PRO SPOT
QUALITY WELDING SYSTEMS

SP-5 DP

1 PHASE SMART DOUBLE PULSE MIG WELDER

Instruction Manual

MNL-SP-5 DP-Rev.A

About Pro Spot

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 intevals 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.

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DISPOSAL OF WASTE EQUIPMENT BY USERS IN PRIVATE HOUSEHOLDS IN THE EUROPEAN UNION

This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

SAFETY INFORMATION

INTRODUCTION

Make sure this manual is carefully read and understood by the welder, and by the maintenance and technical workers.

PERSONAL PROTECTION

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

Arc rays can injure your eyes and burn your skin. The welding arc produces very bright ultra violet and infra red 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 insulating sole and steel toe. Avoid oily greasy clothing.
- Wear a non-flammable welding helmet with appropriate filter lenses designed so as to shield the neck and the face, also on the sides. Keep protective lens clean and replace them when broken, cracked or spattered. Position a transparent glass between lens and welding area.
- 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. The parts degreased with a solvent must be dried before welding.
- Be very carefull when welding any metals which may contain one or more of the following:

Antimony	Beryllium	Cobalt
Manganese	Selenium	Arsenic
Cadmium	Copper	Mercury
Silver	Barium	Chromium
Lead	Nickel	Vanadium

- Remove all chlorinated solvents from the welding area before welding. Certain chlorinated solvents decompose when exposed to ultraviolet radiation to form phosgene gas (nerve gas).

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 air flow 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 work piece 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 pace-maker or hearing-prosthesis should keep far from 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 be not too uch long, kept together and connected to ground;
- After the maintenance all the panels of the power source must be securely fastened in place.

PROTECTIVE WELDING GASES

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 welding arc protection. It is important to choose the appropriate gas for the type of welding being performed;
- Do not use gas from unidentified cylinders or damaged cylinders;
- Do not connnect 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;
- 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.

INTRODUCTION

This manual was edited to give some indications on the operation of the welder and was thought to offer information for its practical and secure use. Its purpose is not teach welding techniques. All given suggestions are indicative and intended to be only guidelines.

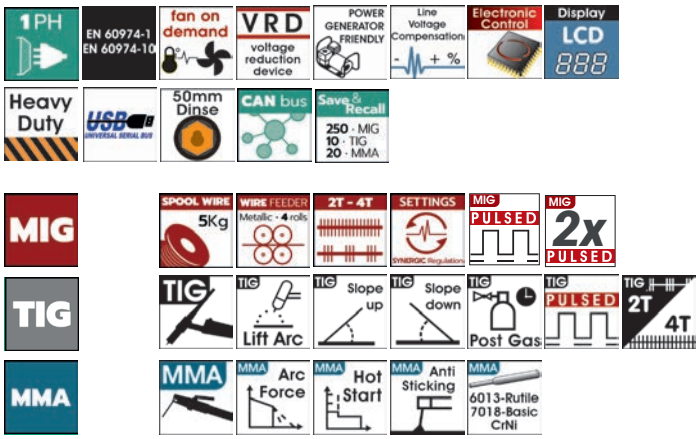
To ensure that your welder is in good condition, inspect it carefully when you remove it from its packing having care to ascertain that the cabinet or the stocked accessories are not damaged.

Your welder is capable of daily activity of construction and reparation. Its simplicity and versatility and its excelling welding characteristics are granted by the inverter technology. This welding inverter allows to be finely set to obtain optimal arc characteristics with a reduced consumption of energy and with respect to the welders based on a traditional transformer.

Respect the duty cycle of the welder making reference to the technical data label on the welder's back/bottom. Duty cycle is given as percentage on a 10 minute time. During this period of time the unit can be used at a defined power regulation. Duty cycle exceeding may cause overheating or welder's damage.

MAIN FEATURES

Your welder is a multiprocess unit capable of excellent performances in TIG, MMA and MIG/MAG welding. Main features are:



Electrodes:
Your welder can weld electrodes ø 1,6 ÷ 6mm, 6011, 6013, 7018, cast iron.

Welding Wire Selection:
Your welder can work with Aluminum wire 0,8÷1,2 thick, solid steel wire 0,6÷1,0 thick and stainless steel wire 0,8÷1,0 thick.

Feed Rolls:
Wide selection of rolls made special for different welding wires and diameters. Grooves available from 0,6 till 1,2.

Gas Selection:
According to the material to be welded and to the wire you are going to use select the shielding gas. The here below table can give you some useful indications:

MATERIAL TO WELD	*GAS CYLINDER*	*WIRE*
Mild steel	Argon + CO2 cylinder or CO2	Copper coated mild steel
Stainless steel	Argon 98% + CO2 2%	Stainless steel
Aluminium	Argon	Aluminium
Brazing Alloys	Argon	Brazing wire

Table 1

INSTALLATION

LOCATION

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

- In areas, free from moisture and dust;
- Ambient temperature between 0° to 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 300mm or more from walls or similar that could restrict natural air flow for cooling.

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

MAIN SUPPLY VOLTAGE REQUIREMENTS

Before you make any electrical connection, check that supply voltage and frequency available at site are those stated in the ratings label of your welder.
The input power requirement is 40 Amp, 1 phase - 208 - 240V.
The main supply voltage should be within ±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, if necessary, 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 (2P+T) to the supply cable (in some models the supply cable is supplied with plug).
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 L
- the blue (neutral) wire must be connected to the terminal identified by the letter N
- the yellow/green (ground) wire must be connected to the terminal identified by the letter PE or by the symbol ⏚ .

In any case, the connection of the yellow/green wire to the PE terminal ⏚ must be done in order that in the event of tearing of the power supply cable from the plug, the yellow/green wire should be the last one to be disconnected.

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 Centre.
- Do not pull violently the input power cable to disconnect it from supply.
- Do not squash the supply cable with other machines, it could be damaged and cause electric shock.
- Keep the supply cable away from heat sorces, oils, solvents or sharp edges.
- In case you are using an extension cord, try to keep it well straight and avoid its heating up.

SAFETY INSTRUCTIONS

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

- An adequate switch must be inserted before the mains outlet; this switch must be equipped with time-delay fuses;
- The connection with ground must be made with a 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 the operator's or at other persons' body;
- The power source must never be operated without its panels; this could cause serious injury to the operator and could damage the equipment.

- Refer to the Welder Base Assembly Instructions for the unit's installation.
- Load the wire, connect the gas cylinder and replace the wire liner if necessary following the instructions in this paragraph.
- Check line voltage and connect power cable.
- Power the welding unit ON. The display shows the screen of the last welding process performed by the unit.

EARTH CABLE AND TORCH CONNECTION

Ensure unit is powered off and unpluged from the mains.

- Plug the torches into the sockets – **A** –, – **B** – and – **C** – on the front of the welder having care to not damage the contacts and secure by hand screwing in the threaded connection.
- Connect the earth cable to the negative current socket – **E** – of the power source.

WIRE LOADING

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

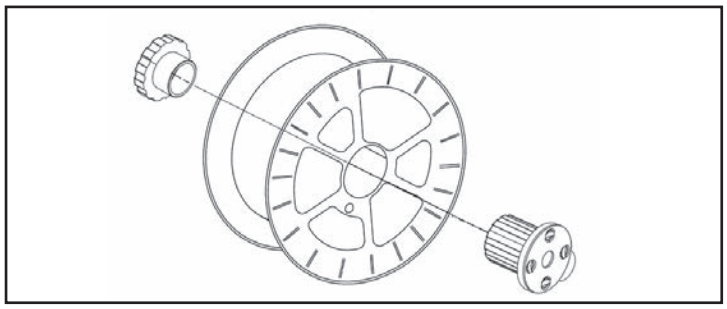


Figure 1 - Spool Assembly

- Open the side panel.
- Loosen the nut of the spool holder (brake-drum) (Fig.1).
- Remove the plastic protection from the spool and place the wire spool on the spool holder.
- Mount the nut.

Tighten nut to appropriate tightness. Excessive pressure strains the wire feeding motor. Too little pressure does not allow the proper wire feeding.

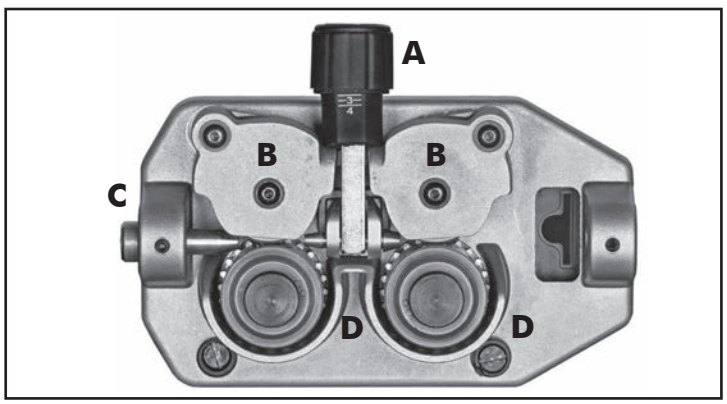


Figure 2 - Wire Feeding Motor

- Loosen and lower the plastic knob (A) (Figure 2). Open the pressure arm (B) of the feeder. (Extract the wire from the torch liner if some wire is left into the torch).
- When the wire is disconnected, grasp it with pliers so that it cannot exit 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.

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 tighten 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 for the wire diameter selected is 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 the torch switch. The wire fed by the wire feeding motor at variable speed must slide through the liner. When it exits from the torch neck, release the torch switch.

Note: after three seconds that torch trigger is pressed wire feeding speed increases to allow a fast exit of the wire on the torch neck and gas stop flowing.

- Turn off the machine.
- Mount the contact tip and the nozzle.

When checking the correct exit of the wire from the torch do not bring your face near the torch, you may run the risk to be wounded by the outgoing wire. Do not bring your fingers close to the feeding mechanism when working! The rolls, when moving, may crush the fingers. Periodically, check the rolls. Replace them when they are worn and compromise the regular feeding of the wire.

GAS CYLINDER AND REGULATOR CONNECTION

Ensure unit is powered off and unpluged from the mains.

WARNING: Cylinders are highly pressurized. Handle with care. Serious accidents can result from improper handling or misuse of compresses 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.

The bottle (not supplied) should be located at the rear of the welder, securely held in position by the chain provided.
For safety, and economy, ensure that the regulator is fully closed, (turned counter-clockwise) when not welding and when fitting or removing the gas cylinder.

- Turn the regulator adjustment knob counter-clock wise to ensure the valve is fully closed.
- Screw the gas regulator fully down on the gas bottle valve, and fully tighten.
- Connect the gas hose to the regulator securing with clip/nut provided.
- Open the cylinder valve, then set the gas flow on the regulator to approx. 5-15l/min. For Pulsed Welding it is suggestable to set the gas flow to approx. 13-14l./min.
- Operate the torch trigger to ensure that the gas is flowing through the torch.

REPLACE WIRE LINER

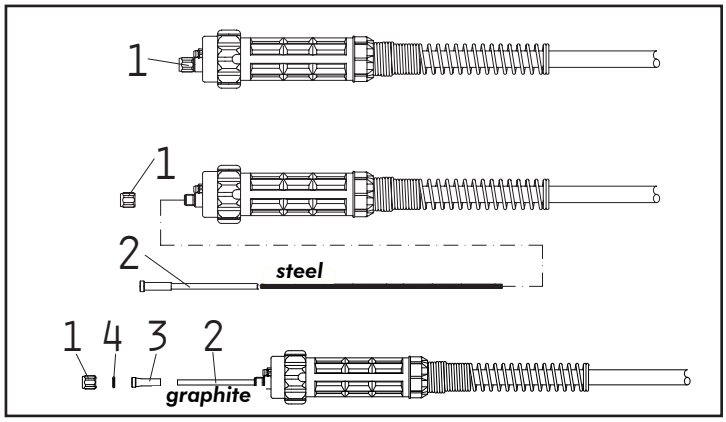


Figure 3 - Wire Liner Assembly

Ensure unit is powered off and unpluged from the mains.

- Chose the suitable wire liner to install. Mainly there are 2 types of wire liners:

1. Steel wire liners. These can be coated or not coated: the coated wire liners are used for air cooled torches; the wire liners which are not coated are used for water cooled torches.
2. Teflon/Graphite wire liners. These are suggested for the welding of Aluminium, as they allow a smooth feeding of the wire. For Pulsed Welding of Aluminium a Teflon/Graphite wire liner with copper or brass terminal is required to ensure a good electric contact of the wire.

COLOR	BLUE	RED	YELLOW
DIAMETER Ø	0.6 - 0.9	1.0 - 1.2	1.2 - 1.6

Table 2

- Disconnect the torch from the machine.
- Place it on a flat surface and carefully remove the brass nut (1).
- Pull the liner out of the hose.
- Install the new liner and mount the brass nut (1) again. Verify that liner head reaches the torch tip.
- Connect the torch to the machine and install the wire into the feeding system.
- In case you are replacing a Teflon or graphite wire liner, follow these instructions:
- Install the new liner and insert the wire liner collet (3) and the O ring (4).
- Mount the brass nut (1).
- At least 20cm of teflon liner have to come out of the brass nut.
- Remove the brass pin on the Euro connector (keep it apart to use it with steel wire liners).
- Tightly and carefully connect the torch to the Euro connector.
- Cut the wire liner 1mm from the wire feed roll.
- Install the welding wire into the feeding system.

Warning: the length of the new wire liner must be the same of the liner you have just pulled out of the hose.

ALUMINUM 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:

1. The lenght of the torch should not exceed 3m (it is advisable not to use longer torches).
2. 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).
3. Ensure that drive rolls are suitable for aluminium wire.
4. 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.

Figure 4 - Front View

A T1 - Centralized Female Connector for the connection of the torch for Aluminum welding, of Push-Pull, Spool Gun and Anolog/Digital Remote Control Torches.

B T2 - Centralized Female Connector for the connection of the torch for Steel and CrNI welding.

C T3 - Centralized Female Connector for the connection of the torch for Silicon Bronze welding.

D Positive Current Socket (+)
- for the connection of the earth cable on TIG welding
- for the connection of the welding cable or earth cable according to the type of electrode in MMA welding

E Negative Current Socket (-)
- for the connection of the earth cable on MIG/MAG welding
- for the connection of the torch on TIG welding

F Torch Gas Connection for TIG welding

G Torch Trigger Connection for TIG welding

H Mains switch for power ON and OFF

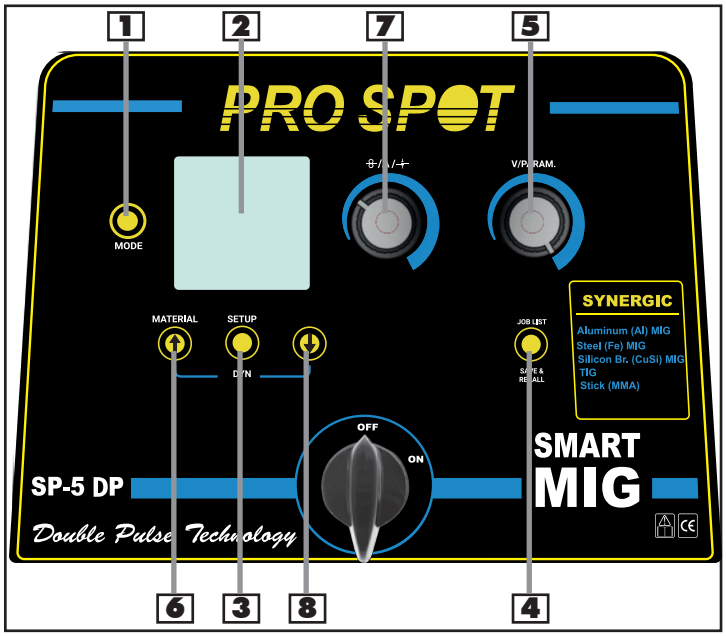


Figure 5 - Control Panel

1 *Mode Key*

- for selecting the following welding processes: MMA/STICK - TIG - MIG
- for returning back to the previous screen after the parameters' setting.

2 *Graphic Display*

for displaying the welding parameters.

3 *Setup Key*

- for setting the MIG Welding Mode: MAN, SYN, PULSE
- for setting the secondary parameters in TIG and MIG/MAG welding processes.

	TIG	*MIG/MAG MAN*	*MIG/MAG SYN*	*MIG/MAG PULSE*
2stroke/4stroke				
Pulse Function				
V2 Cut				
Slope Up				
Slope Down				
Pre-Gas		0-25s	0-25s	0-25s
Post-Gas		0-25s	0-25s	0-25s
I min Val				
Frequency				
Wave Balance				
Crater Filler value				
Spot Welding				
P-W				
Spot Time				
Wire Slope				
Cycle		Normal	Normal/Full	Normal/Full
BBT				ms
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				

Table 3

4 *Save & recall Key*

for saving and recalling the working points that may be changed by the operator.

5 *Right Regulation Knob*

- for selecting the MIG Welding Mode: MAN, SYN, PULSE and adjusting the secondary welding parameters in the Setup View.
- for adjusting the following welding parameters & values:
  MMA/STICK - Hot Start
  TIG - Down Slope
  MIG MAN - Voltage (10-40V)
  MIG SYN / MIG PULSE Balance

6 *Navigation / Material Key*

for decreasing the following welding parameters:
MMA/STICK - Arc Force
TIG - Post-Gas Time
MIG MAN - Inductance
MIG SYN / MIG PULSE Dynamics

- for selecting the material in MIG SYN / MIG PULSE by keeping holding it.
- for navigating the Submenu

7 *Left Regulation Knob*

for adjusting the following welding parameters & values:
MMA/STICK - Amperes
TIG - Amperes
MIG MAN - wire speed m/min
MIG SYN / MIG PULSE Amp, Wire Speed, Thickness mm

8 *Navigation Key*

for increasing the following welding parameters:
MMA/STICK - Arc Force
TIG - Post-Gas Time
MIG MAN - Inductance
MIG SYN / MIG PULSE Dynamics

INITIAL SETUP MENU

To enter the "Initial Setup Menu" power the unit on; while the display views the unit logo, press the Setup Key - **3** -. Use the keys - **6** - and - **8** - to select the parameter and the Right Regulation Knob - **5** - to adjust the modificable values.

BASIC SETUP

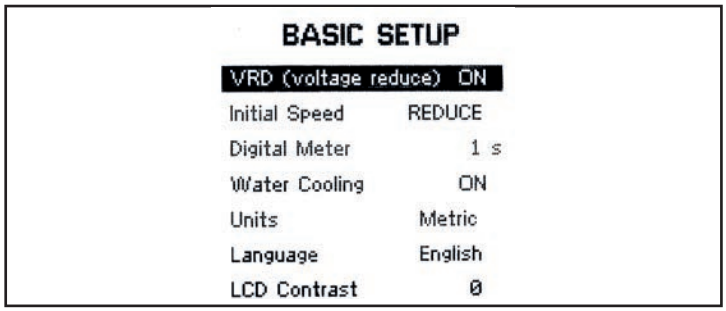


Figure 6 - Basic Setup Screen

VRD - ON/OFF
Selection of the "Voltage Reduction Device" ON or OFF. As default this is OFF.
If ON the unit reduce the OCV below a safety level at the end of welding. Automatically reset to normal value when the electrode get in touch with the workpiece.

INITIAL SPEED - reduced/normal
Reduced Initial Speed setting reduces the speed of the wire feeding on the workpiece to optimize the striking.

D.M. DIGITAL METER - OFF/MEASURE TIME
1''÷10'' (ON): selection of how many seconds the welding parameters, voltage and current, have to be displayed after you stop welding. It is possible to set from 1'' to 10 '', by default, set time is 2''.
OFF: the display views always, even during welding, the screen of the performed welding process.

WATER COOLING
Activate or deactivate Water Cooling control

UNITS
Select the unit of lenght between meters or inches or both meters/inches.

LANGUAGE
Select language of your choice

LCD CONTRAST
Setting of the LCD display contrast according to the environment temperarure and brightness.

Press the "Mode Key" - **1** - to go back to the welding process screen and save set parameters. The display views the screen of the last welding process performed by the unit.

RESET
Press and hold "SAVE & RECALL" Key - **4** - to reset all parameters and go back to the parameters set as default.

SPECIAL SETUP

From "initial setup menu" press setup key - **3** - to enter special setup menu.

Figure 7 - Special Setup Screen

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 starting selection, choose between SOFT or HARD

DROP CUT
ON: in MIG welding processes (GMAW), wire gets sliced through cleanly to get a better arc re-ignition. By default set is ON.

ARC FEELING
In MIG welding processes (GMAW) it allows to enlarge the electric arc if set to negative, to restrict it if positive. The value is adjustable from -16 to +16.

LEFT VIEW
It allows to select the value to be displayed on the left side of the display in MIG welding processes (GMAW): Thickness, Current, Speed .
By default set is "Thickness".

RIGHT VIEW
It allows to select the value to be displayed on the right side of the display in MIG welding processes (GMAW): Balance (Arc Length), Voltage.
By default set is "Balance".

SYSTEM LOG

From "Special Setup" press setup key - **3** - to enter system info. It shows:
- Expansion pcb installed on the machine
- Software version of PCBs

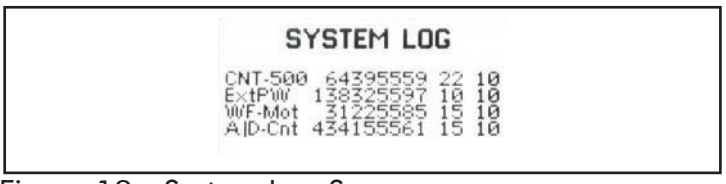


Figure 12 - System Log Screen

SYSTEM INFO

From "System Log" press setup key - **3** - to enter System Info. It shows:
- Alarms sequence
- Type of alarm
- Time of unit ON
- Arc ON time

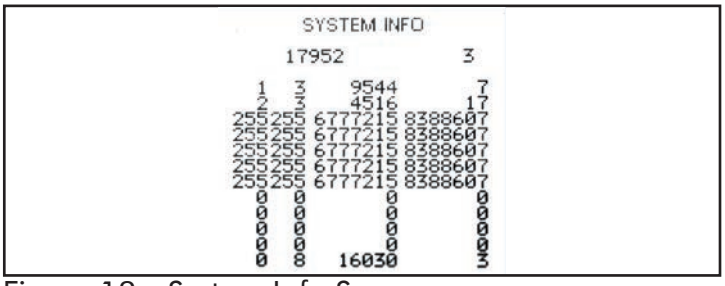


Figure 13 - System Info Screen

Connect the earth cable to the Negative output terminal (minus) - **E** - on the front of the unit and the earth clamp to the workpiece.
Plug the torches' hose into the sockets – **A** –, – **B** – and – **C** – on the front of the welder having care to not damage the contacts and secure by hand screwing in the threaded connection.

TORCH SELECTION

Press the trigger of the torch that you need to use for welding. The display will view the number correspondent to the selected torch. All parameters that will be changed in the next steps will refer to the selected torch only.

[1] Press Mode key to enter the MIG menu.

MIG BASIC SETUP

Figure 14 - MIG Basic Setup Screen

Starting from all MIG Display Views, hold the Setup key - **3** - to enter the MIG Basic Setup and change the MIG patameters set on the Special Setup Menu.

MIG MAN WELDING

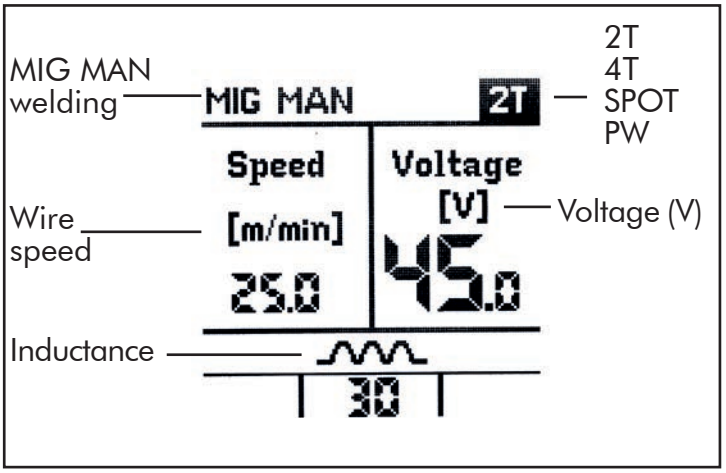


Figure 15 - MIG MAN Display View

[3] ***Setup Key***
for entering the parameters' setup screen.

[6][8] ***Navigation Key***
for running thru the parameters.

[5] ***Right Regulation Knob***
for changing the parameters.

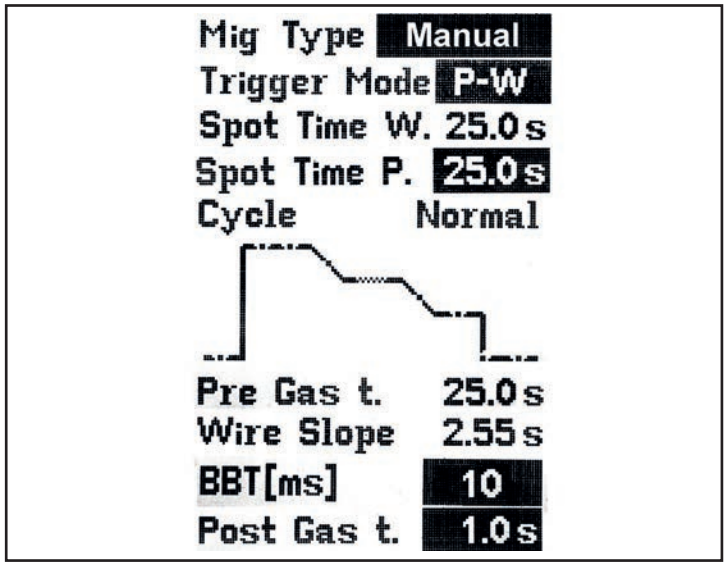


Figure 16 - MIG MAN Setup View

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)

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

PRE GAS T.
Regulation of the gas outflow before the welding start (0 – 25 sec.)

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

BBT
Regulation of the lenght of the wire protruding from the torch at the end of welding (1-250).

POST GAS
Regulation of the gas outflow time at the end of welding (0 – 25 sec.)

[5] ***Right Regulation Knob - Voltage***
Regulation of the voltage (10V to 40V)

[6][8] ***Navigation Key - Inductance***
Regulation of the electronic inductance value (0-30)
Low Value = colder arc High Value = hotter arc

[7] ***Left Regulation Knob - Speed***
Adjusts the wire speed regulation (1-25 m/min or 39-984 in/min)

[4] ***Save & Recall***
for saving and recalling the points that the operator can customize. Refer to the chapter "Save & Recall".

MIG SYN WELDING

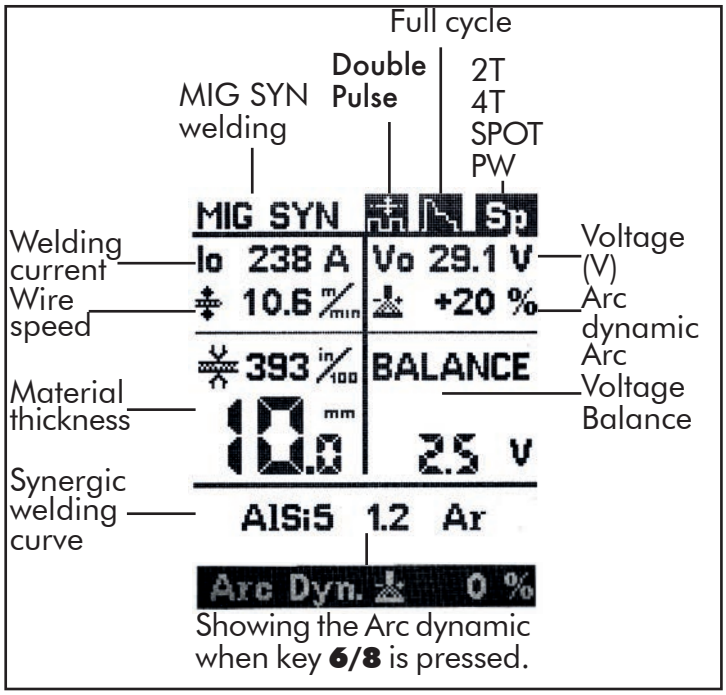


Figure 17 - MIG SYN Display View

3 ***Setup Key***
for entering the parameters' setup screen.

6 8 ***Navigation Key***
for running thru the parameters.

5 ***Right Regulation Knob***
for changing the parameters.

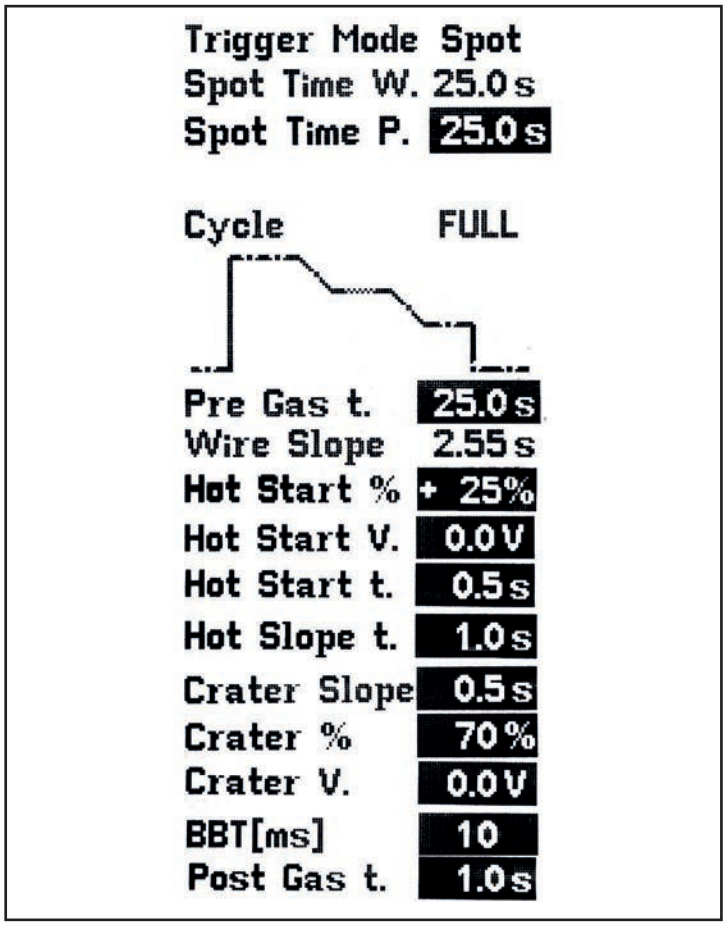


Figure 18 - MIG SYN Setup View

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)

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

CYCLE
Normal or full

PRE GAS TIME
Regulation of the Gas outflow before the welding start (0-25 sec.)

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

HOT START %
Percentage of current increase during hot start phase

HOT START VOLTAGE
Adjust arc voltage compensation during hot start phase

HOT START TIME
Time of hot start phase

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

CRATER %
Percentage of current decrease during crater fill phase

CRATER VOLTAGE
Adjust arc voltage compensation during crater fill phase

BBT
Regulation of the lenght of the wire protruding from the torch at the end of welding (1-250)

POST GAS
Regulation of the gas outflow time at the end of welding (0 – 25 Sec.)

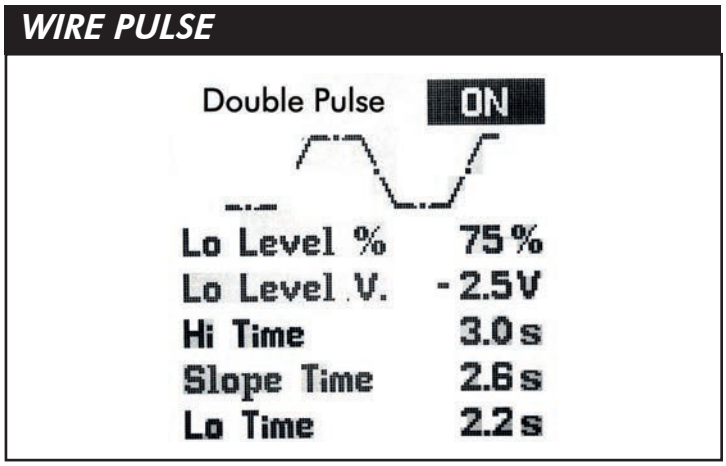


Figure 19 - WIRE PULSE Setup View

3 *Setup Key*
For entering the Wire Pulse Setup Menu by pressing the setup key - **3** - from "setup menu".

DOUBLE PULSE
Activate/Deactivate Wire pulse

Lo LEVEL %
Low welding current. It's a percentage of welding current

Lo LEVEL V.
Low welding current arc voltage compensation

Hi TIME
Welding time at high current

SLOPE TIME
Time needed to switch between high and low current

Lo TIME
Welding time at low current

5 *Right Regulation Knob*
Arc voltage Balance regulation (V)

6 *Navigation / Material Key*
- Decrease the Arc Dyn. value (-20%)
- Hold the key for viewing the Synergic Welding Curves available in the unit.
  Turn the Right Regulation Key - **5** - or press the Material Key - **6** - to choose the desired Synergic Curve, suitable to the type of wire and to the gas going to be used for welding;
- press the Mode Key - **1** - to go back to the main screen and confirm your choice.
  Once selected a Synergic Curve, Slope, Inductance, Wire Speed Balance and Material thickness settings go back to their default values.

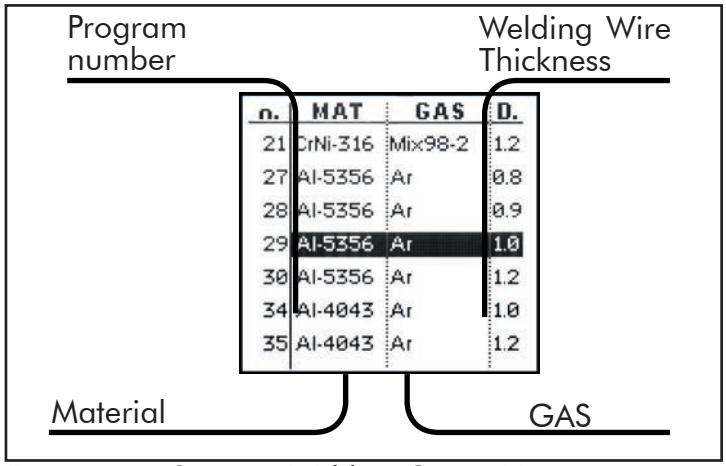


Figure 20 - Synergic Welding Curves View

7 *Left Regulation Knob*
adjusts the welding current (A), wire speed, material thickness

8 *Navigation Key - Arc Dyn*
Increase the Arc Dyn. value (+20%)

4 *Save & Recall*
for saving and recalling the points that the operator can customize. Refer to the chapter "Save & Recall" .

MIG PULSE WELDING

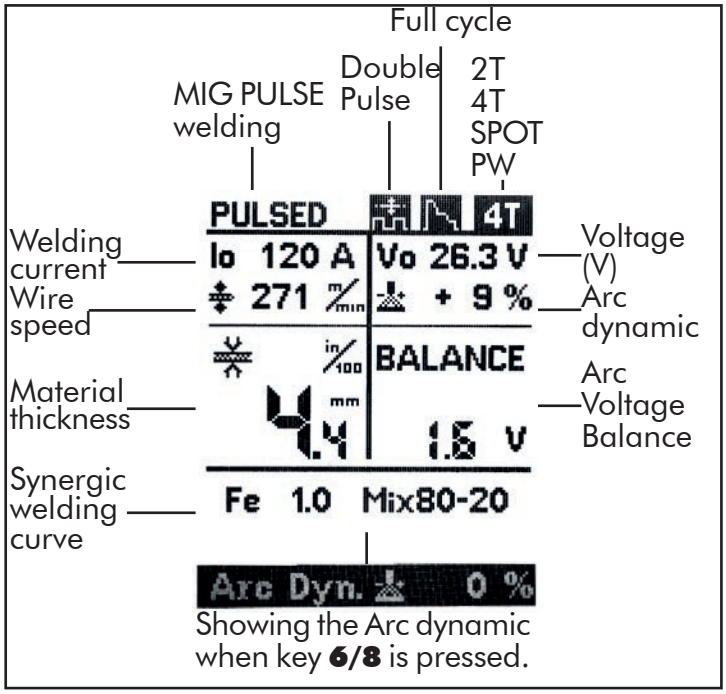


Figure 21 - MIG PULSE Display View

3 ***Setup Key***
for entering the parameters' setup screen.

6 **8** ***Navigation Key***
for running thru the parameters.

5 ***Right Regulation Knob***
for changing the parameters.

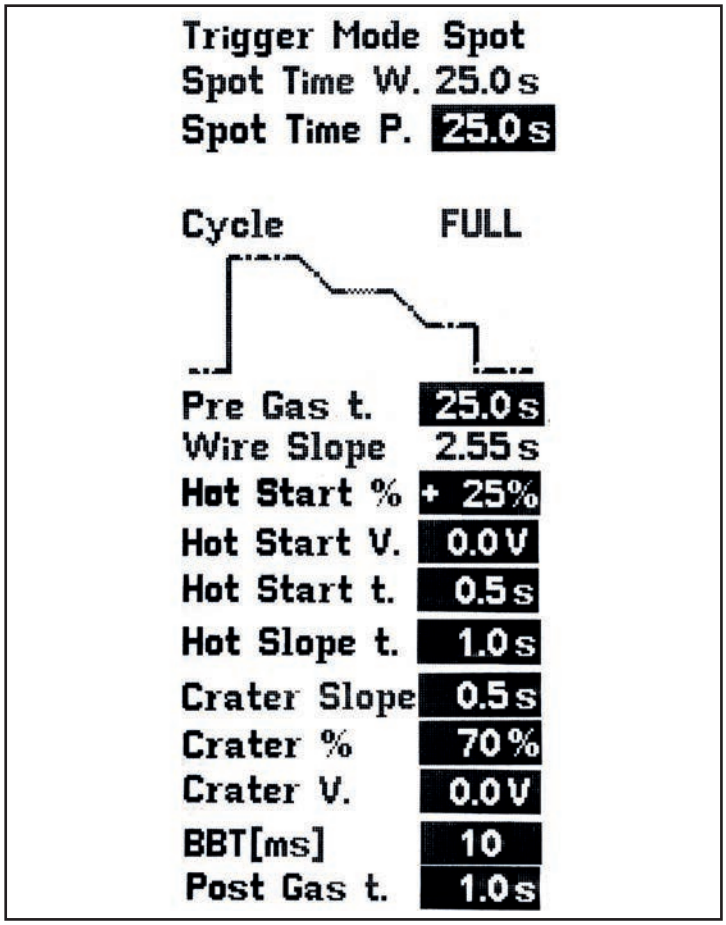


Figure 22 - MIG PULSE Setup View

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)

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. Adjustable Time (0-2.55sec)

CYCLE
Normal or full

PRE GAS TIME
Regulation of the Gas outflow before the welding start (0-25 sec.)

HOT START %
Percentage of current increase during hot start phase

HOT START VOLTAGE
Adjust arc voltage compensation during hot start phase

HOT START TIME
Time of hot start phase

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

CRATER %
Percentage of current decrease during crater fill phase

CRATER VOLTAGE
Adjust arc voltage compensation during crater fill phase

BBT
Regulation of the lenght of the wire protruding from the torch at the end of welding (1-250)

POST GAS
Regulation of the gas outflow time at the end of welding (0 – 25 Sec.)

DOUBLE PULSE

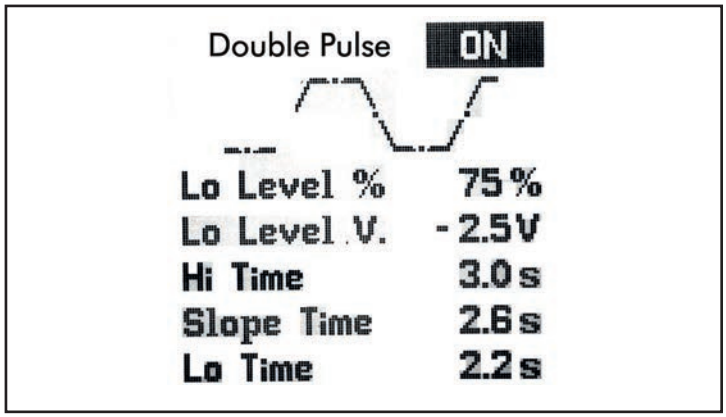


Figure 23 - DOUBLE PULSE Setup View

3 ***Setup Key***
For entering the Wire Pulse Setup Menu by pressing the setup key - **3** - from "setup menu".

DOUBLE PULSE
Activate/Deactivate double pulse

Lo LEVEL %
Low welding current. It's a percentage of welding current

Lo LEVEL V.
Low welding current arc voltage compensation

Hi TIME
Welding time at high current

SLOPE TIME
Time needed to switch between high and low current

Lo TIME
Welding time at low current

5 ***Right Regulation Knob***
Arc voltage Balance regulation (V)

6 ***Navigation / Material Key***
- Decrease the Arc Dyn. value (-20%)
- Hold the key for viewing the Synergic Welding Curves available in the unit.
  Turn the Right Regulation Key - **5** - or press the Material Key - **6** - to choose the desired Synergic Curve, suitable to the type of wire and to the gas going to be used for welding;
- press the Mode Key - **1** - to go back to the main screen and confirm your choice.
  Once selected a Synergic Curve, Slope, Inductance, Wire Speed Balance and Material thickness settings go back to their default values.

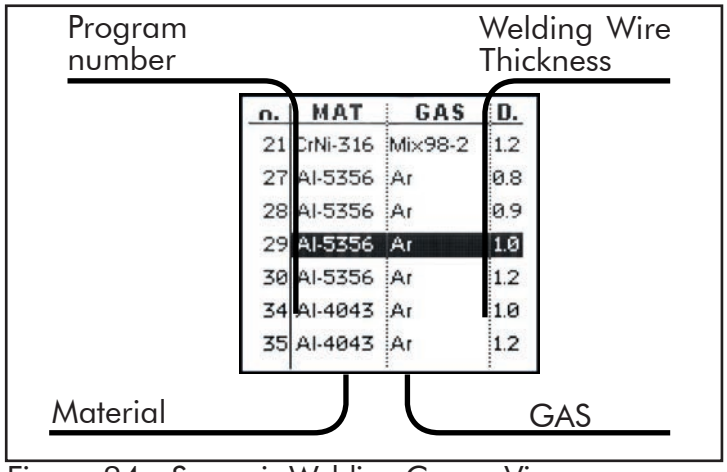


Figure 24 - Synergic Welding Curves View

7 ***Left Regulation Knob***
adjusts the welding current (A), wire speed, material thickness

8 ***Navigation Key - Arc Dyn***
Increase the Arc Dyn. value (+20%)

4 ***Save & Recall***
for saving and recalling the points that the operator can customize. Refer to the chapter "Save & Recall" .

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 of the electrodes requires to connect the ground cable on the negative (minus) connector - **E** - and to connect the electrode holder on the positive (plus) - **D** -. Positive connectors are allocated on the generator and also on wire feeder, you can use both but just one at time.

[1] Press Mode key to enter in MMA menu

MMA WELDING

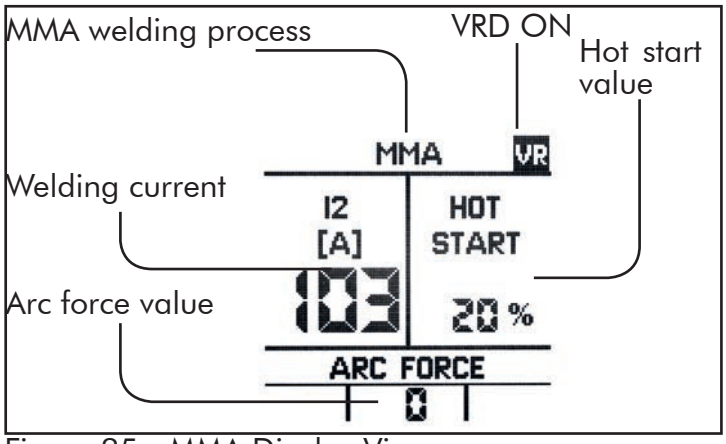


Figure 25 - MMA Display View

[7] ***Left Regulation 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
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

Table 5

[5] ***Right Regulation Knob - Hot start***
Adjust, in the start phase, the welding current increase percentage variable from 0 to 50% on the set current. Thanks to an initial peak current, this function makes the welding arc striking easier.

[6][8] ***Arc force key***
Adjust arc force value on a range from 0 to 20

[4] ***Save & Recall***
Use this key to save and recall the points that the operator can customize. Refer to "Save & Recall".

TIG WELDING

Connect the earth cable to the Positive output terminal (plus) - **D** - on the front of the unit and the earth clamp to the workpiece.
Connect the Tig torch to the negative output terminal (minus) - **E** - on the front of the unit.
Connect the torch trigger plug and the gas hose to the corresponding connectors - **F** - and - **G** - on the front panel (use inert gas).

[1] Press Mode key to enter the TIG menu.

TIG WELDING

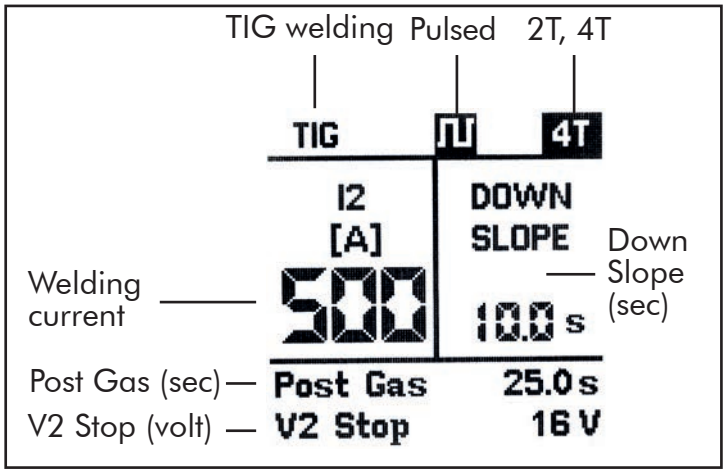


Figure 26 - TIG Display View

[3] ***Setup Key***
for entering the parameters' setup screen.

[6][8] ***Navigation Key***
for running thru the parameters.

[5] ***Right Regulation Knob***
for changing the parameters.

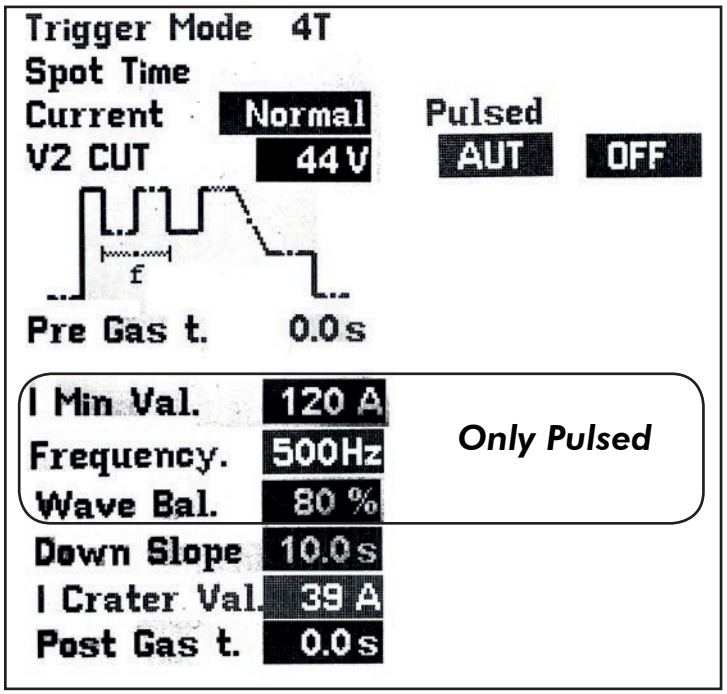


Figure 27 - TIG Setup View

2 Stroke
In Manual Welding Mode the unit will weld continuously while the torch trigger is pressed (Welding ON). Releasing the torch trigger will interrupt welding immediately (Welding OFF).

4 Stroke
In Automatic Welding Mode the welding process is performed as follows:
- first torch trigger pression (Welding ON as current is fed, Slope Up as set till the set current value is reached)
- first torch trigger release
- second torch trigger pression (Slope down and Final Current)
- second torch trigger release (Arc OFF and Post Gas)

Current
Normal / Pulsed

V2 CUT
Arc voltage value over which the arc switches off
Automatic - 16V to 34V - OFF

PRE GAS
Regulation of the Gas outflow before the welding start (0 -25 sec)

I MIN VAL
Regulation of the base current value (5 till set current in A)

FREQUENCY
Regulation of the pulsation frequency to grant excellent quality and apparance results (1-500Hz)

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

Slope Up
Regulation of the time needed by the welding current to reach the set value (0 – 10 Sec)

Down Slope
Regulation of the time needed by the welding current to reach the final current value (Crater Filler 0 – 10 Sec)

Crater VAL
Regulation of the Final Current Value or Crater Filler (5 till set current in A)

Post Gas
Regulation of the gas outflow time at the end of welding (0 – 25 Sec.)

Use the Mode Key - **1** - to go back to the TIG main screen after parameters are adjusted.

5 ***Right Regulation Knob - Down Slope***
Regulation of the time needed by the welding current to reach the final current value (Crater Filler OFF / 0 – 10 Sec)

6 **8** ***Navigation key***
adjusts Post Gas value on a range from 0 to 25 sec

7 ***Left Regulation Knob - Current***
adjusts the welding current (A) on a range from 5 to maximum current value

4 ***Save & Recall***
for saving and recalling the points that the operator can customize. Refer to the chapter "Save & Recall".

SAVE & RECALL

TIG - MMA

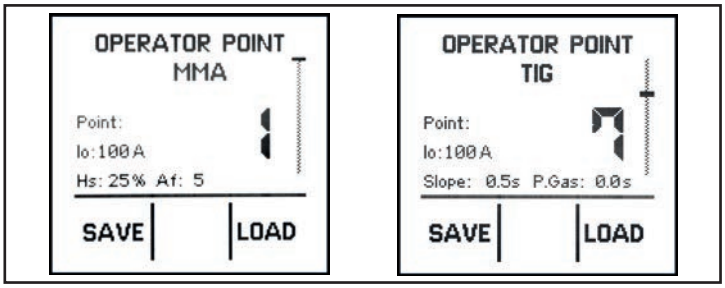


Figure 28 - Save & Recall Views for MMA/TIG

4 *Save & Recall Key*

Use the Save & Recall Key to save and recall the parameters set by the operator. The available memories are 10.

To save the parameters proceed as follows:

- Press the Save & Recall Key - **4** -
- Turn the Right Regulation 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 Regulation knob - **5** - to choose the desired program number.
- Press the LOAD Key - **8** -.

MIG MAG

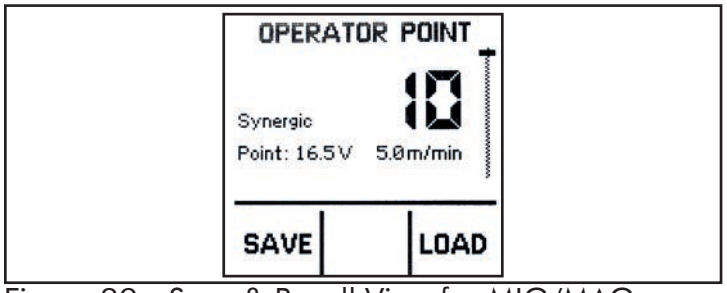


Figure 29 - Save & Recall View for MIG/MAG

4 *Save & Recall Key*

Use the Save & Recall Key to save and recall the parameters set by the operator. The available memories are 80 for each torch. The reference of the torch you are saving the parameters for is viewed on the display.

To save the parameters proceed as follows:

- Press the Save & Recall Key - **4** - to enter in memory selection
- Turn the Right Regulation 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** - to enter in memory selection
- Turn the Right Regulation knob - **5** - to choose the required program number
- Press the LOAD Key - **8** -

SOFTWARE UPDATE

USB UPDATE

Ensure unit is powered off and unpluged from the mains.

- Get an empty USB drive with maximum capacity of 8GB. Format it in FAT 32. SAVE into the USB drive the updated program.
- Locate on the right side of the power unit the expansion PCB compartment and remove the closing panel.
- Insert the 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 you that the process is completed
- Remove the USB drive from the socket
- Close the expansion PCB compartment.

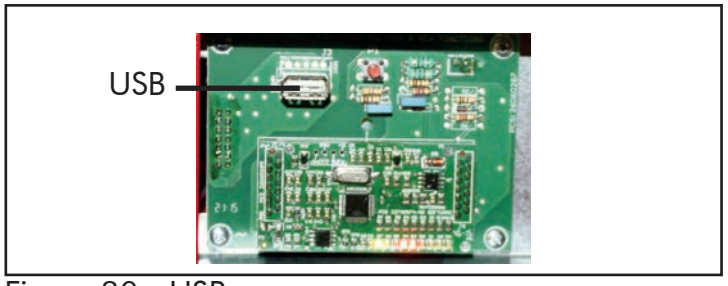


Figure 30 - USB

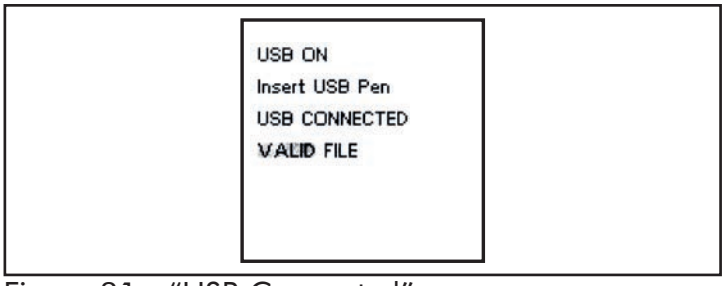


Figure 31 - "USB Connected" screen

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) 80% Argon + 20% CO2 Argon + CO2 + Oxygen 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.

Table 6

Contact the technical service of your gas supplier to know the percentages of the different gases which 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. A weak pitted and porous weld will result due to air blowing away the protective welding gas.
- Keep wire and wire liner clean. Do not use rusty wire.
- Sharp bends or kinks on the welding cable should be avoided.
- Always try to avoid getting particles of metal inside the machine since they could cause short circuits.
- If available, use compressed air to periodically clean the hose liner when changing wire spools

IMPORTANT: Disconnect from power source when carrying out this operation.

- Using low pressure air (3/5 Bar=20-30 PSI), occasionally 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 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.

FAULTS LIST AND TROUBLESHOOTING

LIST OF ERRORS

This table lists the most common errors solvable by the operator following the instructions provided. In the case of error reporting is not listed in the table below, contact the service center providing the error reported and the number of your machine.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Machine powered ON, but not working		
Display viewing the alarm screen, message "Over T"	Thermic Protection Intervention cause of overload, duty cycle exceeded.	Respect the duty cycle of the machine.
	Thermic Protection Intervention cause of overtemperature	Allow welder to cool. The extinguishing of the pilot lamp on the wire feeder front panel indicates the thermostat has closed.
	Thermic Protection Intervention cause of overtemperature, fan defective or blocked	Free the fan from possible obstructions or replace it.

Machine powered ON, but not working		
Machines Powers OFF	Overvoltage	Check the mains voltage and/or set the power unit adequately. Turn the machine OFF and ON again.
Display viewing the alarm screen, message “Max Iout”	The output currrent has exceeded the safety limit.	Adjust again the operator point parameters. Reset the power unit. Contact the Service Center.
Display viewing the alarm screen, message “Max Pout”	The required power exceeds the generator supply capacity.	Limit the welding parameters.

Machine powered ON, but not working, no alarm LED ON		
Display viewing the alarm screen, no message.	Torch or torch trigger fault.	Replace the torch trigger or the torch.
	Wrong earth connection	Check the earth connection and the correct polarity of the clamp.
	Interconnecting Hosepack faulty or not properly connected	Check the Interconnecting Hosepack
Display viewing the alarm screen, message “Check Cables”	Positive (+) and negative (-) terminal in short circuit	Check for the correct connection of positive (+) and negative terminal (-)

TROUBLESHOOTING

This chart will assist you in resolving common problems you may encounter. These are not all the possible solutions.

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
No “life” from welder, display is off	Input cable or plug malfunction.	Check for proper input cable connection
	Wrong size fuse.	Check fuse and replace as necessary
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 gun connection or faulty gun assembly	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	Eccessive 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 lenght
Wire burns back to contact tip	Contact tip clogged or damaged	Replace the contact tip
	Wire feed speed to 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 buildup 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 deoxidate the contact area of the earth clamp.
	The workpiece is excessively oxidized or painted.	Brush carefully the point 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 more sheltered weld area. If not check gas cylinder contents gauge, 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 on the manual for the correct combination.
Weld deposit “stringy” and in-complete	Torch moved over workpiece too quickly	Move the torch slower
	Gas mixture incorrect	See shielding gas table
Weld deposit too thick	Torch moved over workpiece too slowly	Move the torch faster
	Welding voltage too low	Increase welding voltage
Display not clear		Set display contrast.