



SP-5.3

3 PHASE SMART DOUBLE PULSE MIG WELDER

Instruction Manual

MNL-SP-5.3-Rev.A





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Pro Spot International specializes in quality welding and repair products for the collision repair industry. Pro Spot owns three patents for special welding equipment and applications, and works with the majority of the largest auto manufacturers in the world. Pro Spot is a proud 'MADE IN THE USA' manufacturer in Carlsbad, CA. The turnkey facility includes Design, Engineering, Machine and Sheet Metal Shops, Powder Coating, Assembly, Training and Technical Support. The Pro Spot equipment line includes resistance spot welders, aluminum & steel dent repair systems, pulse MIG welders, rivet guns and tools, dust-free sanding systems, fume extraction and more.

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Pro Spot Distributors and Sub-Distributors are carefully selected and are well trained in the collision repair industry. We offer technical and service education at our worldwide training facilities at regular intervals so your local distributor will always be up to date and able to pass on the latest in spot welding technology to our customers.

Customer service is an important part of any investment and our distributors and sub-distributors will be there to support your technical and service needs. We have a great customer service record, we tend to keep it that way.



Pro Spot is certified by CASE and a member of the I-CAR Industry Training Alliance

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INTRODUCTION

Make sure this manual is carefully read and understood by the end user.

PERSONAL PROTECTION

Welding processes of any kind can be dangerous, not only to the operator but to any person situated near the equipment. Safety and operating rules must be strictly observed.

The welding arc produces very bright ultra violet and infrared light. These arc rays will damage your eyes and burn your skin if you are not properly protected.

-  • Wear closed, non-flammable protective clothing (without pockets or turned up trousers) gloves and shoes with insulated soles and steel toes. Avoid oily, greasy clothing.
- Wear a non-flammable welding helmet with appropriate filter lenses designed so as to shield the neck, face and on the sides of the face and head. Keep protective lens clean and replace them when broken, cracked or spattered. Always use a clear glass or plastic lens to protect the filter lens.
- Weld in a closed area that does not open into other working areas.
- Never look at the arc without correct protection to the eyes. Wear safety glasses with the side shields to protect from flying particles.

 Gases and fumes produced during the welding process can be dangerous and hazardous to your health.

- Adequate local exhaust ventilation must be used in the area. It should be provided through a mobile hood or through a built-in system on the workbench that provides exhaust ventilation from the sides, the front and below, but not from above the bench so as to avoid raising dust and fumes. Local exhaust ventilation must be provided together with adequate general ventilation and air circulation, particularly when work is done in a confined space.
- Welding process must be performed on metal surfaces thoroughly cleaned from rust or paint, to avoid production of harmful fumes. Any parts degreased with a solvent must be dried before welding.
- Welding fumes can be dangerous, wear appropriate safety gear.

FIRE PREVENTION

Fire and explosion can be caused by hot slag, sparks or the welding arc.

- Keep an approved fire extinguisher of the proper size and type in the working area. Inspect it regularly to ensure that it is in proper working order.
- Remove all combustible materials from the working area. If you can not remove them, protect them with fire-proof covers.
- Ventilate welding work areas adequately. Maintain sufficient airflow to prevent accumulation of explosive or toxic concentrations of gases.
- Do not weld on containers that may have held combustibles.
- Always check welding area to make sure it is free of sparks, slag or glowing metal and flames.
- The work area must have a fireproof floor.

ELECTRIC SHOCK



WARNING: ELECTRIC SHOCK CAN KILL!

A person qualified in First Aid techniques should always be present in the working area; If a person is found unconscious and electric shock is suspected, do not touch the person if she or he is in contact with cable or electric wires. Disconnect power from the machine, then use First Aid. Use dry wood or other insulating materials to move cables, if necessary away from the person.

- Wear dry gloves and clothing. Insulate yourself from the workpiece or other parts of the welding circuit.
- Make sure the main line is properly grounded.
- Do not coil the torch or the ground cables around your body.
- Never touch or come in physical contact with any part of the input current circuit and welding current circuit.

Electric warning:

- Repair or replace all worn or damaged parts.
- Extra care must be taken when working in moist or damp areas.
- Install and maintain equipment according to local regulations.
- Disconnect power supply before performing any service or repair.
- Should you feel the slightest electrical shock, stop any welding immediately and do not use the welder until the fault has been found and corrected.



NOISE

Noise can cause permanent hearing loss. Welding processes can cause noise levels that exceed safe limits. You must protect your ears from loud noise to prevent permanent loss of hearing.

- To protect your hearing from loud noise, wear protective ear plugs and/or ear muffs.
- Noise levels should be measured to be sure the decibels (sound) do not exceed safe levels.

ELECTROMAGNETIC COMPATIBILITY

Before installing your welder, carry out an inspection of the surrounding area, observing the following guidelines:

- Make sure that there are no other power supply cables, control lines, telephone leads or other equipment near the unit.
- Make sure that there are no radio receivers, television appliances, computers or other control systems near the unit.
- People with pacemakers or hearing-prosthesis should use caution when near the power source.

In particular cases special protection measures may be required.

Interference can be reduced by following these suggestions:

- If there is interference in the power source line, an E.M.T. filter can be mounted between the power supply and the power source.
- The output cables of the power source should not be too long, kept together and connected to ground.
- After any maintenance, all of the panels of the power source must be securely fastened in place.

PROTECTIVE WELDING GASES (SHIELDING GAS)

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Treat them carefully.

- These welders use only inert or non-flammable gases for shielding the welding arc. It is important to choose the appropriate shielding gas for the type of welding being performed.
- Do not use gas from unidentified cylinders or damaged cylinders.
- Do not connect the cylinder directly to the welder, use a pressure regulator.
- Make sure the pressure regulator and the gauges function properly.
- Do not lubricate the regulator with oil or grease.
- Do not use teflon tape on the welder.
- Each regulator is designed for use with a specific gas. Make sure the regulator is designed for the protective gas being used.
- **Make sure that the cylinder is safely secured tightly to the welder with the chain provided.**
- Never expose cylinders to excessive heat, sparks, slag or flame.
- Make sure that the gas hose is in good condition.
- Keep the gas hose away from the working area.



LOCATION

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

- In areas, free from moisture and dust.
- Ambient temperature between 32°F - 104°F (0°C - 40°C).
- In areas, free from oil, steam and corrosive gases.
- In areas, not subjected to abnormal vibration or shock.
- In areas, not exposed to direct sunlight or rain.
- Place at a distance of 12 inches or more from walls or similar that could restrict natural air flow for cooling.



VENTILATION

Always ensure that the welding area is well ventilated.



MAIN POWER SUPPLY VOLTAGE REQUIREMENTS

Before you make any electrical connection, check that supply voltage and frequency available on site are those stated in the ratings label of your welder.

The input power requirement is 40 amp - 3 phase - 208-240V.

The main supply voltage should be within $\pm 10\%$ of the rated main supply voltage. Too low a voltage may cause poor welding performance. Too high a supply voltage will cause components to overheat and possibly fail. The welder Power Source must be:

- Correctly installed by a qualified electrician.
- Correctly grounded (electrically) in accordance with local regulations.
- Connected to the correct size electric circuit.

In case the supply cable is not fitted with a plug, connect a standardized plug (3P+T) to the supply cable.

To connect the plug to the supply cable, follow these instructions:

- The brown (phase) wire must be connected to the terminal identified by the letter L1.
- The blue or grey wire must be connected to the terminal identified by the letter L2.
- The black or grey wire must be connected to the terminal identified by the letter L3.
- The yellow/green (ground) wire must be connected to the terminal identified by the letter PE or by the symbol.

It is very important that the yellow/green wire be connected to the PE terminal ground in accordance with local regulations.

The outlet should be protected by the proper protection fuses or automatic switches.

Notes:

- Periodically inspect supply cable for any cracks or exposed wires. If it is not in good conditions, have it repaired by a Service Center.
- Do not pull on the input power cable to disconnect it from the outlet.
- Keep the supply cable clear of other equipment.
- Keep the supply cable away from heat sources, oils, solvents or sharp edges.



SAFETY INSTRUCTIONS

For your safety, before connecting the power source to the line, closely follow these instructions:

- An adequate two-pole switch must be inserted before the main outlet; this switch must be equipped with time-delay fuses.
- The connection with ground must be made with a two-pole plug compatible with the above mentioned socket.
- When working in a confined space, the power source must be kept outside the welding area and the ground cable should be fixed to the workpiece. Never work in a damp or wet area, in these conditions.
- Do not use damaged input or welding cables.
- The welding torch should never be pointed at another person.
- The power source must never be operated without its protective panels in place; this could cause serious injury to the operator and could damage the equipment.

INTRODUCTION

This manual was designed to provide information on the proper operation of the welder and is meant for its practical and secure use. Its purpose is not to teach welding techniques. All information is intended to be for guidelines only.

To ensure that your welder is in good condition, inspect it carefully when removing it from the packing. Inspect all parts for any possible damage.

Respect the duty cycle of the welder making reference to the technical data label on the welders back/bottom. Duty cycle is given as percentage on a 10 minute cycle. Exceeding duty cycle may cause overheating or damage to the welder.

Welding Wire Selection:

This welder can work with Aluminum Wire 0.8-1.6 diameters, Solid Steel Wire 0.6-1.6 diameters, Silicon Bronze Wire 0.8 - 1.2 diameters and Stainless Steel Wire 0.8-1.6 diameters.

Feed Rolls:

There is a wide selection of rolls available for different welding wires and diameters. These are available from 0.6mm to 1.6mm.

Gas Selection:

Choose the correct shielding gas that matches the base material with the welding wire used.

The table below provides basic information on shielding gas selection and welding processes

| Material To Weld | Gas Cylinder | Wire |
|-------------------------|--|-------------------------------|
| Mild Steel | Argon + CO2 Cylinder or CO2Cylinder | Copper Coated Mild Steel Wire |
| Stainless Steel | Argon 98% + CO2 2% Cylinder | Stainless Steel Wire |
| Aluminum | Argon Cylinder | Aluminum Wire |
| Brazing Alloys | Argon Cylinder | Silicon Bronze/Brazing Wire |

ASSEMBLY

- Refer to welder base assembly instructions



1. Mode Key
2. Graphic Display
3. Left Control Knob
4. Right Control Knob (Volt/Parameters)
5. Save & Recall Key
6. Power
7. Navigation Key
8. Setup Key
9. Material Key

1 Mode Key

Press the Mode Key to select one of the welding processes shown in the table below.

| | | | |
|---|-----------|---|-----------|
| 1 | MMA/STICK | 4 | MIG MAN |
| 2 | GOUGING | 5 | MIG SYN |
| 3 | TIG | 6 | MIG PULSE |

- return to previous screen after parameters setting.

2 Graphic Display

- displays welding parameters.

3 Left Control Knob

| | | | |
|---------------------|---------------------|---------------------|--|
| 7.1 STICK/MMA | 7.2 GOUGING | 7.3 TIG | 7.4 MIG/MAG |
| I2 (Amp) regulation | I2 (Amp) regulation | I2 (Amp) regulation | MIG MAN wire speed regulation 1÷25 m/min MIG SYN/PULSED Thickness regulation 0,6÷25 mm Amp, wire speed |

4 Right Control Knob (Volt/Parameters)

| | | | |
|---|-------------|------------|---|
| 5.1 STICK/MMA | 5.2 GOUGING | 5.3 TIG | 5.4 MIG/MAG |
| HOT START Increase or decrease (+ or -) | NONE | Down Slope | MIG MAN Voltage MIG SYN/PULSED Balance |

5 Save & Recall Key
Saves and recalls the working points that may be changed by the operator.

6 Power
on/off

7 Navigation Key

| | | | |
|----------------------------------|-------------|------------------------|--|
| 8.1 STICK/MMA | 8.2 GOUGING | 8.3 TIG | 8.4 MIG/MAG |
| ¹⁰ Increase Arc Force | None | Increase Post gas time | MIG MAN increase inductance MIG SYN/PULSED Increase Arc Dynamics |
| 8.5 Submenu Navigation Key | | | |

8 Setup Key Setting of the secondary parameters in TIG/MIG welding processes

3.1 Tig Function

2Stroke/4Stroke, Pulse Function, V2 CUT, Slope Up, Slope Down, Pre-Gas and Post Gas-Time, I Min Val, Frequency, Wave Balance, Crater Filler Value

3.2 Mig/Mag MAN Function

2Stroke/4Stroke/Spot Welding/P-W, Spot Time, Wire Slope, Cycle (Normal), Pre-Gas, BBT, Post-Gas.

3.3 Mig/Mag SYN Function


2Stroke/4Stroke/Spot Welding/P-W, Spot Time, Wire Slope, Cycle (Normal/Full), Pre-Gas, BBT, Post-Gas
Hot Start %, Hot Start V, Hot Start T, Hot Slope T, Crater slope, Crater %, Crater V.

3.4 Mig/Mag PULSE Function

2Stroke/4Stroke/Spot Welding/P-W, Spot Time, Wire Slope, Cycle (Normal/Full), Pre-Gas (0-25s), BBT (ms
Post-Gas.

Hot Start %, Hot Start V, Hot Start T, Hot slope T, Crater slope, Crater %, Crater V, L0 Level %, L0 Level V, Hi Time, Slope Time, L0 Time.

9 Material Key

| | | | |
|----------------------------|-------------|---------------------------|--|
| 6.1 STICK/MMA | 6.2 GOUGING | 6.3 TIG | 6.4 MIG/MAG |
| Decrease Arc Force | NONE | Decrease Post Gas Time | MIG MAN Decrease Inductance MIG SYN/PULSED • Decrease Dynamics •  Keep holding: Material Selection |
| 6.5 Submenu Navigation Key | | | |

To enter the “Basic Setup” menu turn the welder on; while the display shows the Pro Spot logo, press the Setup Key - 3. Use the Right Control Knob - 5 - to adjust the modifiable parameters:

BASIC SETUP VRD - ON/OFF

Selection of the “Voltage Reduction Device” ON or OFF. As default this is OFF. If ON the unit reduces the OCV below a safety level at the end of welding. Automatically reset to normal value when the electrode touches the workpiece. Certain countries require VRD to be ON.

INITIAL SPEED - REDUCED/NORMAL

Reduced Initial Speed setting reduces the speed of the wire feeding on the workpiece to optimize arc initiation.

D.M. DIGITAL METER - OFF/DISPLAY TIME

You can choose how many seconds to display the welding feedback after you stop welding. To hide it select OFF.

WATER COOLING

Activate or deactivate Water Cooling control.

UNITS

Select between meters or inches.

LANGUAGE

Select the language of your choice.

LCD CONTRAST

Set the LCD display contrast according to the environment temperature and brightness. Press the “Mode Key” - 1 - to go back to the welding process screen and save set parameters. The display views the screen for the last welding process performed by the unit.

RESET

Press and hold “Mode Button” - 4 - to reset all parameters and go back to the factory original settings.

SPECIAL SETUP

From “Basic Setup Menu” press setup key - 3 - to enter special setup menu.

LOCK LEVEL

Select the level and number of parameters available to the user.

Off- All settings are unlocked.

Low - Blocks most sensitive parameters.

Medium - Welding parameters are blocked, operator can recall program and change parameters .

High - All parameters are locked (wire speed balance still adjustable).

GAS TIG LIFT

Select ON if you want to use TIG torch with gas valve in lift mode (without using the machine internal valve).

ARC START MODE

Type of arc start selection, choose between SOFT or HARD.

DROP CUT

Select ON if you want to end welding with a fast current drop.

SYSTEM LOG

From “Special Setup Menu” press setup key - 3 - to enter

System log shows:

- Expansion PCB of the Machine
- Expansion PCB Code
- Software Version
- Welding Time
- Power Source Working Time

BASIC SETUP

| VRD (voltage reduce) ON | |
|-------------------------|---------|
| Initial Speed | REDUCE |
| Digital Meter | 1 s |
| Water Cooling | ON |
| Units | Metric |
| Language | English |
| LCD Contrast | 0 |

Check line voltage and connect power cable.

Connect water cooling unit (if present) to the machine and check liquid cooling. Power the unit on. The display shows the screen of the last welding mode used. When turning on the machine, check activation of cooler unit in Basic Setup Menu.

MMA WELDING

In STICK/MMA Welding (SMAW), for the connection of the ground cable connector check for correct polarity for the electrode you are going to use, refer to the information on its box.

Most electrodes require a negative ground cable. Connect the ground cable to the negative and connect the electrode holder on the positive (plus). Positive connector is allocated on the welder and also on wire feeder, you can use both but only one at time.

Press Mode key to enter in MMA menu.

TIG WELDING

Connect the ground cable to the Positive output terminal (plus) on the front of the unit. Connect the Tig torch to the negative output terminal (minus) on the front of the unit.

Connect the torch trigger plug (if present) and the gas hose (if present) to the corresponding connectors on the back panel (use inert gas) and if available the water connection.

Press Mode key to enter in TIG menu.

MIG WELDING

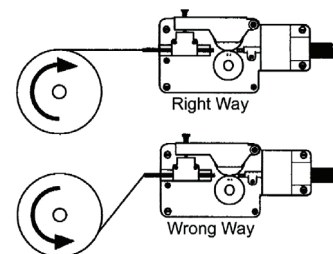
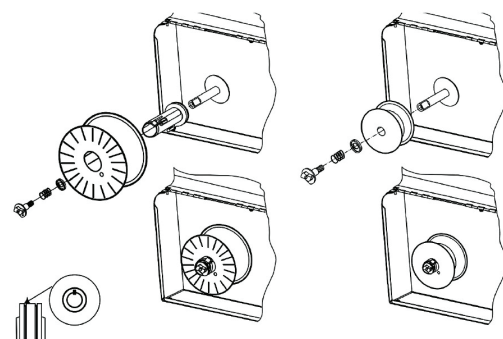
TORCH CONNECTION

Plug the torch into the socket on the front of the welder having care not to damage the contacts and secure by hand screwing in the threaded connection until it is tight.

WIRE LOADING

Ensure the gas and electrical supplies are off. Before proceeding, remove the nozzle and the contact tip from the torch.

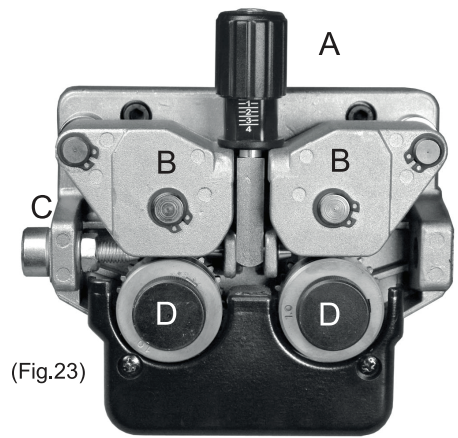
- Open the side panel.
- Loosen the nut of the spool holder (brake drum). In the case you are replacing the wire spool, extract it by pushing the snap tongue.
- Remove the plastic protection from the spool. Place it on the spool holder. Tighten the lock nut turning it to position 2.
- The unit can also accept 100 mm diameter wire spools. For mounting follow these instructions:
 - Remove the wire spool from the spool holder.
 - Loosen the nut, remove the spring and the washer; remove the spool holder from the pivot.
 - Insert on the pivot the 100 mm diameter wire spool; Mount the washer and the spring.
 - Tighten the lock nut.



Tighten nut (A) to appropriate tightness. Excessive pressure strains the wire feeding motor. Too little pressure will cause the wire to unwind from the spool.

- Loosen and lower the plastic knob (A) (Fig.23). Open the pressure arm (B) of the feeder. (Extract the wire from the torch liner if some wire is left in the torch).

- When the wire is disconnected, grasp it with pliers so that it cannot slip from the spool. If necessary, straighten it before inserting it in the wire input guide (C). Insert the wire on the lower roll (D) and in the torch liner.



(Fig.23)



! WARNING: Keep the torch straight. When feeding a new wire through the liner, make sure the wire is cut cleanly (no burrs or angles) and that at least 2 cm from the end is straight (no curves). Failure to follow these instructions could cause damage to the liner.

- Lower the pressure arm (B) and place the knob (A). Tighten slightly. If tightened too much, the wire gets locked and could cause motor damage. If not tight enough, the rolls will not feed the wire.

! WARNING: When changing the wire diameter being used, or replacing the wire feed roll, be sure that the correct groove on the drive roller for the wire diameter selected is facing inside, closest to the machine. The wire is driven by the inside groove. Feed rolls are marked on the side identifying the groove nearest that side.

- Close the side panel of the machine.
- Connect the power supply cable to the power output line. Turn on the machine. Press and hold the torch switch. The wire fed by the wire feeding motor at variable speed will feed through the liner. When it exits from the torch neck, release the torch switch.
Note: after three seconds the torch trigger is pressed, wire feeding speed increases to allow a fast wire feed through the torch and gas stops flowing.
- Turn off the machine.
- Mount the contact tip and the nozzle.

When feeding wire through the torch do not look into the end of the torch. Keep your fingers clear of the wire feed drive when working. Periodically, check the rolls and replace them if they are worn.

GAS CYLINDER AND REGULATOR CONNECTION

! WARNING: Cylinders contain very high pressure, handle with care. Serious accidents can result from improper handling or misuse of compressed gas cylinders. Do not drop the cylinder, knock it over, expose it to excessive heat, flames or sparks. Do not strike it against other cylinders. Always keep the cap on cylinders when transporting or moving them around the work area.

The cylinder (not supplied) should be located at the rear of the welder, securely held in position by the chain provided.

! WARNING: Ensure that the regulator flow gauge is backed off completely (turned counter-clockwise), when not welding and when fitting or removing the gas cylinder.

- Turn the regulator adjustment knob counterclockwise to ensure the valve is fully backed off.
- Screw the gas regulator into the shielding gas cylinder valve and tighten completely.
- Connect the gas hose to the regulator securely with clamp provided.
- Open the cylinder valve slowly, then set the gas flow on the regulator to approx. 5-15 l/min. For Pulsed Welding it is suggestible to set the gas flow to approx. 13-14 l./min.
- Press the torch trigger to ensure that the gas is flowing through the torch.

9 MIG WELDING

MIG Welding has three different welding modes:

- Synergic - Programmed welding presets based on wire type/grade, wire diameter, and shielding gas. Only need to choose the correct preset and adjust the thickness setting to the thickness of the base metal with the left knob.
- Synergic Pulse - Follows the same presets and requirements as synergic mode, but also includes a Double Pulse Mode feature. Double Pulse Mode assists in controlling temperature for aluminum welding.
- Manual - Similar to a traditional MIG welder where you adjust the wire speed and voltage independently.

Change Welding Modes by pressing the Mode button.

9.1 Synergic (MIG Syn) Welding Mode

In Synergic Welding Mode, the operator only needs to adjust the material thickness parameter based on the thickness of metal being welded. The wire speed is automatically adjusted when the thickness (aka welding current) is adjusted with the left knob. The welder is pre-programmed to have the proper wire speed for the welding current.

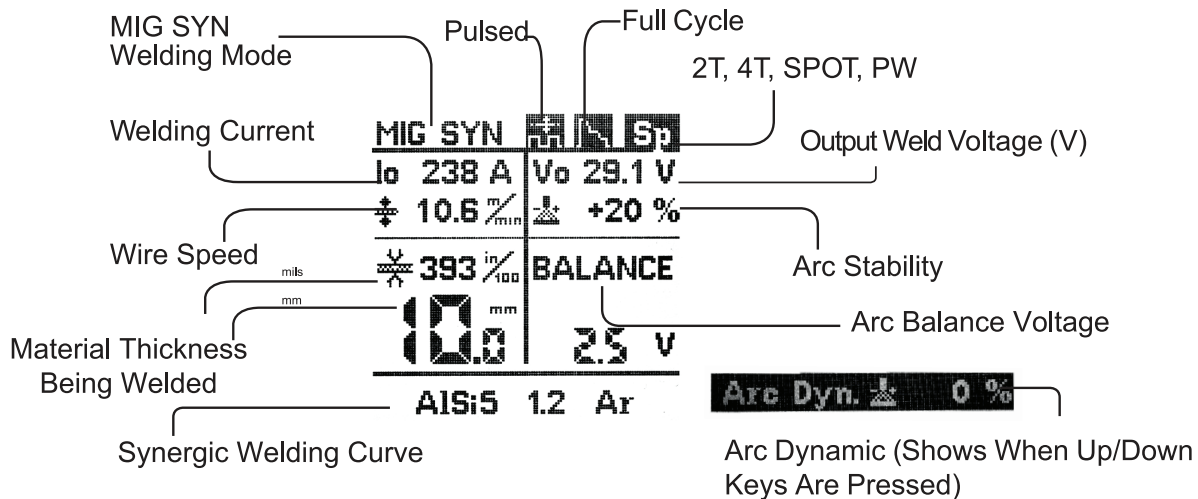


Fig.9.1: Synergic Welding Home Screen

Welding Current - The welding current is set by the Material Thickness parameter and determines how much heat goes into the workpiece.

Wire Speed - This is the actual wire speed that the welding wire feeds through the torch while welding. In MIG Synergic Welding Mode, the speed can only be adjusted by increasing or decreasing the material thickness setting.

Material Thickness - The Material Thickness number displayed should be set to approximately the individual thickness of metal being welded. Different individual welding techniques, weld type, weld position (flat, vertical, overhead, etc), and varied thicknesses in the weld stackup may require the operator to adjust this setting accordingly to produce a proper weld.

Synergic Welding Curve - This is the weld program that must match the welding wire type/grade, wire diameter, and shielding gas being used. Always refer to the OEM repair procedures for the proper wire type, grade and diameter that should be used.

Balance - The Arc Balance voltage adjusts the Arc Length. By increasing the Arc Balance Voltage, the machine will produce a wider, flatter weld bead. By decreasing the Arc Balance Voltage, the machine will produce a narrower, taller weld bead. Adjusting the Arc Balance Voltage has little to no effect on the weld penetration.

Output Weld Voltage - Adjust material thickness or balance to raise or lower output weld voltage. This is typically not changed away from the "Synergic" weld thickness setting unless the user adjusts the "Balance" to change the appearance of the weld.

Arc Stability:

A Negative Arc - Normal setting when the operator has a very steady hand while welding.

A Positive Arc - Stability has a more reactive arc and is more forgiving for an operator who doesnot have a steady hand.

Setup

Press the Setup Key in MIG SYN mode to access the secondary parameters' setup screen.

Use the Right Regulating Knob to change secondary parameters.

Use the Key to run through the parameters

| | |
|---------------------|---------------|
| Trigger Mode | Spot |
| Spot Time W. | 25.0 s |
| Spot Time P. | 25.0 s |
| Wire Slope | 2.55 s |
| Cycle | FULL |

Fig.9.2: Basic Setup Menu

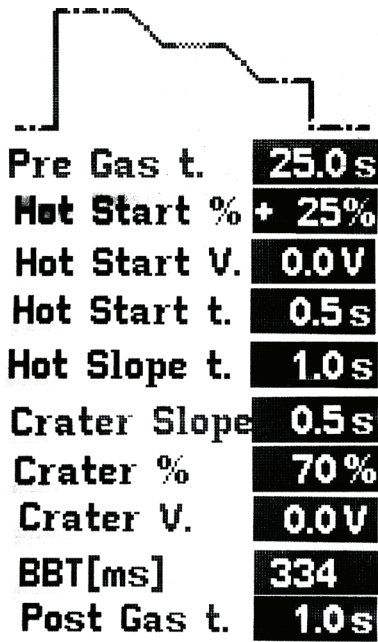
TRIGGER MODE: Select 2Stroke/4Stroke / Spot Welding Mode / Pause-Work Mode (P-W)

SPOT TIME W: Adjustable only when Spot Welding Mode or P-W Mode is set. Regulates the Spot Welding Time (0-25 sec). Trigger must be released and pushed again for next weld

SPOT TIME P: Adjustable only when P-W Mode is set. Regulates the Pause time (0-25 sec)

WIRE SLOPE: Changes the time needed to reach normal wire speed after arc striking speed.

CYCLE: Normal or Full. Full activates advanced parameters and Normal does not.



PRE GAS TIME: Regulates the gas flow before the welding starts (0-25 sec.).

HOT START %: Percentage of welding current increased during hot start phase - 80% - 100%. Hot start is used to achieve better penetration at the beginning of the weld.

HOT START VOLTAGE: Adjusts voltage compensation during hot start phase. Increasing this increases the bead width at the start of the weld.

HOT START TIME: Time of hot start phase in 2T mode. Time of hot start controls the length of time trigger is pushed in 4T mode.

HOT SLOPE TIME: Time required to shift from hot start phase to welding phase.

CRATER SLOPE: Time required to shift from welding phase to crater fill phase in 2T mode. Crater slope time controlled with length of time trigger is pushed in 4T mode

CRATER %: Percentage of current decrease during crater fill phase CRATER VOLTAGE: Adjust voltage compensation during crater fill phase.

BBT: Regulates the length of the wire sticking out (stick out) from the torch at the end of welding (1-510).

POST GAS: Regulates the gas flow time at the end of welding (0 – 25 Sec.).

9.2 Mig Pulse Welding Mode

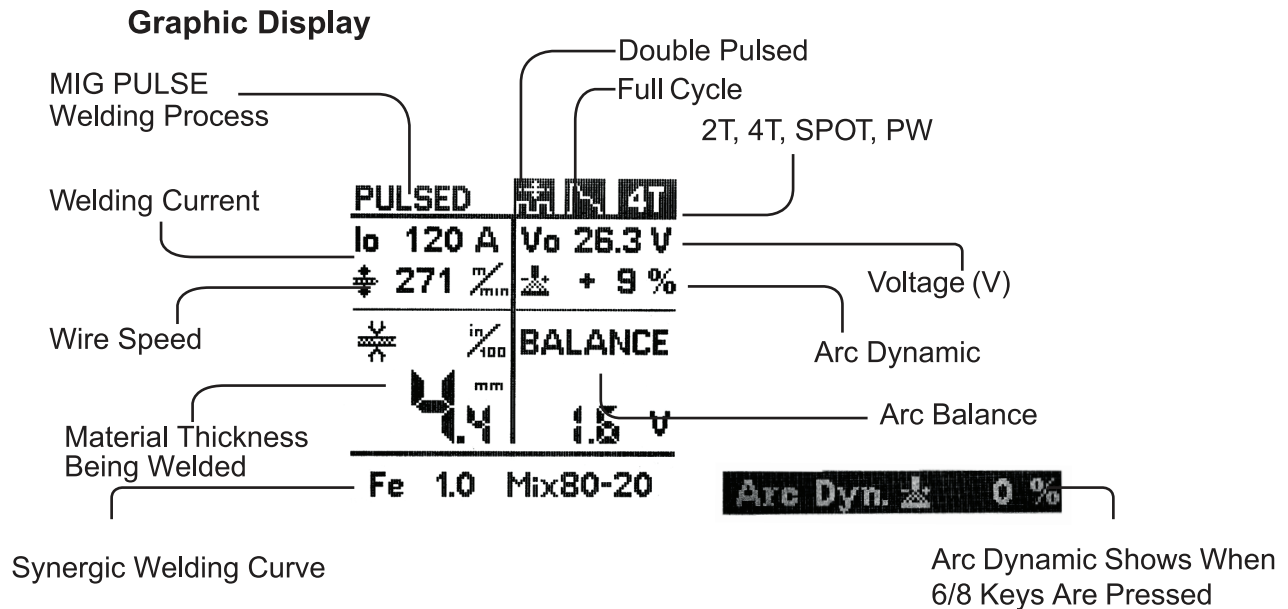
When the welder is placed in Mig Pulse mode, the welder will be in Pulse welding mode.

The operator will be able to turn on Wire Pulse (Double Pulse) in the setup menu when in this mode. The welder will also be in a "Synergic" mode, which means that the wire speed is automatically adjusted as the welding current is turned up or down.

The operator only needs to adjust the welding current up or down based on the thickness of material being welded.

The wire Speed is automatically adjusted when the thickness (aka welding current) is adjusted up or down.

The welder is pre-programmed to have the correct wire speed feed for the welding current that is being used



Press the "Mode" button on the front panel to access this welding mode.

Welding Current:

This is the output welding amperage based on the Material Thickness setting

Wire Speed:

This is the actual wire speed that the welding wire feeds through the torch while welding. Wire speed can only be adjusted by increasing or decreasing the material thickness setting.

Material Thickness:

The Material Thickness number displayed should be set to approximately the thickness of material being welded. Different individual welding techniques, weld type, weld position (flat, vertical, overhead, etc) and varied thicknesses of metal being welded will require the operator to adjust this setting accordingly to produce a proper weld.

Synergic Welding Curve:

This is the weld program that must match the welding wire diameter, wire type/grade and shielding gas being used. Always refer to the OEM repair procedures for the proper wire type and diameter that should be used.

Balance:

Balance is the Arc Length adjustment.

By increasing the Balance voltage, the machine will produce a wider and flatter weld bead. By decreasing the Balance Voltage, the machine will produce a narrower & taller weld bead.

Adjusting the Balance/Arc Length has little to no effect on the penetration of the weld.

Continued.

Voltage:

The Voltage setting adjusts output voltage of the weld. This is raised or lowered by adjusting the Material Thickness setting up or down and also by adjusting the Balance.

The Synergic settings are designed so you do not have to manually adjust these settings. You can adjust the Balance to change the weld bead appearance

Arc Dynamic:

The Arc Dynamic setting adjusts arc stability. Negative arc dynamic creates for a stable arc as long as the user has a steady hand when welding. Positive arc dynamic creates a more reactive arc and is more forgiving for the occasional operator.

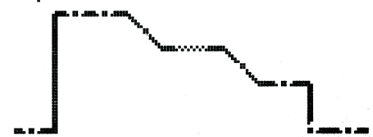
Setup:

Press the Setup Key - in MIG SYN mode to access the parameters' setup screen. Use the Right Control Knob - to change parameters. Use the Key - to run through the parameters

TRIGGER MODE:

Selection of the 2Stroke / 4Stroke / Spot Welding Mode / Pause-Work Mode (P-W)

| | |
|---------------------|---------------|
| Trigger Mode | Spot |
| Spot Time W. | 25.0 s |
| Spot Time P. | 25.0 s |
| Wire Slope | 2.55 s |
| Cycle | FULL |



| | |
|---------------------|---------------|
| Pre Gas t. | 25.0 s |
| Hot Start % | + 25% |
| Hot Start V. | 0.0 V |
| Hot Start t. | 0.5 s |
| Hot Slope t. | 1.0 s |
| Crater Slope | 0.5 s |
| Crater % | 70 % |
| Crater V. | 0.0 V |
| BBT[ms] | 334 |
| Post Gas t. | 1.0 s |

SPOT TIME W: Adjustable only when Spot Welding Mode or P-W Mode is set: Regulates the Spot Welding Time (0-25 sec). Trigger must be released and pushed again for next weld.

SPOT TIME P: Adjustable only in P-W Mode is set: Regulates the pause time (0-25 sec).

WIRE SLOPE: Regulates the time needed to reach normal wire set speed after arc striking speed (0-2.55sec).

CYCLE: Normal or Full

Normal: No activation of advanced parameters, Hot Start %, Hot Start V., Hot Start t, Hot Slope t, Crater Slope, Crater %, Crater V, Pre Gas t, BBT, and Post Gas t. are adjustable in setup menu

Full: Activates advanced parameters, Hot Start %, Hot Start V, Hot Start t., Hot Slope t., Crater Slope, Crater %, Crater V, BBT[MS], Post Gas t.

PRE GAS TIME: Regulates the time of gas flow before the welding start (0-25 sec.).

HOT START %: Percentage of welding current increase during hot start phase - 80% - 100%.

HOT START VOLTAGE: Adjust voltage compensation during hot start phase.

HOT START TIME: Time of hot start phase in 2T mode. Time of hot start controlled with length of time trigger is pushed in 4T mode.

HOT SLOPE TIME: Time required to shift from hot start phase to welding phase.

CRATER SLOPE: Time required to shift from welding phase to crater fill phase in 2T mode. Crater slope time controlled with length of time trigger is pushed in 4T mode.

CRATER %: Percentage of current decrease during crater fill phase .

CRATER VOLTAGE: Adjust voltage compensation during crater fill phase.

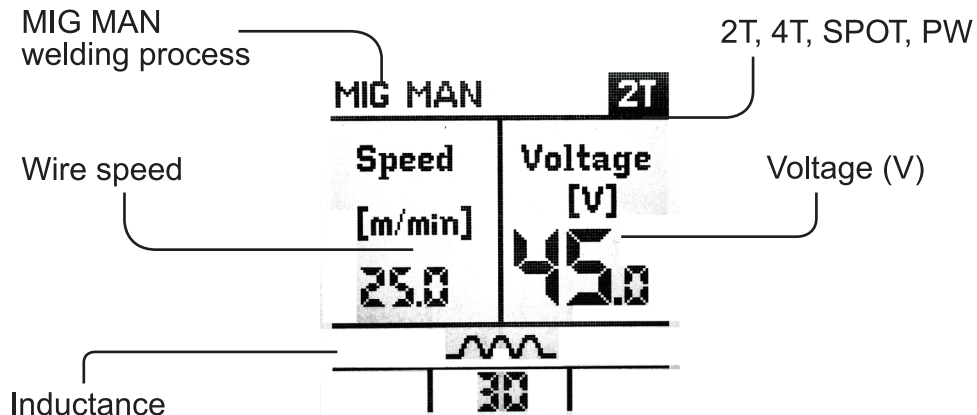
BBT: Regulates the length of the wire protruding from the torch at the end of welding (1-510).

POST GAS: Regulates the gas flow time at the end of welding (0 – 25 Sec.).

9.3 MIG MAN (Manual) Welding Mode

When the welder is placed in MIG MAN welding mode, the operator is able to adjust the welding current and the wire speed independently.

Graphic Display



Voltage:

This adjustment regulates the welding current output.

Wire Speed:

This adjustment regulates the wire speed required for the voltage that has been set.

Inductance:

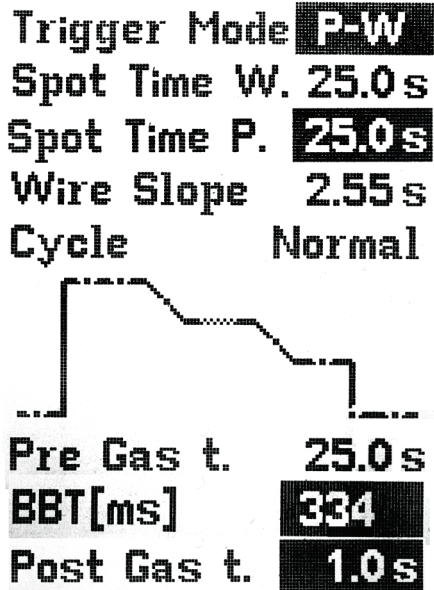
This adjustment regulates the inductance.

Low value = colder arc.

High value = hotter arc.

Setup Menu

Press the Setup Key in MIG MAN mode to access the parameters' setup screen. Use the Right Control Knob - to change parameters, use the Key to run through the parameters.



TRIGGER MODE:

Selection of the 2Stroke / 4Stroke / Spot Welding Mode / Pause-Work mode (P-W).

SPOT TIME W:

Adjustable only when Spot Welding Mode or P-W Mode is set: regulation of the maximum duration of the Spot Welding Time (0-25 sec) welds for length of time set while trigger is pushed. Trigger must be released and pushed again for next weld.

SPOT TIME P:

Adjustable only when P-W Mode is set: Regulates the Pause time (0-25 sec).

WIRE SLOPE:

Regulates the time needed to reach wire set speed after arc striking speed.

PRE GAS T:

Regulates the gas flow time before the welding starts (0 – 25 sec.).

BBT:

Regulates the length of the wire protruding from the torch at the end of welding (1-510) .

POST GAS:

Regulates the gas flow time at the end of welding (0 – 25 sec.).

Save & Recall

Use this key to save and recall the points that the operator can customize. Refer to the chapter “Save & Recall”.

Right Control Knob - Voltage

Regulates the voltage (10V to 45V).

Inductance

Regulates the electronic inductance value (0-30).

Low Value = colder arc.

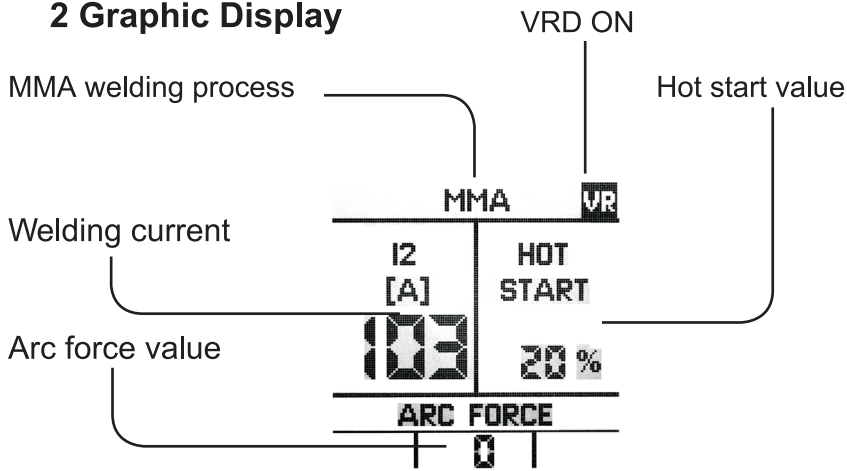
High Value = hotter arc.

Left Control Knob - Speed

Adjusts the wire speed (1-25 m/min or 39-984 in/min).

MMA WELDING

2 Graphic Display



Left Control Knob - Current

Adjust the welding current (A) on a range from 5 to maximum current value.
 Note: adjust the welding current according to the diameter of the electrode to be used.

| RANGE | Ø MM | Electrode diameter |
|-------------|-------|--------------------|
| UP TO 40 A | 1.6mm | |
| 40 - 70 A | 2.0mm | |
| 55 - 90 A | 2.5mm | |
| 90 - 135 A | 3.2mm | |
| 135 - 160 A | 4.0mm | |
| 170 - 220 A | 5.0mm | |
| 230 - 300 A | 6.0mm | |

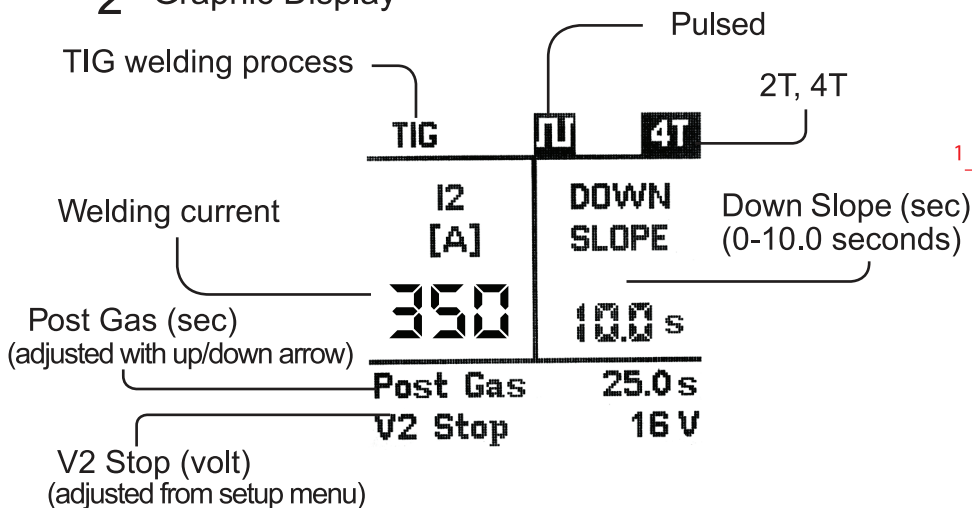
Right Control Knob - Hot Start

Adjust, in the start phase, the welding current increased percentage variable from 0 to 50% on the set current. The higher initial peak current makes striking the arc easier.

Arc Force Keys (Up & Down Arrows)

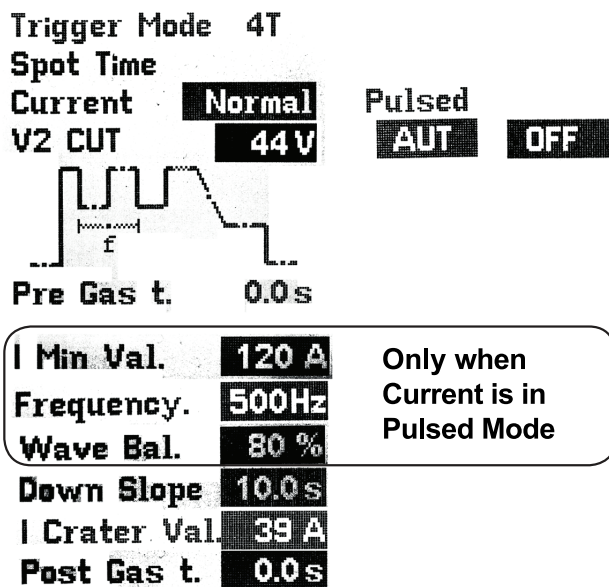
Adjust arc force value on a range from 0 to 20.

2 Graphic Display



Set Up

Press the Setup Key in TIG mode to access the secondary parameters setup screen. Use the Right Control Knob- to change parameters. Use the Key $\uparrow\downarrow$ to run through the parameters.



2T Stroke: In Manual Welding Mode the unit will weld continuously while the torch trigger is pressed (Welding ON). Releasing the torch trigger will stop welding immediately (Welding OFF). **Only when Current is in Pulsed Mode.**

4 Stroke: In Automatic Welding Mode the welding process is performed as follows:

- First torch trigger press and hold (Welding ON as current is fed, Slope Up as set till the set current value is reached)
- First torch trigger release
- Second torch trigger press and hold (Slope down and Final Current)
- Second torch trigger release (Arc OFF and Post Gas)

Current: Normal or Pulsed

Normal Mode: No adjustment of I Min Val, frequency, wave balance.

Pulsed Mode: Allows operator to adjust I Min Val, frequency, wave balance.

V2 CUT: Arc voltage value over which the arc switches off. Automatic - 16V to 44V - OFF

PRE GAS: Regulates the gas flow before welding starts (0 -25 sec)

I MIN VAL: Regulates the base current value (5 till set current in A)

FREQUENCY: Regulates the pulse frequency to give excellent quality and appearance results (1-500Hz) Adjusted from setup menu. Current mode must be switched to "Pulsed" in setup menu.

WAVE BAL.: Corresponds to the Time ON percentage (20% - 80%); adjusting the cycle in pulsed mode allows the peak current on for a longer or shorter time.

Down Slope: Regulates the the time needed to reach the final current value (Crater Filler 0 – 10 Sec)

Crater VAL: Regulates the Final Current Value or Crater Filler (5 A up to set welding amps(A))

Post Gas: Regulates the gas flow time at the end of welding (0 – 25 Sec.). Use the Mode Key - to go back to the TIG main screen after parameters are adjusted.

Save & Recall

Press this key to save and recall the points that the operator can customize. Refer to the chapter "Save & Recall".

Right Control Knob - Down Slope

Regulates the time needed by the welding current to reach the final current value (Crater Filler OFF / 0 – 10 Sec).

Post Gas Key (Up/Down Arrows)

adjusts Post Gas value on a range from 0 to 25 sec.

Left Control Knob - Current

Adjusts the welding current (A) on a range from 5 to maximum current value.

3.1 Normal & Full Welding Mode

Below is a chart of the Normal Welding Mode. Turned on/off in setup screen.

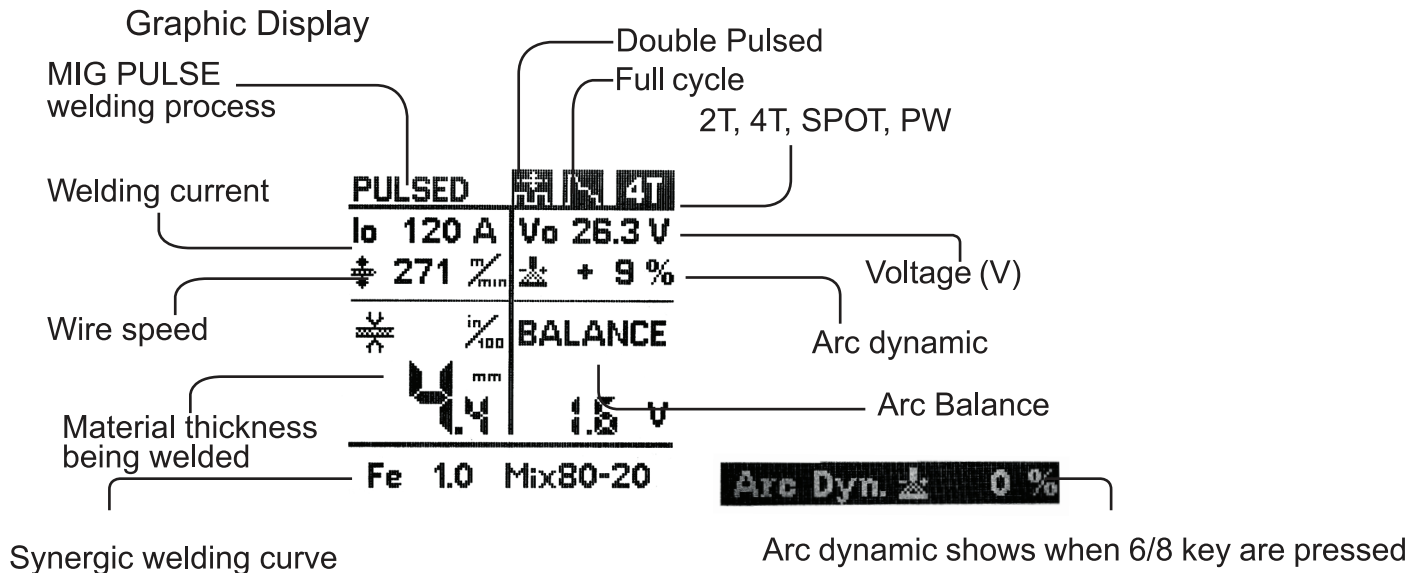
| Normal Welding Mode | 2T Mode | 4T Mode |
|---|------------------------|------------------------|
| Pre Gas Time - Time that the shielding gas flows prior to welding when the trigger is initially pressed | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Hot Start % - Percentage of welding current above the normal set welding current | N/A | N/A |
| Hot Start Voltage - Higher voltage creates a flatter, wider bead. Lower voltage creates a narrower, taller bead | N/A | N/A |
| Hot Start Time - Time that the increased Hot Start percentage is active | N/A | N/A |
| Hot Slope Time - Time it takes for the Hot Start current to reach normal welding current | N/A | N/A |
| Crater Slope - Time it takes for the normal welding current to ramp down to crater fill current | N/A | N/A |
| Crater % - Percentage of welding current below normal welding current to fill the crater at the end of the weld | N/A | N/A |
| Crater Voltage - Higher voltage creates a flatter, wider bead. Lower voltage creates a narrower, taller bead | N/A | N/A |
| BBT - Regulation of the length of wire sticking out from the end of the torch at the end of welding | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Post Gas Time - Time that the shielding gas flows from the torch at the end of welding | Adjusted in Setup Menu | Adjusted in Setup Menu |

Below is a chart of the Full Welding Mode. Turned on/off in setup screen.

| Full Welding Mode | 2T Mode | 4T Mode |
|---|--|---|
| Pre Gas Time - Time that the shielding gas flows prior to welding when the trigger is initially pressed | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Hot Start % - Percentage of welding current above the normal set welding current | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Hot Start Voltage - Higher voltage produces a flatter, wider bead. Lower voltage produces a narrower, taller bead during hot start phase | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Hot Start Time - Time that the increased Hot Start percentage is active | Hot Start phase is on based on the actual time set in the Setup Menu | Hot Start is active based on the length of time that the trigger is pressed the first time |
| Hot Slope Time - Time it takes for the Hot Start current to reach normal welding current | Based on the actual time set in the Setup Menu | Based on the actual time set in the Setup Menu - Starts when trigger is released for the first time |
| Crater Slope - Time it takes for the normal welding current to ramp down to crater fill current | Based on the actual time set in the Setup Menu | Based on the actual time set in the Setup Menu - Starts when trigger is pressed for the second time |
| Crater % - Percentage of welding current below normal welding current to fill the crater at the end of the weld | Based on the actual % set in the Setup Menu | Based on the actual % set in the Setup Menu - Starts when trigger is released for the second time |
| Crater Voltage - Higher voltage produces a flatter, wider bead. Lower voltage produces a narrower, taller bead during the crater fill phase | Based on the actual voltage set in the Setup Menu | Based on the actual voltage set in the Setup Menu |
| BBT - Regulation of the length of wire sticking out from the end of the torch at the end of welding | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Post Gas Time - Time that the shielding gas flows from the torch at the end of welding | Adjusted in Setup Menu | Adjusted in Setup Menu |

MIG Pulse Welding Mode

When the welder is placed in MIG Pulse mode, the welder will be in Pulse welding mode. The operator will be able to turn on Wire Puse (Double Pulse) in the setup menu when in this welding mode. The welder will also be in a "Synergic" mode, which means that the wire speed is automatically adjusted as the welding current is turned up or down. The operator only needs to adjust the welding current up or down based on the thickness of metal being welded. The wire speed is automatically adjusted when the thickness (welding current) is adjusted up or down. The welder is pre-programmed to have the proper wire speed feed for the welding current that is being used.



Press the "Mode" button on the front panel to access this welding mode.

Welding Current:

This is the output welding amperage based on the Material Thickness setting

Wire Speed:

This is the actual wire speed that the welding wire feeds through the torch while welding. Wire speed can only be adjusted by increasing or decreasing the material thickness setting.

Material Thickness:

The Material Thickness number displayed should be set to approximately the thickness of metal being welded. Different individual welding techniques, weld type, weld position (flat, vertical, overhead, etc) and varied thicknesses of metal being welded will require the operator to adjust this setting accordingly to produce a proper weld.

Synergic Welding Curve:

This is the weld program that must match the welding wire diameter, wire type/grade and shielding gas being used. Always refer to the OEM repair procedures for the proper wire type and diameter that should be used.

Balance:

The Balance is the Arc Length adjustment. By increasing the Balance voltage, the machine will produce a wider and flatter weld bead. By decreasing the Balance Voltage, the machine will produce a narrower and taller weld bead. Adjusting the Balance/Arc Length has little, to no effect on the penetration of the weld.

Continued.

Voltage:

The Voltage setting adjusts output voltage of the weld. This is raised or lowered by adjusting the Material Thickness setting up or down and also by adjusting the Balance. The Synergic settings are designed so you do not have to manually adjust this settings. You can adjust the Balance to change the appearance

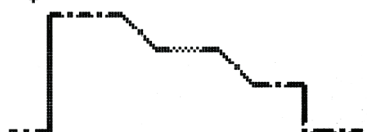
Arc Dynamic:

The Arc Dynamic setting adjusts arc stability. Negative arc dynamic creates for a stable arc as long as the user has a steady hand when welding. Positive arc dynamic creates a more reactive arc and is more forgiving for a user that does not have a steady hand.

Setup:

Press the Setup Key - in MIG SYN mode to access the parameters' setup screen. Use the Right Control Knob - to change parameters. Use the Key - to run through the parameters

| | |
|---------------------|---------------|
| Trigger Mode | Spot |
| Spot Time W. | 25.0 s |
| Spot Time P. | 25.0 s |
| Wire Slope | 2.55 s |
| Cycle | FULL |



| | |
|---------------------|---------------|
| Pre Gas t. | 25.0 s |
| Hot Start % | + 25% |
| Hot Start V. | 0.0 V |
| Hot Start t. | 0.5 s |
| Hot Slope t. | 1.0 s |
| Crater Slope | 0.5 s |
| Crater % | 70 % |
| Crater V. | 0.0 V |
| BBT[ms] | 334 |
| Post Gas t. | 1.0 s |

TRIGGER MODE: Selection of the 2Stroke / 4Stroke / Spot Welding Mode / Pause-Work Mode (P-W)

SPOT TIME W: Adjustable only when Spot Welding Mode or P-W Mode is set: regulation of the maximum duration of the Spot Welding Time (0-25 sec) welds for length of time set. Trigger must be released and pushed again for next weld

SPOT TIME P: Adjustable only when P-W Mode is set: regulation of the maximum duration of pause (0-25 sec)

WIRE SLOPE: Regulation of time needed to reach wire set speed after arc striking speed(0-2.55sec)

CYCLE: Normal or Full

Normal: No activation of advanced parameters, Hot Start %, Hot Start V., Hot Start t, Hot Slope t, Crater Slope, Crater %, Crater V. Pre Gas t, BBT, and Post Gas t. are adjustable in setup menu

Full: Activates advanced parameters, Hot Start %, Hot Start V., Hot Start t., Hot Slope t., Crater Slope, Crater %, Crater V, BBT[MS], Post Gas t.

PRE GAS TIME: Regulates the gas flow before the welding start (0-25 sec.)

HOT START %: Percentage of welding current increase during hot start phase - 80% - 100%

HOT START VOLTAGE: Adjust voltage compensation during hot start phase

HOT START TIME: Time of hot start phase in 2T mode. Time of hot start controlled with length of time trigger is pushed in 4T mode

HOT SLOPE TIME: Time required to shift from hot start phase to welding phase

CRATER SLOPE: Time required to shift from welding phase to crater fill phase in 2T mode. Crater slope time controlled with length of time trigger is pushed in 4T mode

CRATER %: Percentage of current decrease during crater fill phase CRATER VOLT

AGE: Adjust voltage compensation during crater fill phase

BBT: Regulates the length of the wire protruding from the torch at the end of welding (1-510)

POST GAS: Regulates the gas flow time at the end of welding (0 – 25 Sec.)

Switching between 2T, 4T, Spot Time, and P-W (Pause/Weld)

- Press the "Setup" button to enter the Setup menu
- Use the Up/Down arrows to highlight "Trigger Mode"
- Use the Right hand dial to scroll to the desired trigger mode
- Use the Up/Down arrows to highlight Spot Time W/Spot Time P to weld/pause times for

Spot Time and P-W Weld Modes.



| | 1st Trigger Push | Trigger release after 1st Trigger Push | 2nd Trigger Push | Trigger Release after 2nd Trigger Push |
|---|---|---|---|--|
| 2T Trigger Mode (Normal Weld Mode) | •Welding Starts | •Welding Stops | N/A | N/A |
| 2T Trigger (Full Weld Mode) | •Pre Gas starts, then Hot Start begins after Pre Gas time has elapsed. •Gas and Hot Start time values set in setup Menu. | •Crater Slope starts, then Crater Fill percentage, then Post Gas time based on set values in the Setup Menu. •Welding Stops. | N/A | N/A |
| 4T Trigger Mode (Normal Weld Mode) | •Pre Gas starts, then Hot Start begins after Pre Gas time has elapsed. •Based on PreGas and Hot Start time values set in setup Menu. | •Normal weld mode starts. | •Crater Slope starts, then Crater Fill percentage, then Post Gas time based on set values in the Setup Menu. | •Crater Slope starts, then Crater Fill percentage, then Post Gas time based on set values in the Setup Menu. |
| 4T Trigger Mode (Full Weld Mode) | •Pre Gas starts, then Hot Start begins after Pre Gas time has elapsed. •Based on the length of time the trigger is pushed. | •Normal weld mode starts. | •Crater Slope starts, based on the Crater Fill percentage value set in the Setup Menu. •Stays in this mode for the length of time the trigger is pushed. | •Post Gas time starts based on set values in the Setup Menu. |
| Spot Time Trigger Mode | •Welding Starts and continues to weld for length of time set for "Spot Time W" in the Setup Menu. •Welding Stops after once the "Spot Time W" time has been reached. | N/A | •Initiates the "Spot Time" weld cycle again. | N/A |
| P-W Trigger Mode | •Welding Starts and continues to weld for length of time set for "Spot Time W" in the Setup Menu. •Welding Stops after once the "Spot Time W" time has been reached. Welding "Pauses" for the length of time set for "Spot Time P" in the Setup Menu. •Trigger remains pressed and welding starts again when the "Spot Time P" time is reached. | N/A | N/A | N/A |

3.1 Normal & Full Welding Mode

Below is a chart of the Normal Welding Mode. Turned on/off in setup screen.

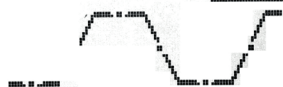
| Normal Welding Mode | 2T Mode | 4T Mode |
|---|------------------------|------------------------|
| Pre Gas Time - Time that the shielding gas flows prior to welding when the trigger is initially pressed | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Hot Start % - Percentage of welding current above the normal set welding current | N/A | N/A |
| Hot Start Voltage - Higher voltage creates a flatter, wider bead. Lower voltage creates a narrower, taller bead | N/A | N/A |
| Hot Start Time - Time that the increased Hot Start percentage is active | N/A | N/A |
| Hot Slope Time - Time it takes for the Hot Start current to reach normal welding current | N/A | N/A |
| Crater Slope - Time it takes for the normal welding current to ramp down to crater fill current | N/A | N/A |
| Crater % - Percentage of welding current below normal welding current to fill the crater at the end of the weld | N/A | N/A |
| Crater Voltage - Higher voltage creates a flatter, wider bead. Lower voltage creates a narrower, taller bead | N/A | N/A |
| BBT - Regulation of the length of wire sticking out from the end of the torch at the end of welding | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Post Gas Time - Time that the shielding gas flows from the torch at the end of welding | Adjusted in Setup Menu | Adjusted in Setup Menu |

Below is a chart of the Full Welding Mode. Turned on/off in setup screen.

| Full Welding Mode | 2T Mode | 4T Mode |
|---|--|---|
| Pre Gas Time - Time that the shielding gas flows prior to welding when the trigger is initially pressed | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Hot Start % - Percentage of welding current above the normal set welding current | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Hot Start Voltage - Higher voltage produces a flatter, wider bead. Lower voltage produces a narrower, taller bead during hot start phase | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Hot Start Time - Time that the increased Hot Start percentage is active | Hot Start phase is on based on the actual time set in the Setup Menu | Hot Start is active based on the length of time that the trigger is pressed the first time |
| Hot Slope Time - Time it takes for the Hot Start current to reach normal welding current | Based on the actual time set in the Setup Menu | Based on the actual time set in the Setup Menu - Starts when trigger is released for the first time |
| Crater Slope - Time it takes for the normal welding current to ramp down to crater fill current | Based on the actual time set in the Setup Menu | Based on the actual time set in the Setup Menu - Starts when trigger is pressed for the second time |
| Crater % - Percentage of welding current below normal welding current to fill the crater at the end of the weld | Based on the actual % set in the Setup Menu | Based on the actual % set in the Setup Menu - Starts when trigger is released for the second time |
| Crater Voltage - Higher voltage produces a flatter, wider bead. Lower voltage produces a narrower, taller bead during the crater fill phase | Based on the actual voltage set in the Setup Menu | Based on the actual voltage set in the Setup Menu |
| BBT - Regulation of the length of wire sticking out from the end of the torch at the end of welding | Adjusted in Setup Menu | Adjusted in Setup Menu |
| Post Gas Time - Time that the shielding gas flows from the torch at the end of welding | Adjusted in Setup Menu | Adjusted in Setup Menu |

3.2 Setup menu 2 - DOUBLE PULSE

Pulsed wire **ON**



Lo Level % **75%**
 Lo Level V. **-2.5V**
 Hi Time **3.0s**
 Slope Time **2.6s**
 Lo Time **2.2s**

From "Setup Menu" press setup key - 3 - to enter Wire pulsed setup menu

PULSED WIRE: Activate/Deactivate Wire pulse (on/off).

Lo LEVEL %: Low welding current. Percentage of the welding current.

Lo LEVEL V.: Low welding current voltage compensation. Increased voltage produces a wider, flatter bead; decreased voltage produces a taller narrow bead.

Hi TIME: Welding time at high current.

SLOPE TIME: Time needed to switch between high and low current.

4 Save & Recall

Use this key to save and recall the programs that the operator can customize. Refer to the chapter "Save& Recall".

5 Right Control Knob

Balance and Voltage regulation (V)

6 Arc Dyn

Decrease the Arc Dyn. value (-20% +20%)

6.1 KEEP HOLDING MATERIAL BUTTON

Use the Material Key to view the Synergic Welding Curves available on the unit. Turn the Right Control Knob - 5 - or press the Material Key - 6 - to choose the desired Synergic Program, suitable to the type of wire and to the gas to be used for welding. To confirm your choice simply press the Mode Key - 1 - to go back to the main screen.

| Program number | MAT | GAS | D. | Welding Wire Thickness |
|----------------|----------|---------|-----|------------------------|
| 15 | CrNi-316 | Mix98-2 | 0.8 | |
| 16 | CrNi-316 | Mix98-2 | 1.0 | |
| 17 | CrNi-316 | Mix98-2 | 1.2 | |
| 19 | AlMg-5 | Ar | 0.8 | |
| 20 | AlMg-5 | Ar | 1.0 | |
| 21 | AlMg-5 | Ar | 1.2 | |
| 24 | AISI-5 | Ar | 1.0 | |

Material/Wire type GAS

Once selected a Synergic Program, Slope, Inductance, Wire Speed Balance and Material thickness settings go back to their default values.

7 Left Control Knob

adjusts the welding current (A), wire speed and material thickness

8 Arc Dyn

Increase the Arc Dyn. value (-20% +20%).

TIG - MMA

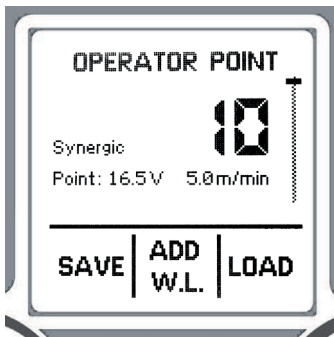
Save & Recall Key -

Use the Save & Recall Key to save and recall the parameters set by the operator. To save the parameters proceed as follows:

- Press the Save & Recall Key - 4.
- Turn the Right Control Knob - 5 - to choose the program number to save in.
- To save the program push the SAVE Key - 6.

To recall a saved program proceed as follows:

- Press the Save & Recall Key - 4.
- Turn the Right Control Knob - 5 - to choose the desired program number.
- Press the LOAD Key.



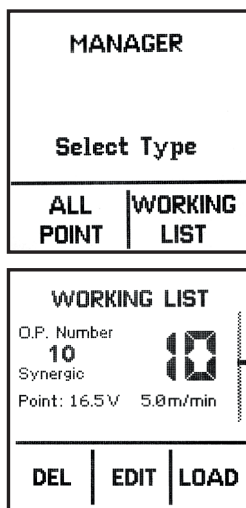
MIG MAG

Use the Save & Recall Key to save and recall the parameters set by the operator. To save the parameters proceed as follows:

- Press the Save & Recall Key - 4.
- Press - 6 - to enter in memory selection (ALL POINTS).
- Turn the Right Control Knob - 5 - to choose the program number to save in.
- To save the program push the SAVE Key - 6.
- To add the operator point in the working list press - 3 - (ADD W.L.).
- Turn the Right Control Knob - 5 - to choose the program number to save in.
- To save the program into the working list push the SAVE Key - 6.

To recall a saved program proceed as follows:

- Press the Save & Recall Key - 4.
- Press - 6 - to enter in memory selection (ALL POINTS).
- Turn the Right Control Knob - 5 - to choose the required program number.
- Press the LOAD Key - 8.



WORKING LIST

The user can select up to 20 memories and place them in a working list. To save the parameters directly proceed as follows:

- Press the Save & Recall Key - 4.
- Press - 8 - to enter in the working list (WORKING LIST).
- Turn the Right Control Knob - 5 - to choose the program number to save in.
- Press - 3 - (EDIT) to enter in the operator point memory selection.
- Turn the Right Control Knob - 5 - to choose the program number to add to the working list.
- Press - 3 - (ADD W.L.) to add the parameters to the selected memory of working list.
- To save the working list point push the SAVE Key - 6.

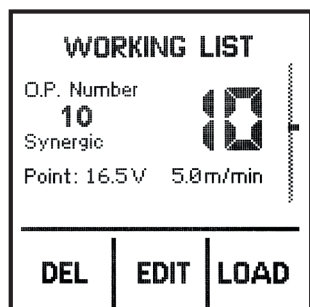
To recall a saved operator point into the working list proceed as follows:

- Press the Save & Recall Key - 4.
- Press - 8 - to enter in the working list selection (WORKING LIST).
- Turn the Right Control Knob - 5 - to choose the required program number.
- Press the LOAD Key - 8.

To delete a saved operator point into the working list proceed as follows:

- Press the Save & Recall Key - 4.
- Press - 8 - to enter in the working list selection (WORKING LIST).
- Turn the Right Control Knob - 5 - to choose the required program number.
- Press the DEL Key - 6.

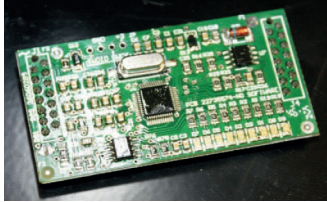
To exit SAVE & RECALL mode press MODE key - 1 - until you reach your required welding process menu.



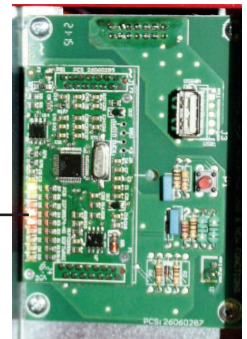
EXPANSION PCB

To perform software update:

- Open the expansion PCB panel of the generator.
- Take the expansion PCB and place it into the white corresponding border on lower PCB already installed in the generator .
- Turn ON the machine and check that the status led is working.
- After 60 seconds on the screen you will see the new configuration vs. the old one.



STATUS
LED



USB UPDATE

Use the following steps to perform a USB Update:

- Take an empty USB drive with maximum capacity of 8GB. Format it in FAT 32.
- SAVE into the USB drive the updated program.
- Turn OFF the machine.
- Open the expansion PCB panel of the generator, insert USB drive into the USB socket
- Switch ON the machine holding MODE key - 1 -.
- On the screen will appear USB CONNECTED. Release MODE key - 1 -.
- Once the software is updated a sound will confirm that the process is completed
- Remove the USB drive from the socket
- Close the expansion PCB panel.

| |
|----------------|
| USB ON |
| Insert USB Pen |
| USB CONNECTED |
| VALID FILE |

ALUMINIUM WELDING

The machine will be set up as for mild steel except for the following changes:

- 100% ARGON as welding protective gas.
- Ensure that your torch is set up for aluminium welding.
- The length of the torch should not exceed 3m (it is advisable not to use longer torches).
- Install a teflon or graphite wire liner with copper or brass terminal (follow the instructions for the renewing of the wire liner at paragraph REPLACING THE WIRE LINER).
- Ensure that drive rolls are suitable for aluminium wire.
- Use contact tips that are suitable for aluminium wire and make sure that the diameter of the contact tip hole corresponds to the wire diameter that is going to be used. To obtain a high duty cycle without wire feeding problems it is advisable to install the gas diffuser, the contact tip with 8mm thread and the nozzle. For easy welding of Aluminium and good quality welding results it is advisable to work in Pulsed Mode (Default Mode with torch 1).

PROTECTION GASES GUIDE

| METAL | GAS | NOTE |
|---------------------------|--|--|
| Mild steel | CO2 Argon + CO2 Argon + CO2 + Oxygen | High Penetration Argon controls spatters Oxygen improves arc stability |
| Mild steel - Pulsed Mode | 98%Argon + 2% CO2 (C2) | Recommended. |
| Aluminium | Argon Argon + Helium | Arc stability, good fusion and minimum spatter. Higher heat input suitable for heavy sections. Minimum porosity. |
| Stainless steel | 98%Argon + 2% CO2 (C2) Argon + CO2 + Helium Argon + Oxygen | Recommended. Arc stability. Minimum spatter. |
| Copper, Nickel and Alloys | Argon Argon + Helium | Suitable for light gauges because of low flowability of the weld pool. Higher heat input suitable for heavy sections. |

Contact your gas supplier for further information on the different gas mixtures that are the most suitable to your application.

WELDING HINTS AND MAINTENANCE

- Always weld clean, dry and well prepared material.
- Hold gun at a 45° angle to the workpiece with nozzle about 5 mm from the surface.
- Move the gun smoothly and steadily as you weld.
- Avoid welding in very drafty areas. Insufficient shielding gas coverage caused by extreme air draft will result in porosity in your weld.
- Keep wire and wire liner clean. Do not use rusty wire.
- Sharp bends or kinks on the welding cable should be avoided.
- If available, use compressed air to periodically clean the hose liner when changing wire spools

IMPORTANT: Disconnect from power source when performing maintenance on the unit.

- Using low pressure air (3/5 Bar=20-30 PSI), occasionally to blow the dust from the inside of the welder. This keeps the machine running cooler. Note: Do not blow air over the printed circuit board and electronic components.
- The wire feed roller will eventually wear out during normal use. With the correct tension the pressure roller must feed the wire without slipping. If the pressure roller and the wire feed roller make contact (when the wire is in place between them), the wire feed roller must be replaced.
- Check all cables periodically. They must be in good condition and not cracked.

TROUBLESHOOTING

This chart will assist you in resolving common issues you may encounter. Note: These are common solutions. Contact a Pro Spot representative if they do not resolve your issue.

| PROBLEM | POSSIBLE CAUSE | POSSIBLE SOLUTION |
|---|--|---|
| No "life" from welder | Input cable or plug malfunction | Check for proper input cable connection |
| | Wrong size fuse | Check fuse and replace as necessary |
| Fan operates normally, but when gun trigger is pulled, there is no wire feed, weld output or gas flow | Faulty trigger on torch | Replace torch trigger |
| | Thermostat intervention | Allow welder to cool. The extinguishing of the pilot lamp / switch on the front panel indicates the thermostat has closed |
| Feed motor operates but wire will not feed | Faulty wire feeding motor (rare) | Replace wire feeding motor |
| | Insufficient feed roller pressure | Increase roller pressure |
| | Burr on end of wire | Re-cut wire square with no burr |
| | Liner blocked or damaged | Clear with compressed air or replace liner |
| Lack of penetration | Voltage or wire feed speed too low. | Re-adjust the welding parameters |
| | Loose connection inside the machine (rare) | Clear with compressed air and tighten all connections. |
| | Worn or wrong size contact tip | Replace the contact tip |
| | Loose torch connection or faulty torch | Tighten or replace torch |
| | Wrong size wire | Use correct size welding wire |
| | Torch moved too fast | Move the gun smoothly and not too fast |
| Wire is birdnesting at the drive roller | Excessive pressure on drive roller | Adjust pressure on drive roller |
| | Gun liner worn or damaged | Replace wire liner |
| | Contact tip clogged or damaged | Replace contact tip |
| | Liner stretched or too long | Cut wire liner at the right length |
| Wire burns back to contact tip | Contact tip clogged or damaged | Replace the contact tip |
| | Wire feed speed too slow | Increase wire speed |
| | Wrong size contact tip | Use correct size contact tip |
| Workpiece clamp and/or cable gets hot. | Bad connection from cable to clamp | Tighten connection or replace cable |
| Gun nozzle arcs to work surface. | Slag build-up inside nozzle or nozzle is shorted | Clean or replace nozzle |

| | | |
|---|--|--|
| Wire pushes torch back from the workpiece | Wire feed speed too fast | Decrease wire feed speed |
| | Bad connection between earth clamp and workpiece | Clean and remove oxidation or other minerals that contact area of the earth clamp |
| | The workpiece is excessively oxidized or painted | Clean the area to be welded |
| Poor quality welds | Nozzle clogged | Clean or replace nozzle |
| | Torch held too far from the workpiece | Hold the torch at the right distance |
| | Insufficient gas at weld area | Check that the gas is not being blown away by drafts and if so move to a more sheltered weld area. If not check gas levels, regulator setting and operation of gas valve |
| | Rusty, painted, damp, oil or greasy workpiece | Ensure workpiece is clean and dry |
| | Rusty or dirty wire | Ensure wire is clean and dry |
| | Poor ground contact | Check ground clamp/workpiece connection |
| | Incorrect gas / wire combination | Check the manual for the correct combination - pg. 32 |
| Weld deposit "stringy" and incomplete | Torch moved over workpiece too quickly | Move the torch slower |
| | Gas mixture incorrect | Check shielding gas table - pg. 32 |
| Weld deposit too thick | Torch moved over workpiece too slowly | Move the torch faster |
| | Welding voltage too low | Increase welding voltage |
| Display not clear | | Adjust LCD display contrast - pg. 10 |
| When welder is turned on, the display shows ERR 1 and / or ERR2 | Failure of system memory | Contact a Pro Spot representative |



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