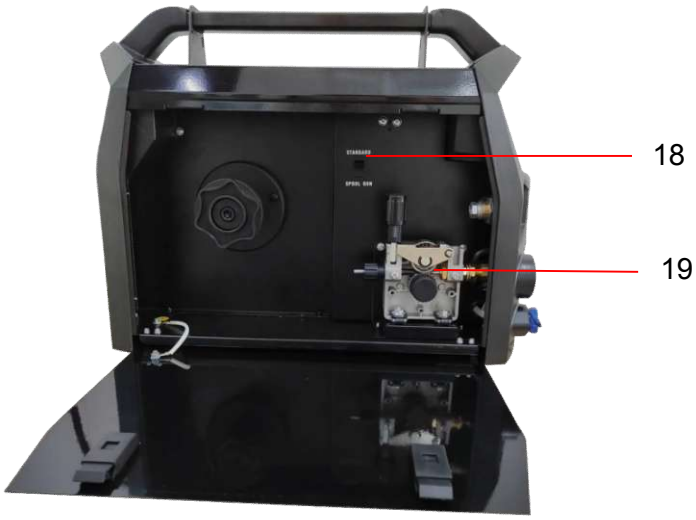


Rear View

15. Power switch
16. Input cable
17. Gas inlet

Inside View

18. Push Pull Torch Switch
19. Wire Feed Assembly



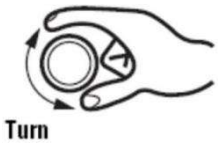
3.02 Power Source Controls, Indicators and Features

1. **Process Selection Control**
   The process selection control is used to select the desired welding mode. Four modes are available, MIG Gasless (FCAW) ,MIG Gas (Solid) (GMAW), Lift-TIG, MMA modes.

2. **Control Knob**
   The TitanMig 160 Syn Pro equipped with a Quick Set Feature for MIG. This allows the user to simply select the welding process, Wire Ø (diameter), Material Plate Thickness and the pre determined welding parameters are set and ready to weld. By further pressing the Control Knob the

   user can modify the Wire Feed Speed (WFS) and Voltage settings if desired, which allows full manual settings range if required.

Press the Control Knob to select parameter to be set Wire Ø (diameter), Plate Thickness, Wire Feed Speed (WFS) and Volts Trim.



Once the desired parameter is selected by pressing the Control Knob, the setting can be adjusted by turning the Control Knob Clockwise to increase value or by turning the Control Knob Anti-clockwise to decrease the value.
If the Control Knob is turned slowly it will adjust the value in small increments and if turned quickly it will adjust the value in larger increments.

Wire Feed Speed (WFS) Function
If the Welding Current is found to be too High or too Low for the application, the Wire Feed Speed can be adjusted to the desired value.

Volts Function (Volts)
By turning the Control Knob, you can change the Pre-set Voltage from the Factory Set Quick Set values. Once the Volts Trim function is selected the Pre-set Voltage can be adjusted by turning the Control Knob Clockwise to increase the value or turning the Control Knob Anti-clockwise to decrease

the value.

3. Digital Meter

In MIG mode the digital meter is used to display the Wire Ø (diameter), Material Plate Thickness, Pre-set Wire Feed Speed in Metres Per Minute (MPM), Pre-set Voltage, in MIG mode and the actual welding amperage of the power source whilst welding.

NOTE *The Pre-set functionality provided on this power source is intended to act as a guide only. Some differences may be observed between pre-set values and actual welding values due to factors including the mode of welding, differences in consumables/gas mixtures, individual welding techniques and the transfer mode of the welding arc (ie dip versus spray transfer). Where exact settings are required (in the case of procedural work), it is recommended that alternate measurement methods be utilised to ensure output values are accurate*

4. MIG Gun Polarity Lead

The polarity lead is used to connect the MIG Gun to the appropriate positive or negative output terminal (allowing polarity reversal for different welding applications). The polarity lead should be connected in to the positive welding terminal (+) when using solid steel, stainless steel or aluminium MIG wire. When using gasless wire, the polarity lead is connected to the negative welding terminal (-). If in doubt, consult the manufacturer of the electrode wire for the correct polarity. It is essential, that the male plug is inserted and turned securely to achieve a sound electrical connection

CAUTION *Loose welding terminal connections can cause overheating and result in the male plug being fused in the Dinse terminal*.

5. Negative Welding Output Terminal

The negative welding terminal is used to connect the welding output of the power source to the work lead. Most General Purpose electrodes are connected with work lead to negative. Consult the electrode manufacturer's information for the correct polarity.
Welding current flows from the workpiece via this Dinse type terminal to the power source. It is essential, that the male dinse type plug is inserted and turned securely to achieve a sound electrical connection. Do not over tighten.

CAUTION *Loose welding terminal connections can cause overheating and result in the male plug being fused in the Dinse terminal.*

6. Positive Welding Output Terminal

The positive welding terminal is used to connect the welding output of the power source to the appropriate welding accessory such as the MIG Gun (via the MIG Gun polarity lead), electrode holder lead or work lead. Positive welding current flows from the power source via this Dinse terminal. It is essential, that the male plug is inserted and turned securely to achieve a sound electrical connection.

CAUTION *Loose welding terminal connections can cause overheating and result in the male*

plug being fused in the Dinse terminal.

7. Gas Inlet Note the Optional Argon

Mini- Regulator and Gas Hose is required in order to use Gas Shielded Solid MIG Welding Wires. The Gas Inlet connection is a barb type inlet fitting located on the rear of the machine which is used to supply the appropriate MIG welding gas to the unit.

WARNING *Only Inert Shielding Gases specifically designed for welding applications should be used.*

8. On/Off Switch

This switch is used to turn the unit ON/OFF. When this switch is turned ON the Digital Meter on the front panel will illuminate.

NOTE *If the Power Source is repeatedly switched On then Off rapidly or the supply to the power source is turned On and Off rapidly it may not turn On due to inbuilt protective devices acting. If this occurs leave the Power Source On/Off switch turned to the Off position for several minutes to allow for the protective devices to reset.*

9. Fan

The Fan is turned ON/OFF by the Power Switch on the rear panel of the machine.

4 MIG (GMAW) WELDING

4.01 Shielding Gas Regulator Operating Instructions

WARNING

This equipment is designed for use with welding grade (Inert) shielding gases only.

Shielding Gas Connection

The Argon Regulator and Gas Hose Kit is an optional accessory. Connect the gas regulator onto the gas cylinder/bottle by hand, keeping the flow tube in the vertical position. Then tighten the nut with a spanner, but do-not over tighten. Connect the gas hose to the threaded outlet on the right-hand side of the regulator and tighten with a spanner. Connect the other end of the gas hose to gas inlet fitting on the rear panel of the welding machine using the supplied Adjustable Hose Clamp to tighten up the hose onto the barb-connector. Check for any leaks with soapy water in a squeeze bottle, and look for bubbles (when the gas is on), this will highlight any gas leaks.

The gas flow (in Litres Per Minute) for shielding the molten weld metal from the atmosphere is adjustable and depends on the job and atmospheric conditions you encounter when welding. As a general rule for MIG Welding, always use a minimum of 12 LPM when welding with an amperage range of under 100Amps, a min. of 15 LPM when the amperage is under 180Amps. A lower gas flow will affect the welding quality and cause a porous weld while high gas flow results in bigger consumption of gas. The flow rate is measured at the middle of the float ball.

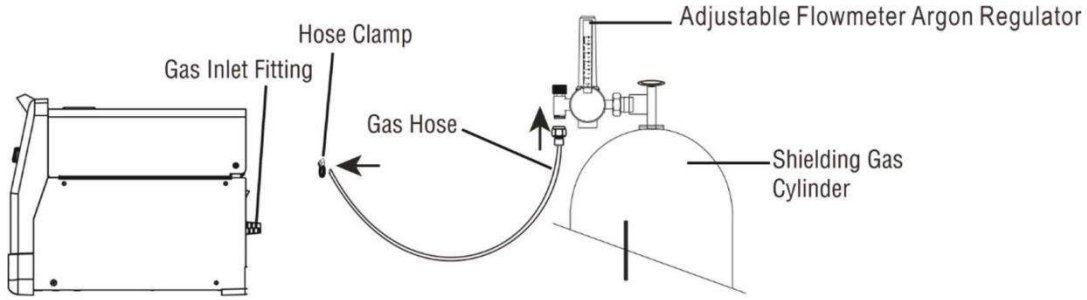


Figure 4-1: Shielding Gas Connection

Shielding Gas Regulator Safety

This regulator is designed to reduce and control high pressure gas from a cylinder or pipeline to the working pressure required for the equipment using it.

If the equipment is improperly used, hazardous conditions are created that may cause accidents. It is the users responsibility to prevent such conditions. Before handing or using the equipment, understand and comply at all times with the safe practices prescribed in this instruction.

SPECIFIC PROCEDURES for the use of regulators are listed below.

1. NEVER subject the regulator to an inlet pressure greater than its rated inlet pressure.
2. NEVER pressurize a regulator that has loose or damaged parts or is in a questionable condition. NEVER loosen a connection or attempt to remove any part of a regulator until the gas pressure has been relieved. Under pressure, gas can dangerously propel a loose part.

3. DO NOT remove the regulator from a cylinder without first closing the cylinder valve and releasing gas in the regulator high and low pressure chambers.
4. DO NOT use the regulator as a control valve. When downstream equipment is not in use for extended periods of time, shut off the gas at the cylinder valve and release the gas from the equipment.
5. OPEN the cylinder valve SLOWLY. Close after use.

User Responsibilities

This equipment will perform safely and reliably only when installed, operated and maintained, and repaired in accordance with the instructions provided. Equipment must be checked periodically and repaired, replaced, or reset as necessary for continued safe and reliable performance. Defective equipment should not be used. Parts that are broken, missing, obviously worn, distorted, or contaminated should be replaced immediately.

The user of this equipment will generally have the sole responsibility for any malfunction, which results from improper use, faulty maintenance, or by repair by anyone other than an accredited repairer.

CAUTION

Match regulator to cylinder. NEVER CONNECT a regulator designed for a particular gas or gases to a cylinder containing any other gas.

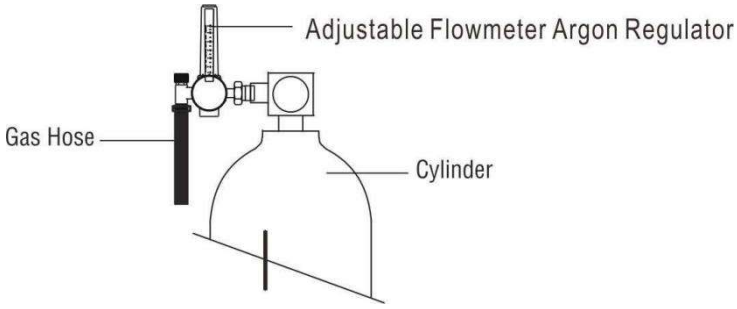


Figure 4-2: Fit Regulator to Cylinder

Installation

1. Remove cylinder valve plastic dust seal. Clean the cylinder valve outlet of impurities that may clog orifices and damage seats before connecting the regulator.
   Crack the valve (open then close) momentarily, pointing the outlet away from people and sources of ignition. Wipe with a clean lint free cloth.
2. Match regulator to cylinder. Before connecting, check that the regulator label and cylinder marking agree and that the regulator inlet and cylinder outlet match. NEVER CONNECT a regulator designed for a particular gas or gases to a cylinder containing any other gas.
3. Connect the regulator inlet connection to cylinder or pipeline and tighten it firmly but not excessively, with a suitable spanner.
4. Connect and tighten the outlet hose firmly and attach the hose to the welding machine with a suitable hose clamp. Ensure no gas leakage. The flowmeter must be in the vertical position to read accurately.

5. The regulator has a self-reseating relief valve – not designed to protect down stream equipment. To protect sensitive down-stream equipment a separate safety device may be necessary.

Operation

With the regulator connected to cylinder or pipeline:

1. Stand to one side of regulator and slowly open the cylinder valve. If opened quickly, a sudden pressure surge may damage internal regulator parts.
2. Check the outlet flow control valve has been closed – turn clockwise by hand until valve stops – valve is fully closed. Before opening the cylinder valve, be sure that the flow adjusting valve is in a finger-tight "OFF" position (clockwise).
3. Slowly and carefully, open the cylinder valve until the maximum pressure registers on the high pressure gauge.

CAUTION

DO NOT purge oxidising or flammable gases in the presence of flame, lighted cigarettes, or other sources of ignition or in a confined space. Open each downstream valve in turn, if more than one regulator is used. Close one valve before opening the next one. This procedure will prevent explosive gas mixtures occurring in the welding hose between regulators and equipment. Close equipment valve(s) after purging, and test all connections for leaks with a suitable leak detection solution or soapy water. Never use a flame when testing for leaks.

Adjusting Flow Rate

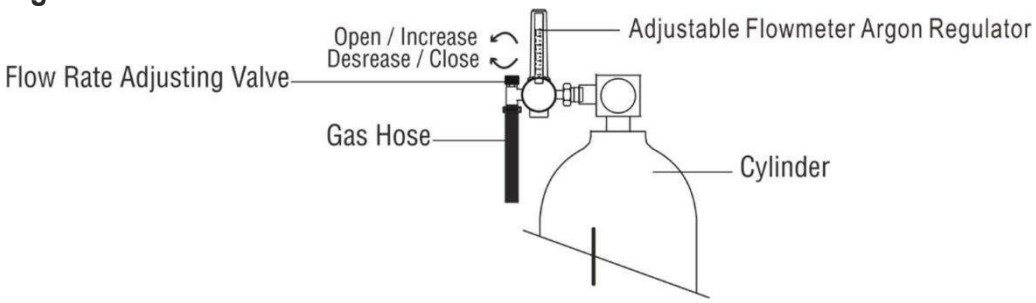


Figure 4-3: Adjust Flow Rate

With the regulator ready for operation, adjust working flow rate as follows:

1. Slowly turn adjusting valve in anti-clockwise direction to open and increase until the bobbin in the flow tube indicates the required flow rate.

NOTE

It may be necessary to re-check the shielding gas regulator flow rate following the first weld sequence due to back pressure present within shielding gas hose assembly.

2. To reduce flow rate, allow the welding grade shielding gas to discharge from regulator by opening the downstream valve. Bleed welding grade shielding gas into a well ventilated area and away from any ignition source. Turn adjusting screw clockwise, until the required flow rate is indicated on the gauge. Close downstream valve.

3. The correct flow rate will depend on the place and conditions you are working in. For indoors work shielding gas flow rate can be from 12L/min for welding thin metals (0.6-1.0mm) when using 0.6mm MIG

wire, up to 15L/min when using thicker metals and using 0.8mm MIG wire. When welding near draughty doorways then the gas flow rate can go up to 18-20L/min. The tell tale sign is to ensure your finished welds do-not have priority holes in the surface. Shutdown Close cylinder valve whenever the regulator is not in use. To shut down for extended periods (more than 30 minutes).

1. Close cylinder or upstream valve tightly.
2. Open downstream equipment valves to drain the lines. Bleed gas into a well ventilated area and away from any ignition source.
3. After gas is drained completely, disengage adjusting screw and close downstream equipment valves.
4. Before transporting cylinders that are not secured on a cart designed for such purposes, remove regulators.

4.02 Setup for MIG (FCAW) Welding with Gasless MIG Wire

A. Ensure that the Power Source On/Off switch located on the rear of the Power Source is in the Off position.

B. Insert the welding torch into the “Euro connector for torch in MIG” output socket on the front panel of the machine, and tighten it.

C. Insert the cable plug with work clamp into the “+” output terminal on the front panel of the welding machine, and tighten it clockwise.

D. Insert the quick plug of the gas / no gas selector into the “-” output terminal on the middle plate of the welding machine, and tighten it clockwise

E. Switch the Power Source On/Off switch located on the rear of the Power Source to the On position and ensure the Power indicator on the Front Panel is illuminated.

F. Select MIG Gasless Mode using the Process Selection Control button.

G. Install the wire spool on the spindle adapter, ensuring that the groove size in the feeding position on the drive roll matches the contact tip size of the welding torch and the wire size being used. Release the pressure arm of the wire feeder to thread the wire through the guide tube, and into the drive roll groove. Adjust the pressure arm, ensuring no sliding of the wire. Too high pressure will lead to wire distortion, which will affect wire feeding. Press the wire inch button to thread the wire out of the torch contact tip.

WARNING

Before connecting the work clamp to the work piece make sure the mains power supply is switched off.

CAUTION

Loose welding terminal connections can cause overheating and result in the male plug being fused in the terminal.

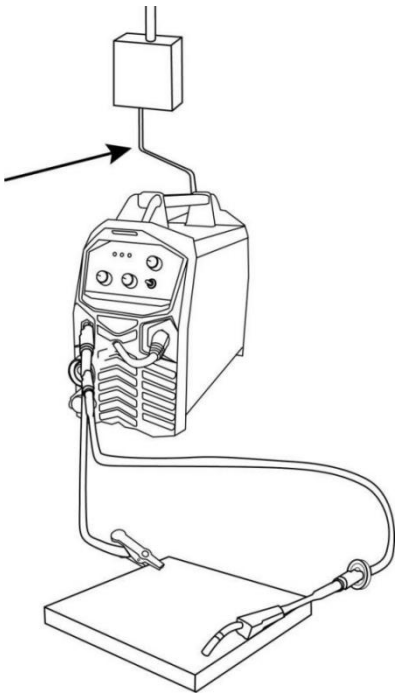


Figure 4-4: Setup for MIG Welding with Gasless MIG Wire

Select MIG Gasless Mode using the Process Selection Control button.

Figure 4-5: Select MIG Gasless mode

Figure 4-6: Select Welding Wire Diameter

Figure 4-7: Select Plate (Material) Thickness

At this point the desired Quick Set settings have been set and the unit is ready for Welding. Once the Welding Arc is established the display will show the Welding Current. If the user wishes to adjust the Quick Set settings outside of the factory settings, the following steps are available.

Wire Feed Speed Control (WFS / AMPS) adjustment

Figure 4-8: Select Wire Feed Speed Control

NOTE!

At this moment you can operate with the recommended welding Quick Set data , once an arc is established, the digital display will be changed to show the welding current.

If the Welding Current is found to be too High or too Low for the application the Wire Feed Speed can be adjusted to the desired value. Once WFS/AMPs function is selected by pressing the Control Knob the setting it can be adjusted by turning the Control Knob Clockwise to increase value or turning the Control Knob Anti-clockwise to decrease the value. If the Control Knob is turned slowly it will adjust in small increments and if turned quickly it will adjust in larger increments.

NOTE!

Adjusting the Wire Feed Speed (WFS) may also change the Voltage Value Synergically.

Volts Function (Volts)

Figure 4-9: Select to Display Pre-set Volts Value

Once Volts function is selected by pressing the Control Knob the Voltage range can be adjusted by turning the Control Knob Clockwise to increase value or turning the Control Knob Anti-clockwise to decrease the value.

Preview Voltage

When in Volts Function, by turning the Control Knob you can vary the Pre-set Voltage from the Factory Set Quick Set values. Once the Volts Trim function is selected the Pre-set Voltage can be adjusted by turning the Control Knob Clockwise to increase value or turning the Control Knob Anticlockwise to decrease the value.

Restoring Factory Weld Settings

If you manually change either WFS/AMPS or Volts from the factory settings on the Plate Thickness, and you need to revert back to the factory setting. The TitanMig160 Syn Pro can have Factory Default Settings restored. To do this hold/press the Control Knob before turn on the welding machine. The LED Digital meter will display "- - -" to indicate a Factory Reset has been completed.

4.03 Setup for MIG (GMAW) Welding with Gas Shielded MIG Wire

Note: Argon Mini- Regulator and Gas Hose Kit is required in order to use Gas Shielded MIG Welding Wires.

Note: Due to the higher Wire Feed Speed required to run ALU Wire successfully it must be run in the 0.6mm Wire Diameter, MIG Gas Mode. Refer to the MIG Setup Guide for suggested parameter settings.

A. Ensure that the Power Source On/Off switch located on the rear of the Power Source is in the Off position.

B. Insert the welding torch into the “Euro connector for torch in MIG” output socket on the front panel of the machine, and tighten it..

C. Install the wire spool on the spindle adapter. Connect the cylinder equipped with the gas regulator to the gas inlet on the back panel of the machine with a gas hose.

D. Insert the cable plug with work clamp into the “-” output terminal on the front panel of the welding machine, and tighten it clockwise

E. Insert the quick plug of the gas / no gas selector into the “+” output terminal of the welding machine, and tighten it clockwise..

F. Switch the Power Source On/Off switch located on the rear of the Power Source to the On position and ensure the Power indicator on the Front Panel is illuminated.

G. Select MIG Gas (Solid) Mode using the Process Selection Control button.

H. Ensuring that the groove size in the feeding position on the drive roll matches the contact tip size of the welding torch and the wire size being used. Release the pressure arm of the wire feeder to thread the wire through the guide tube, and into the drive roll groove. Adjust the pressure arm, ensuring no sliding of the wire. Too high pressure will lead to wire distortion,which will affect wire feeding. Press the wire inch button to thread the wire out of the torch contact tip

NOTE!

As a guide for the welding parameter settings for the welding job refer to the Weld Guide located on the inside of the wirefeed compartment door. Power Source settings are adjusted using the front panel controls. Refer to section 3.02.

WARNING

Before connecting the work clamp to the work piece make sure the mains power supply is switched off..

WARNING

Secure the welding grade shielding gas cylinder in an upright position by chaining it to a suitable stationary support to prevent falling or tipping..

CAUTION

Loose welding terminal connections can cause overheating and result in the male plug being fused in the terminal.

Remove any packaging material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.

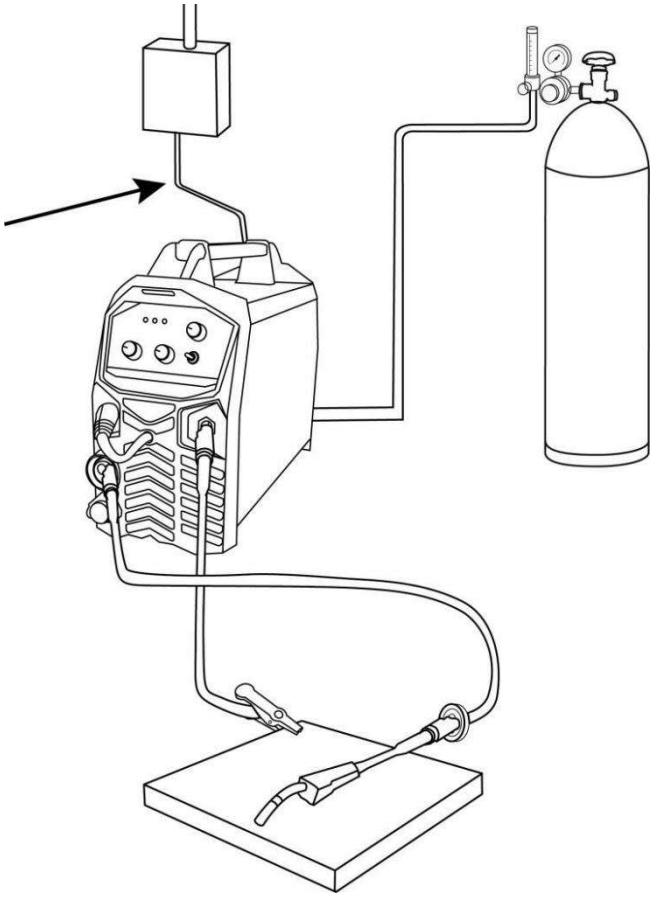


Figure 4-10 Setup for MIG Welding with Gas Shielded MIG Wire

select MIG Gas (Solid) Mode using the Process Selection Control button. (refer to section 3.02 for further information)

Figure 4-11: Select MIG Gas Mode

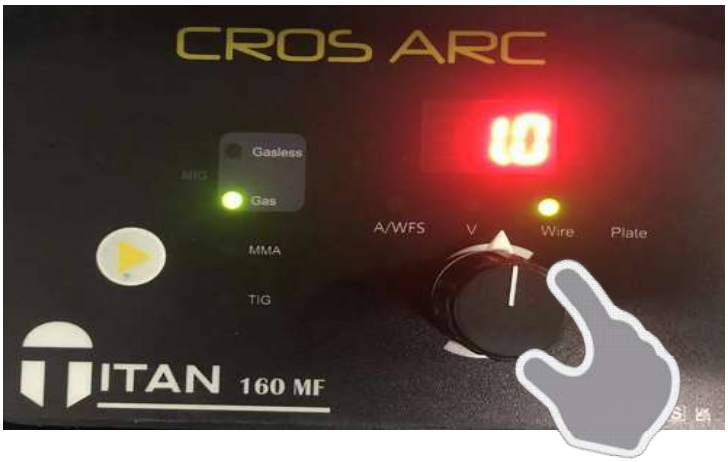


Figure 4-12: Select Welding Wire Diameter

NOTE!

Quick Set wire sizes for MIG GAS (Solid Wire) are 0.8mm and 0.8mm and 1.0mm diameter.

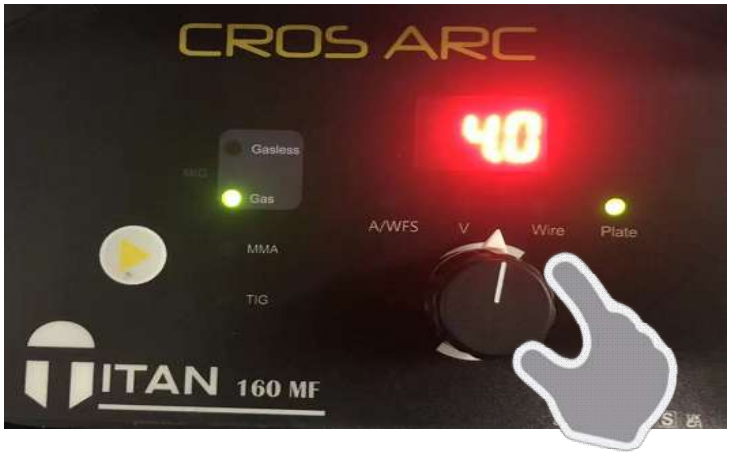


Figure 4-13: Select Plate (Material) Thickness

At this point the desired Quick Set settings have been set and the unit is ready for Welding. Once the Welding Arc is established the display will show the Welding Current.

If the user wishes to adjust the Quick Set settings outside of the factory settings, the following steps are available.

Wire Feed Speed Control (WFS / AMPS) adjustment

Figure 4-14: Select Wire Feed Speed Control

NOTE!

At this moment you can operate with the recommended welding Quick Set data , once an arc is established, the digital display will be changed to show the welding current.

Remove any packaging material prior to use. Do not block the air vents at the front or rear of the Welding Power Source.

If the Welding Current is found to be too High or too Low for the application the Wire Feed Speed can be adjusted to the desired value.

Once WFS/AMPs function is selected by pressing the Control Knob the setting it can be adjusted by turning the Control Knob Clockwise to increase value or turning the Control Knob Anti-clockwise to decrease the value.

If the Control Knob is turned slowly it will adjust in small increments and if turned quickly it will adjust in larger increments.

Note: Adjusting the Wire Feed Speed (WFS) may also change the Voltage Value Synergically.

Volts Function (Volts)

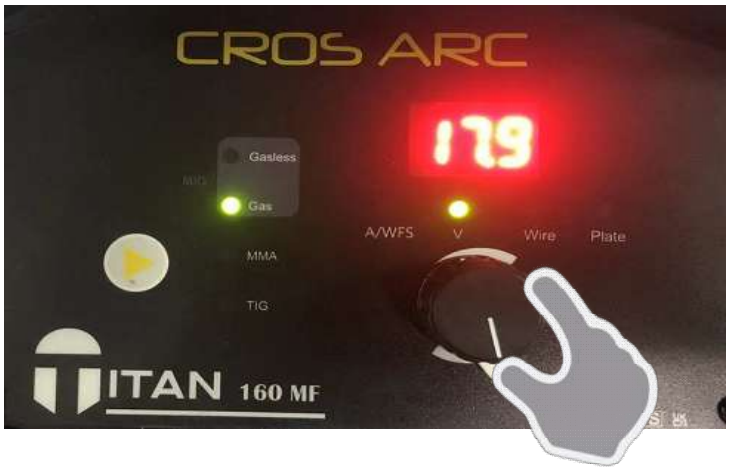


Figure 4-15: Select to Display Pre-set Volts Value

Once Volts function is selected by pressing the Control Knob the Voltage range can be adjusted by turning the Control Knob Clockwise to increase value or turning the Control Knob Anti-clockwise to decrease the value.

Preview Voltage

When in Volts Function, by turning the Control Knob you can vary the Pre-set Voltage from the Factory Set Quick Set values. Once the Volts Trim function is selected the Pre-set Voltage can be adjusted by turning the Control Knob Clockwise to increase value or turning the Control Knob Anticlockwise to decrease the value.

Restoring Factory Weld Settings

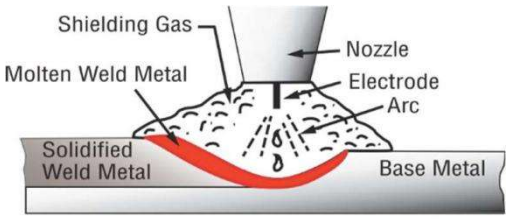
If you manually change either WFS/AMPS or Volts from the factory settings on the Plate Thickness, and you need to revert back to the factory setting。 The TitanMig 160 Syn Pro can have Factory Default Settings restored. To do this hold/press the Control Knob before turn on the welding machine. The LED Digital meter will display "- - -" to indicate a Factory Reset has been completed

4.04 MIG (GMAW/FCAW) Basic Welding Technique

Two different welding processes are covered in this section (GMAW and FCAW), with the intention of providing the very basic concepts in using the MIG mode of welding, where a welding gun is hand held, the electrode (welding wire) is fed into a weld puddle, and the arc is shielded by an inert welding grade shielding gas or inert welding grade shielding gas mixture.

GAS METAL ARC WELDING (GMAW): This process, also known as MIG welding, CO2 welding, Micro Wire Welding, short arc welding, dip transfer welding, wire welding etc., is an electric arc welding process which fuses together the parts to be welded by heating them with an arc between a solid continuous, consumable electrode and the work. Shielding is obtained from an externally supplied welding grade shielding gas or welding grade shielding gas mixture. The process is normally applied semi automatically; however the process may be operated automatically and can be machine operated.

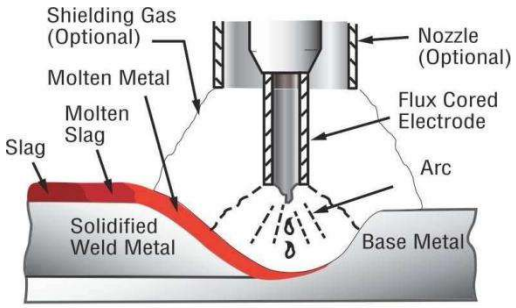
The process can be used to weld thin and fairly thick steels, and some non-ferrous metals in all positions.



GMAW Process

Figure 4-16

FLUX CORED ARC WELDING (FCAW): This is an electric arc welding process which fuses together the parts to be welded by heating them with an arc between a continuous flux filled electrode wire and the work. Shielding is obtained through decomposition of the flux within the tubular wire. Additional shielding may or may not be obtained from an externally supplied gas or gas mixture. The process is normally applied semi automatically; however the process may be applied automatically or by machine. It is commonly used to weld large diameter electrodes in the flat and horizontal position and small electrode diameters in all positions. The process is used to a lesser degree for welding stainless steel and for overlay work.



FCAW Process

Figure 4-17

Position of MIG Gun

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

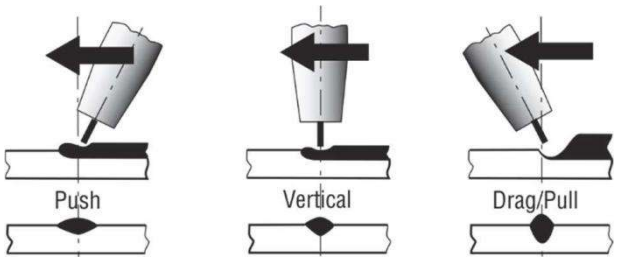


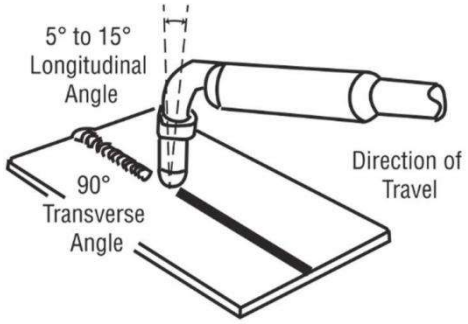
Figure 4-18

The welding gun should be held at an angle to the weld joint. (see Secondary Adjustment Variables below) Hold the gun so that the welding seam is viewed at all times. Always wear the welding helmet with proper filter lenses and use the proper safety equipment.

CAUTION

Do not pull the welding gun back when the arc is established. This will create excessive wire extension (stick-out) and make a very poor weld.

The electrode wire is not energized until the gun trigger switch is depressed. The wire may therefore be placed on the seam or joint prior to lowering the helmet.



Butt & Horizontal Welds

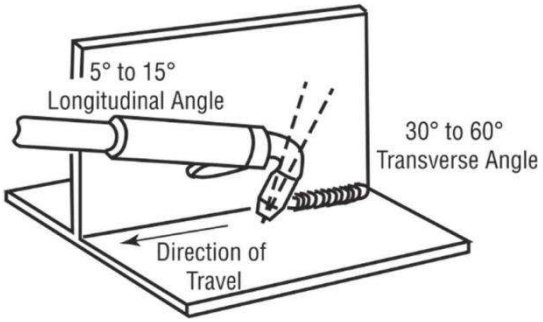
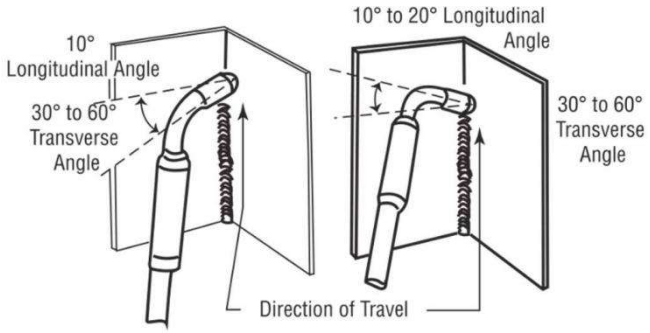


Figure 4-19 /4-20



Vertical Fillet Welds

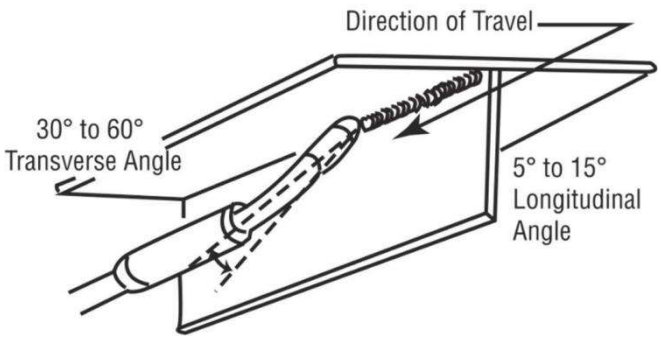


Figure 4-21/4-22

Distance from the MIG Gun Nozzle to the Work Piece

The electrode wire stick out from the MIG Gun nozzle should be between 8 mm to 12mm. This distance may vary depending on the type of joint that is being welded.

Travel Speed

The speed at which the molten pool travels influences the width of the weld and penetration of the welding run.

MIG Welding (GMAW) Variables

Most of the welding done by all processes is on carbon steel. The items below describe the welding variables in short-arc welding of 24gauge (0.024", 0.6mm) to ¼" (6.4mm) mild sheet or plate. The applied techniques and end results in the GMAW process are controlled by these variables.

Preselected Variables

Preselected variables depend upon the type of material being welded, the thickness of the material, the welding position, the deposition rate and the mechanical properties. These variables are:

- Type of electrode wire
- Size of electrode wire
- Type of gas (not applicable to self shielding wires FCAW)
- Gas flow rate (not applicable to self shielding wires FCAW)

Primary Adjustable Variables

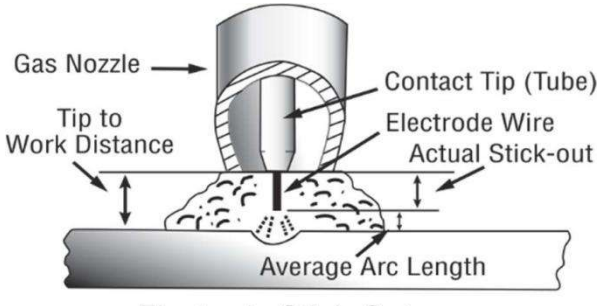
These control the process after preselected variables have been found. They control the penetration, bead width, bead height, arc stability, deposition rate and weld soundness. They are:

- Arc Voltage
- Welding current (Wire Feed Speed)
- Travel speed

Secondary Adjustable Variables

These variables cause changes in primary adjustable variables which in turn cause the desired change in the bead formation. They are:

1. Stick-out (distance between the end of the contact tube (tip) and the end of the electrode wire). Maintain at about 10mm stick-out.
2. Wire Feed Speed. Increase in Wire Feed Speed increases weld current, Decrease in Wire Feed Speed decreases weld current.

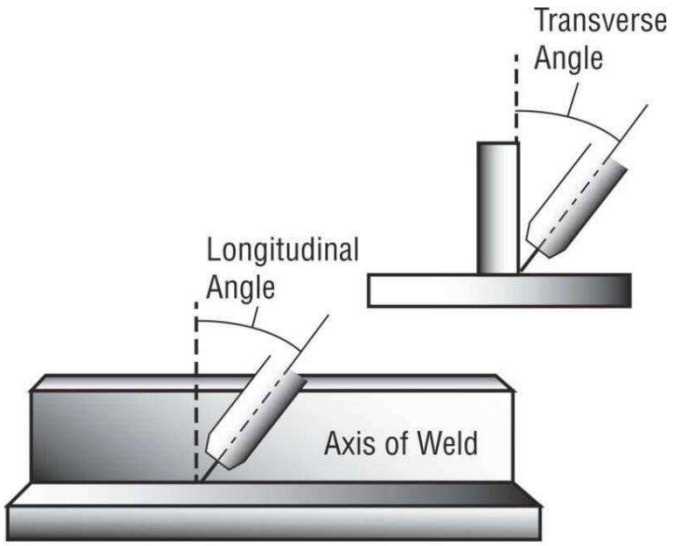


Electrode Stick-Out

Figure 4-23

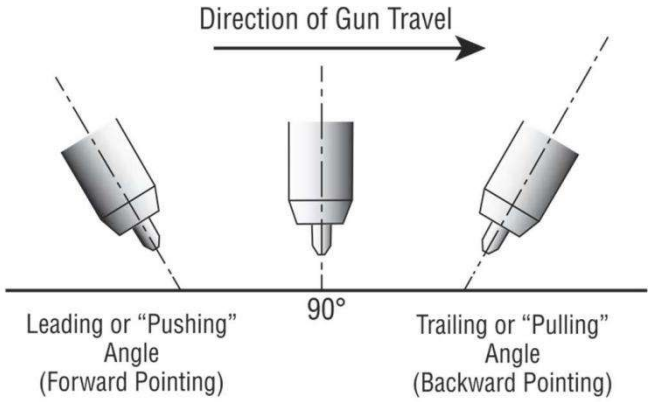
3. Nozzle Angle. This refers to the position of the welding gun in relation to the joint. The transverse angle is usually one half the included angle between plates forming the joint. The

longitudinal angle is the angle between the centre line of the welding gun and a line perpendicular to the axis of the weld. The longitudinal angle is generally called the Nozzle Angle and can be either trailing (pulling) or leading (pushing). Whether the operator is left handed or right handed has to be considered to realize the effects of each angle in relation to the direction of travel.



Transverse and Longitudinal Nozzle Axes

Figure 4-24



Nozzle Angle - Right Hand Operator

Figure 4-25

Establishing the Arc and Making Weld Beads

Before attempting to weld on a finished work piece, it is recommended that practice welds be made on a sample of the work piece, as that of the finished piece.

The easiest welding procedure for the beginner to experiment with MIG welding is the flat position. The equipment is capable of flat, vertical and overhead positions.

For practicing MIG welding, secure some pieces of 16 or 18 gauge (0.06" 1.5mm or 0.08" 2.0mm) mild steel plate 6" x 6" (150 x 150mm). Use 0.030" (0.8mm) flux cored gasless wire or a solid wire with shielding gas.

Setting of the Power Source

Power source and Wirefeeder setting requires some practice by the operator, (however with the Quick Set feature of the TitanMig160 Syn Pro, setting up the correct parameters is a very simple procedure), as the welding plant has two control settings that have to balance. These are the Wire Feed Speed control (refer to section 3.02) and the welding Voltage Control (refer to section 3.02). The welding current is determined by the Wire Feed Speed control, the current will increase with increased Wire Feed Speed, resulting in a shorter arc. Less Wire Feed Speed will reduce the current and lengthen the arc. Increasing the welding voltage hardly alters the current level, but lengthens the arc. By decreasing the voltage, a shorter arc is obtained with a little change in current level.
When changing to a different electrode wire diameter, different control settings are required. A thinner electrode wire needs more Wire Feed Speed to achieve the same current level.
A satisfactory weld cannot be obtained if the Wire Feed Speed and Voltage settings are not adjusted to suit the electrode wire diameter and the thickness of the work piece.
If the Wire Feed Speed is too high for the welding voltage, "stubbing" will occur as the wire dips into the molten pool and does not melt. Welding in these conditions normally produces a poor weld due to lack of fusion. If, however, the welding voltage is too high, large drops will form on the end of the wire, causing spatter. The correct setting of voltage and Wire Feed Speed can be seen in the shape of the weld deposit and heard by a smooth regular arc sound.

Electrode Wire Size Selection

The choice of Electrode wire size and shielding gas used depends on the following

- Thickness of the metal to be welded
- Type of joint
- Capacity of the wire feed unit and Power Source
- The amount of penetration required
- The deposition rate required
- The bead profile desired
- The position of welding

4.05 MIG (GMAW/FCAW) Welding Troubleshooting

Solving Problems Beyond the Welding Terminals

The general approach to fix Gas Metal Arc Welding (GMAW) problems is to start at the wire spool then work through to the MIG Gun. There are two main areas where problems occur with GMAW, Porosity and Inconsistent wire feed

Solving Problems Beyond the Welding Terminals - Porosity

When there is a gas problem the result is usually porosity within the weld metal. Porosity always stems from some contaminant within the molten weld pool which is in the process of escaping during solidification of the molten metal. Contaminants range from no gas around the welding arc to dirt on the work piece surface.
Porosity can be reduced by checking the following points.

FAULT	CAUSE
1 Shielding gas cylinder contents	Ensure that the shielding gas cylinder is not empty and the flow meter is correctly adjusted to 15 litres per minute.
2 Gas leaks.	Check for gas leaks between the regulator/cylinder connection and in the gas hose to the Power Source.
3 Internal gas hose in the Power Source.	Ensure the hose from the solenoid valve to the gun adaptor has not fractured and that it is connected to the gun adaptor.
4 Welding in a windy environment.	Shield the weld area from the wind or increase the gas flow.
5 Welding dirty, oily, painted, oxidised or greasy plate.	Clean contaminates off the work piece.
6 Distance between the MIG Gun nozzle and the work piece.	Keep the distance between the MIG Gun nozzle and the work piece to a minimum.
7 Maintain the MIG Gun in good working order.	A Ensure that the gas holes are not blocked and gas is exiting out of the gas diffuser. B Do not restrict gas flow by allowing spatter to build up inside the gun nozzle. C Check that the MIG Gun O-rings are not damaged.

Table 4-1: Solving Problems beyond the Welding Terminals-Porosity

WARNING

Disengage the feed roll when testing for gas flow by ear.

Solving Problems Beyond the Welding Terminals - Inconsistent Wire Feed

Wire feeding problems can be reduced by checking the following points.

FAULT	CAUSE
1 Feed roll driven by motor in the wirefeed compartment slipping.	A Wire spool brake is too tight. B Incorrect feed roll fitted for wire used, or incorrect pressure set on wire feed pressure roller. Check and change to correct feed roll if necessary.
2 Wire spool unwound and tangled.	Wire spool brake is too loose.
3 Worn or incorrect feed roll size	A Use a feed roll matched to the size wire you are using. B Replace feed roll if worn.
4 Wire rubbed against the mis-aligned guides and reduced wire feedability.	Mis-alignment of inlet/outlet guides
5 Liner blocked with swarf	A Increased amounts of swarf are produced by the wire passing through the feed roll when excessive pressure is applied to the pressure roller adjuster.

	B Swarf can also be produced by the wire passing through an incorrect feed roll groove shape or size. C Swarf is fed into the conduit liner where it accumulates thus reducing wire feedability.
6 Incorrect or worn contact tip	A The contact tip transfers the weld current to the electrode wire. If the hole in the contact tip is too large then arcing may occur inside the contact tip resulting in the wire jamming in the contact tip B When using soft wire such as aluminium it may become jammed in the contact tip due to expansion of the wire when heated. A contact tip designed for soft wires should be used.
7 Poor work lead contact to work piece	If the work lead has a poor electrical contact to the work piece then the connection point will heat up and result in a reduction of power at the arc.
8 Bent liner	This will cause friction between the wire and the liner thus reducing wire feedability

Table 4-2: Wire Feeding Problems

Basic MIG (GMAW) Welding Troubleshooting

FAULT	CAUSE	REMEDY
1 Undercut	A Welding arc voltage too high. B Incorrect gun angle C Excessive heat input	A Decrease voltage or increase the Wire Feed Speed. B Adjust angle. C Increase the gun travel speed and/or decrease welding current by decreasing the voltage or decreasing the Wire Feed Speed.
2 Lack of penetration	A Welding current too low	A Increase welding current by increasing Wire Feed Speed and increasing voltage.
	B Joint preparation too narrow or gap too tight	B Increase joint angle or gap.
	C Incorrect shielding gas	C Change to a gas which gives higher penetration.
3 Lack of fusion	Voltage too low	Increase voltage.
4 Excessive spatter	A Voltage too high	A Decrease voltage or increase the Wire Feed Speed control.
	B Voltage too low	B Increase the voltage or decrease Wire Feed Speed.
5 Irregular weld shape	A Incorrect voltage and current settings. Convex, voltage too low. Concave, voltage too	A Adjust voltage and current by adjusting the voltage control and the Wire Feed Speed control.

	high.	
	B Wire is wandering.	B Replace contact tip.
	C Incorrect shielding gas	C Check shielding gas.
	D Insufficient or excessive heat input	D Adjust the Wire Feed Speed control or the voltage control.
6 Weld cracking	A Weld beads too small	A Decrease travel speed.
	B Weld penetration narrow and deep	B Reduce current and voltage and increase MIG Gun travel speed or select a lower penetration shielding gas.
	C Excessive weld stresses	C Increase weld metal strength or revise design
	D Excessive voltage	D Decrease voltage.
	E Cooling rate too fast	E Slow the cooling rate by preheating part to be welded or cool slowly.
7 Cold weld puddle	A Loose welding cable connection.	A Check all welding cable connections.
	B Low primary voltage	B Contact supply authority.
	C Fault in power source	C Have an Accredited CIGWELD Service Provider to test then replace the faulty component.
8 Arc does not have a crisp sound that short arc exhibits when the Wire Feed Speed and voltage are adjusted correctly.	The MIG Gun has been connected to the wrong voltage polarity on the front panel.	Connect the MIG Gun to the positive (+) welding terminal for most solid wires and gas shielded flux cored wires. Connect MIG Gun to the negative (-) welding terminal for most Gasless Wires. Refer to the electrode wire manufacturer for the correct polarity.

Table 4-3: MIG (GMAW) Welding Problems

5 MMA & TIG WELDING

Before starting any welding activity ensure that you have suitable eye protection and protective clothing. Also take the necessary steps to protect any persons within the area.

5.01 MMA welding

Insert the cable plug with electrode holder into the “+” socket on the front panel of the welding machine, and tighten it clockwise.

Insert the cable plug of the work return lead into the “-” socket on the front panel of the w e l d i n g machine, and tighten it clockwise.

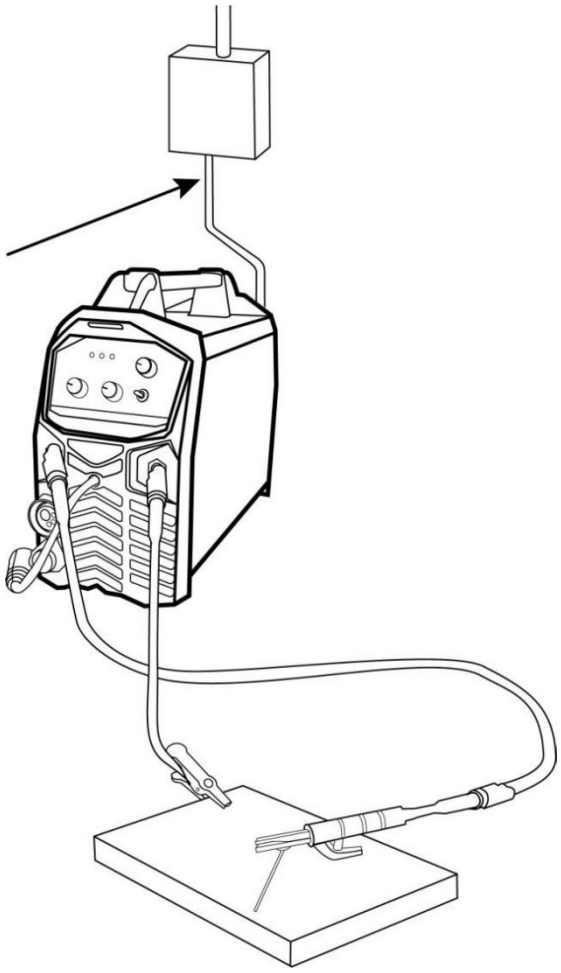


Figure 4-26

After connecting the welding leads as detailed you will need to switch the power switch on the back panel to “ON”, Select MMA mode using the Process Selection Control button. There is voltage output at both output terminals. Set the amperage on the machine suitable for the electrode being used. Ensure you check that you have the electrode polarity correct.

5.02 TIG Welding

TIG Welding(For the TIG torch with Dinse connection)

Insert the cable plug with the work clamp into the “+” socket on the front panel of the welding machine, and tighten it clockwise.

Insert the cables plug of the TIG torch into the “-” socket on the front panel of the machine and tighten clockwise.

Connect the gas hose to the regulator / flow meter located on the shield gas cylinder and connect the other end to the TIG torch.

Open the valve on the TIG torch slowly and set the flow rate for 12 l/min.

After connecting the welding leads as detailed you will need to switch the power switch on the back panel to “ON”, Select TIG mode using the Process Selection Control button. “Scratch” the electrode on the work piece to start the arc

6 ROUTINE SERVICE AND POWER SOURCE PROBLEMS

6.01 Routine Maintenance & Inspection

WARNING

There are extremely dangerous voltage and power levels present inside this product. Do not attempt to open or repair unless you are a qualified electrical tradesperson. Disconnect the Welding Power Source from the Mains Supply Voltage before disassembling.

Welding equipment should be regularly checked by a qualified electrical tradesperson to ensure that:

- The main earth wire of the electrical installation is intact.
- Power point for the Welding Power Source is effectively earthed and of adequate current rating.
- Plugs and cord extension sockets are correctly wired.
- Flexible cord is of the 3-core tough rubber or plastic sheathed type of adequate rating, correctly connected and in good condition.
- Welding terminals are shrouded to prevent inadvertent contact or short circuit.
- The frame of the Welding Power Source is effectively earthed.
- Welding leads and electrode holder are in good condition.
- The Welding Power Source is clean internally, especially from metal filing, slag, and loose material. If any parts are damaged for any reason.

6.02 Cleaning the Welding Power Source

WARNING

There are extremely dangerous voltage and power levels present inside this product. Do not attempt to open or repair unless you are a qualified electrical tradesperson. Disconnect the Welding Power Source from the Mains Supply Voltage before disassembling.

To clean the Welding Power Source, open the enclosure and use a vacuum cleaner to remove any accumulated dirt, metal filings, slag and loose material. Keep the shunt and lead screw surfaces clean as accumulated foreign material may reduce the welders output welding current.

CAUTION

Do not use compressed air to clean the Welding Power Source. Compressed air can force metal particles to lodge between live electrical parts and earthed metal parts within the Welding Power Source. This may result in arcing between this parts and their eventual failure.

6.03 Cleaning the Feed Rolls

Clean the grooves in the drive rolls frequently. This can be done by using a small wire brush. Also wipe off or clean the grooves on the upper feed roll. After cleaning, tighten the feed roll retaining knobs.

6.04 Basic Troubleshooting

WARNING

There are extremely dangerous voltage and power levels present inside this product. Do not attempt to open or repair unless you are a qualified electrical tradesperson and you have had training in power measurements and troubleshooting techniques.

If major complex subassemblies are faulty, then the Welding Power Source must be returned to an Accredited Service Agent for repair. The basic level of troubleshooting is that which can be performed without special equipment or knowledge.

PROBLEM	CAUSE	REMEDY
1 Mains Supply Voltage is On, the On/Off switch on the rear panel is in the On position and the Power indicator on the front panel is illuminated however the power source will not MIG weld.	A Power source is not in the correct mode of operation.	A Set the power source to the correct MIG mode. Refer to Section 3.02.1.
	B MIG Gun Polarity Lead is not connected.	B Connect the MIG Gun Polarity Lead to the positive or negative output terminal.
	C Work Lead is not connected to the work piece.	C Ensure that the Work Lead is connected to the work piece and has a good connection to the work piece.
2 When welding at maximum output (WFS and Volts) the machine stops welding.	A When output amperage exceeds the rated maximum output of the machine by 15%, the welding machine will sense this and initiates a safety circuit which stops the output current.	A Reduce output amperage (WFS and Volts).
	B Contact Tip of the MIG gun is too close to the work piece.	B Increase distance between the Contact Tip of the MIG gun and the work piece.
	C The Pre-set voltage is too	C Decrease the Pre-set voltage.

	high.	
	D The MIG Welding Wire in use is not consistent with the selected MIG wire diameter, e.g. 0.8mm wire is selected but 0.9mm wire is used.	D Ensure that the correct MIG Welding Wire Diameter is selected for MIG Wire being used.
3 Mains Supply Voltage is On, the On/Off switch in the rear panel is in the On position but the Power On indicator on the front panel is Not illuminated and the digital displays on the front panel are also not illuminated and the power source will not weld.	This may occur due to the activation of an in-built protective device if the Power Source is repeatedly switched On then Off rapidly or the supply to the Power Source is switched On then Off rapidly.	If this occurs leave the Power Source On/Off switch in the Off position for several minutes to allow the protective device to reset.
4 E-2 showing in Digital Display and the unit will not commence welding when the gun trigger switch is depressed.	Duty cycle of power source has been exceeded.	Leave the power source switched ON and allow it to cool. E-2 Error Code is cleared from the Digital Display prior to commencement of welding.
5 Unit will not feed wire in MIG mode.	A Incorrect Feed Roll fitted for wire type being used.	A Fit the correct feed roll for MIG wire type being used
	B Pressure Roller Arm is not secured in the correct position or not correctly adjusted.	B Secure Pressure Roller in the correct position and ensure that it is correctly adjusted.
	C Electrode wire stuck in conduit liner or contact tip (burn-back jam).	C Check for clogged / kinked MIG Gun conduit liner or worn contact tip. Replace faulty components.
	D Internal fault in power source	D Have an Accredited Service Provider investigate the fault.
6 Welding wire continues to feed when MIG Gun trigger is released.	A MIG Gun trigger leads shorted, or faulty MIG Gun Trigger.	A Repair or replace MIG Gun trigger switch/lead.
7 Welding arc cannot be established in MIG mode.	A MIG Gun polarity lead is not connected into a welding	A Connect the MIG Gun polarity lead to either the positive

	output terminal.	welding output terminal or the negative welding output terminal as required.
	B Poor or no work lead contact.	B Clean work clamp area and ensure good electrical contact.
8 Inconsistent wire feed.	A Worn or dirty contact tip.	A Replace if necessary.
	B Incorrect or worn feed roll.	B Replace if necessary.
	C Excessive brake tension on wire reel hub.	C Reduce brake tension on spool hub.
	D Worn, kinked or dirty conduit liner	D Clean or replace conduit liner.
	E Pressure Roller Arm is not secured in the down position or not correctly adjusted.	E Secure Pressure Roller in the down position and ensure that it is correctly adjusted.
9 No gas flow in MIG Gas (Solid) mode.	A Gas hose is damaged.	A Replace or repair.
	B Gas passage contains impurities.	B Disconnect gas hose from the rear of power source or wirefeeder and blow out impurities.
	C Machine set in MIG Gasless mode.	C Set Machine to MIG Gas mode.
	D Empty gas cylinder.	D Replace gas cylinder.
	E Cylinder Valve not turned on.	E Turn Cylinder valve in anti clockwise direction until gas is flowing.
10 Gas flow continues after the MIG Gun trigger switch has been released (MIG Gas Solid mode).	Gas valve has jammed open due to impurities in the gas or the gas line.	Have an accredited service provider repair or replace gas valve.

Table 6-1

Error Code	**CAUSE**	**REMEDY**
E-1	Over current	
E-2	Over Temperature	

Table 6-2

APPENDIX : CIRCUIT DIAGRAM