GPS DR ADVANCED

EN

TECHNICAL INSTRUCTIONS MANUAL. GPS MODULAR SYSTEM.
INDUSTRIAL MIG/MAG WELDING EQUIPMENT OF PULSED-SYNERGIC CONTROL.

EN

THIS EQUIPMENT SHOULD BE USED ONLY BY PROFESSIONALS.
TO HELP YOU IN YOUR WORK
READ THIS MANUAL CAREFULLY.

GALA PULSE SYNERGIC 4000 DR ADVANCED

□ (3Ph - 400V 50/60 Hz); Ref. 42381200
□ (3Ph - 440V 50/60 Hz); Ref. 42355200

GALA PULSE SYNERGIC 5000 DR ADVANCED

□ (3Ph - 400V 50/60 Hz); Ref. 42600200
□ (3Ph - 440V 50/60 Hz); Ref. 42650200

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Ref.: 42617247 V0

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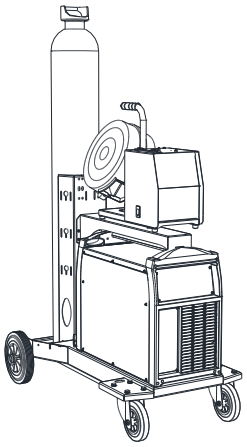
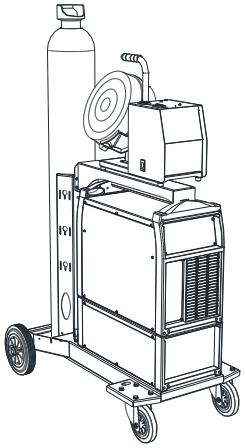
1. GPS MODULAR SYSTEM - GENERAL DESCRIPTION. TECHNICAL FEATURES.

Multiprocessing equipment, MIG / MAG (STD-PULSED), TIG (STD-PULSED) and MMA (STD-PULSED), recommended for welding all types of materials (carbon steels, aluminium, stainless steels and all those applications in which a reduction in heat input and deformation is necessary).

- Integrated software packages:
  - ADVANCED SCREEN
  - 105 MIG PROGRAMMES (STD ARC).
  - TIG (STD ARC).
  - MMA (STD-PULSED ARC).
  - MANUAL MODE (independent parameter setting in programme)
  - ADVANCED CYCLE CONTROL MODE.
  - Access restrictions (SAFETY LEVELS).
  - Available Languages: Spanish, English, French, German, Italian and French.

- Optional Software Packages
  - DOUBLE-ARC MODULE (STD) - 35 PROGRAMMES.
  - PULSED-ARC MODULE - 132 PROGRAMMES.
  - DOUBLE-ARC MODULE (PULSED) - 44 PROGRAMMES.
  - CUSTOMISED WELDING PROGRAMMES CREATION MODULE
  - SPECIAL ARCS (SCA "COLD" - MIXED).
  - PULSE TIG MODULE.
  - TIG COLD WIRE INPUT MODULE (TCW)
  - COOLING MODULE.
  - ROB MODE (wired interface – ModBus – …).

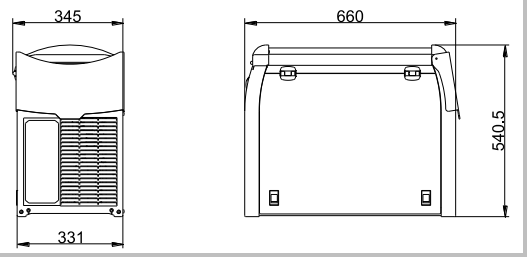
1- AIR-COOLED INSTALLATION	2- COOLED INSTALLATION
	

REFERENCE	DESCRIPTION	1	2
42381200	GPS 4000 DR ADVANCED (400 V – 50/60Hz)	☑ Select Model	☑ Select Model
42355200	GPS 4000 DR ADVANCED (440 V – 50/60Hz)		
42600200	GPS 5000 DR ADVANCED (400 V – 50/60Hz)		
42650200	GPS 5000 DR ADVANCED (440 V – 50/60Hz)		
64184000	Transport trolley	☑	☑
65982000	Cooling Module WCS 520 (230/400/440V)		☑
64185101	Wire feeder support	☑	☑
64187100	Air-cooled cable set, 5 m	☑	
64187150	Cooled cable set, 5 m		☑
66082100	Wire feeder D-GPS 21 A (Open with roll-cover)	☑	☑
	OPTIONAL ITEMS		
64187010	Air-cooled cable set, 1.5 m	☑	
64187200	Air-cooled cable set, 10 m	☑	
64187300	Air-cooled cable set, 15 m	☑	
64187015	Cooled cable set, 1,5 m		☑
64187250	Cooled cable set, 10 m		☑
64187350	Cooled cable set, 5 m		☑
66083000	Wire feeder D-GPS 21 A BLIND.	☑	
66081100	Wire feeder D-GPS 5 K N.M. (5 kg for shipyard).	☑	
66012080	Transport Wheels KIT for Wire feeder (5k)	☑	
42370012	BILEVEL Package of Double Standard Arc	☑	
42370010	Pulsed Arc Package	☑	
42370011	BIPULSE Package of Double Pulsed Arc	☑	
42370025	Special Arc Package (SCA)	☑	
42370015	Package for customised welding programmes creation	☑	
42370020	Gala TIG Pulse Package Pulsed Arc TIG	☑	
66790000	TCW Welding Package, TIG with cold wire filler	☑	
42612081	TELENET / INTERFACE connection KIT	☑	
66012085	Remote control KIT (42612081 required)	☑	
42612090	Connection KIT between PC and TELENET (Backup)	☑	

1.1. TECHNICAL FEATURES.

TECHNICAL FEATURES	GPS 4000 DR ADVANCED		GPS 5000 DR ADVANCED	
Reference	42381200	42355200	42600200	42650200
Input voltage U1 (3 Ph, 50/60Hz)	400 V	440 V	400 V	440 V
Maximum primary intensity I1max	35 A	32 A	40 A	36 A
Primary effective intensity I1eff	22 A	20 A	27 A	24 A
Maximum Effective Power	24/15 KVA		28/19 KVA	
MIG/MAG Regulation Range I2min-I2max	30 ÷ 400 A (45%)		30 ÷ 500 A (45%)	
MIG/MAG Welding Intensity DC = 100%	270 A		350 A	
Welding Voltage Regulation U2min-U2max	12 ÷ 34 V		12 ÷ 42 V	
Applicable Wire Diameters (mm.)	0.8 ÷ 1.6 mm		0.8 ÷ 1.6 mm	
Wire speed (m/min.)	1 ÷ 24 m/min		1 ÷ 24 m/min	
Wire feeding system	4R – 100 W-Enc		4R – 100 W-Enc	
MMA Continuous Regulation Range I2min-I2max	30 ÷ 400 A		30 ÷ 500 A	
TIG Continuous Regulation Range I2min-I2max	5 ÷ 400 A		5 ÷ 500 A	
Mechanical Protection Index (IP)	IP 23 S		IP 23 S	
Ventilation	Forced		Forced	
Weight	45 kg.		54.5 Kg	
ACCORDING TO UNE-EN 60974. (1) Other power supply voltage values on demand.				

GPS DR DIMENSIONS



IS INCLUDED

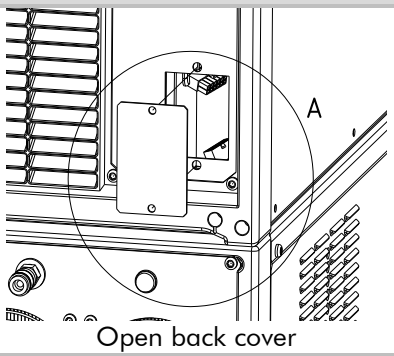
- Grounding:
  - 400A → GPS 4000 DR
  - 500A → GPS 5000 DR
- Instructions Manual

1.2. COOLING MODULE - WCS 520. Ref. 65982000.

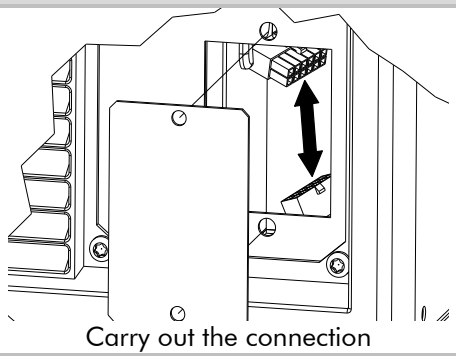
Recommended for connection extensions up to a max. length of 15 m.

The electrical connection of the equipment is carried out directly to the power source by an internal connection. For further information, please refer to the cooling module manual.

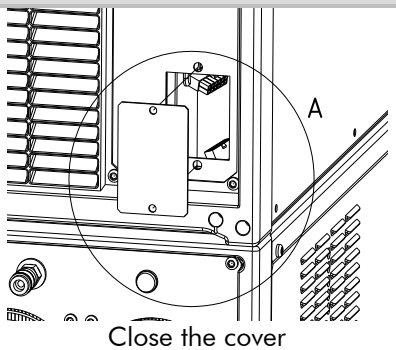
ELECTRICAL CONNECTION OF THE COOLING MODULE TO THE POWER SUPPLY.



Open back cover



Carry out the connection



Close the cover

1.3. D-GPS WIRE FEEDERS.

They have a Universal Welding Control. Enables setting and viewing of parameters. (Except for Blind model).

- 3 welding regulation variables. (Wire speed, piece thickness and amperes).
- Arc correction (Voltage).
- Dynamic correction.
- Globular transfer indication.
- Wire purge
- Gas Purge.
- HOLD mode for parameter memorisation.

			
D-GPS (15 kg) Ref. 66000000	D-GPS 21 A (15 kg) Ref. 66082100	D-GPS 21 A BLIND (15 kg) Ref. 66083000	D-GPS 5K Ref. 66081100

1.4. RECOMMENDED ACCESSORIES.

Reference	Description	MIG/MAG							MMA	TIG	
		Fe (Steel)	Al (Pulse)	SS (Pulse Inox.)	CuSi (Galvanized)	CuAl8 (Galvanized)	FCAW (With gas)	FCAW (Without gas)		Ø 2.0 - 2.4 mm.	Ø 2.4 - 3.2 mm.
42316121	Drive roll Ø37, 0.8-1.0 mm "V"	●		●	●	□					
42316122 (*)	Drive roll Ø37, 1.0-1.2 mm "V" (*)	●		●	●	□					
42316124	Drive roll Ø37, 1.2-1.6 mm "V"	●		●	●	□					
42316125	Drive roll Ø37, 0.9-1.2 mm "R" (FLUX-CORED)						●	●			
42316126	Drive roll Ø37, 1.2-1.6 mm "R" (FLUX-CORED)						●	●			
42316127	Drive roll Ø37, 1.0-1.2 mm "ALU"		●		□	●					
42316128	Drive roll Ø37, 1.2-1.6 mm "ALU"		●		□	●					
42316227	ALU DRIVE ROLLS KIT 1.0-1.2 mm "ALU"		●		□	●					
5722	Graphite liner, 4 m		●		□	●					
30144000 V	Professional Automatic electronic shield	●	●	●	●	●	●	●	●	●	●
19052634	Torch TIG XT-26E EURO - 4 m									●	
19051834	Air-cooled Torch TIG XT-18E EURO - 4 m										●
37600000	Argon Regulator - Mod. EN 2000	●	●	●	●	●	●			●	●
37900000	Argon Gas Free Regulator	●	●	●	●	●	●			●	●
600000	CO2 gas heater	●									
8044166-NT	Tungsten sharpener									●	●
259065	Acrylic cable with electrode-holder 50 mm2 - 4 m - 500A.								●		
43912063 (*)	Earth cable 50 mm2 - 4 m - 400 A (*)								●		
259056 (*)	Earth cable 70 mm2 - 4 m - 500 A (*)								●		
1704V10	Heater TRC V10. Fitted with thermometer and thermostat.								●		

(*) Supplied as standard with the equipment. ● Recommended use. □ Possible use.

2. TRANSPORT AND INSTALLATION.

HANDLE THE EQUIPMENT CAREFULLY, IT WILL LAST LONGER!

2.1. TRANSPORT AND PACKAGING.

Knocks and sudden movements must be avoided when transporting the equipment. The transport position will be shown by arrows on the packaging. In any case, the packaging must be protected from water.

2.2. ELECTRICAL SUPPLY INSTALLATION.

The electrical installation of the equipment making up the system must be carried out by specialised personnel according to the applicable standards.
The location must fulfil the following conditions:

- Place: Dry and ventilated. Far enough away from the welding area in order to prevent the dust caused by the welding process from getting into the equipment. Never work in the rain.
- The main switchboard where the machine has to be connect must be comprised of a differential circuit breaker and a magnetothermal switch.

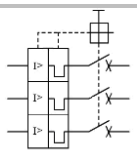
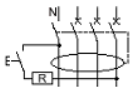
PLACE THE WELDING MACHINE ON A FIRM FLAT SURFACE.
IF EQUIPMENT OF THIS KIND TIPS OVER IT CAN HAVE VERY SERIOUS CONSEQUENCES.

The main switchboard where the machine has to be connected must be comprised of a differential circuit breaker and a magnetothermal switch.

MAGNETOTHERMAL SWITCH (IA): Three-pole or four-pole. The instrument will be chosen according to the characteristics plate. We advise choosing a slow type of Intensity-Time characteristic (Curve G), as false tripping could occur due to transitory current.

DIFFERENTIAL CIRCUIT BREAKER (ID): Four-pole or three-pole with a minimum sensitivity of 300 mA. The aim of this switch is to protect the personnel from direct or indirect contact with electrical parts under voltage. The differential circuit breaker is selected with a superior gauge to ID.

<table>
<tr><th>CABLE PLUG</th><th colspan="4">SOCKET AND ELECTRICAL PROTECTION DEVICES</th></tr>
<tr><td rowspan="3"> 
"CETAC"

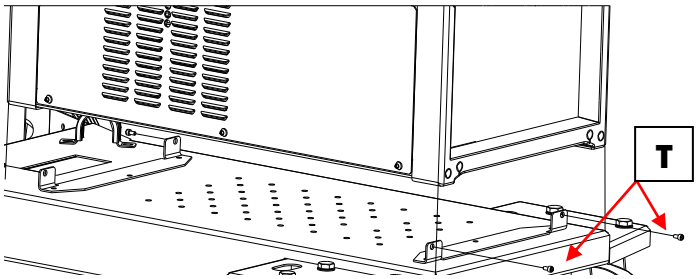
3P 32A + TT</td><td>  </td><td>  </td><td>SOCKET</td><td>3P 32A + TT</td></tr>
<tr><td>  </td><td>  </td><td>MAGNETOTHERMAL SWITCH</td><td>3P 25A-(GPS 4000 DR)
3P 32A-(GPS 5000 DR)</td></tr>
<tr><td>  </td><td>  </td><td>DIFFERENTIAL CIRCUIT-BREAKER</td><td>3P 63A / 300 mA</td></tr>
<tr><td colspan="5">DO NOT FORGET TO FIT THE EARTH CONNECTION INTO THE PLUG.</td></tr>
</table>

2.2.3. INSTALLATION AT A LARGE DISTANCE FROM THE WELDING STATION.

LENGHT	CROSS-SECTION	REMARKS
<10 m	4 mm²	If it is necessary to use a longer power supply hose or a connection to an extension, keep in mind the values of this table. These values are for reference and are influenced by the state of the conductors, connections and temperature.
< 20 m	6 mm²	
> 50 m	10 mm²	

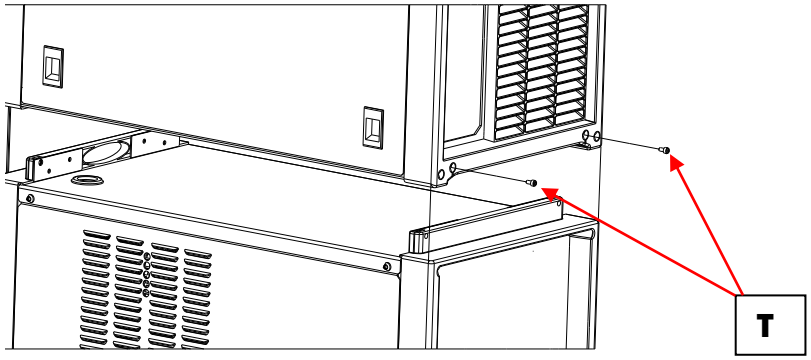
2.3. ASSEMBLY AND DIMENSIONS.

ASSEMBLY PROGRAMME. GPS EQUIPMENT OVER TRANSPORT TROLLEY/BASE.

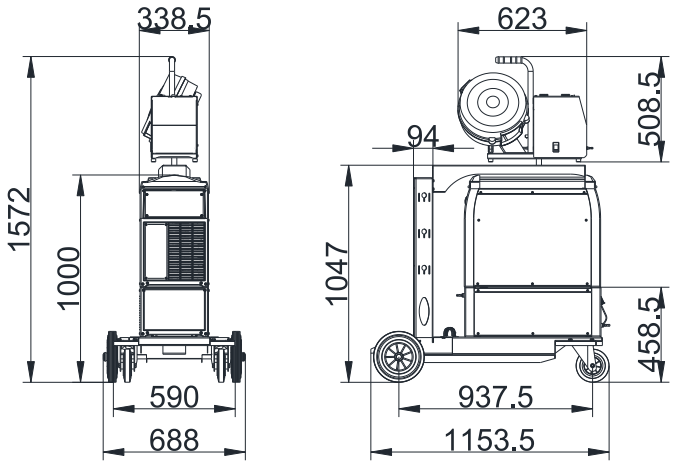


There are some openings in the four lower corners used to secure the machine to the carriage, observe arrows on fig.

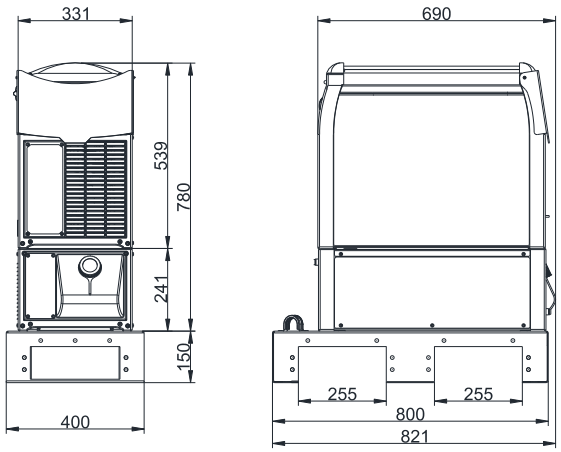
ASSEMBLY PROGRAMME. WELDING EQUIPMENT MOUNTED ON TOP OF THE COOLING MODULE.



There are some openings in the four lower corners used to secure the machine to the carriage, observe arrows on fig.



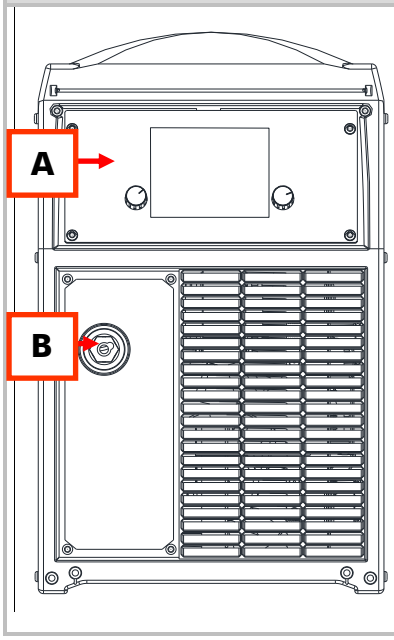
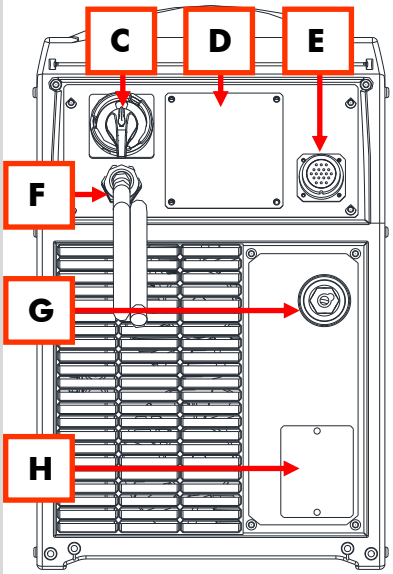
Dimensions of GPS 4000DR/5000 DR + WCS-520 + D-GPS 21 A + Transport trolley



Dimensions of GPS 4000DR/5000 DR + WCS-520 + Base

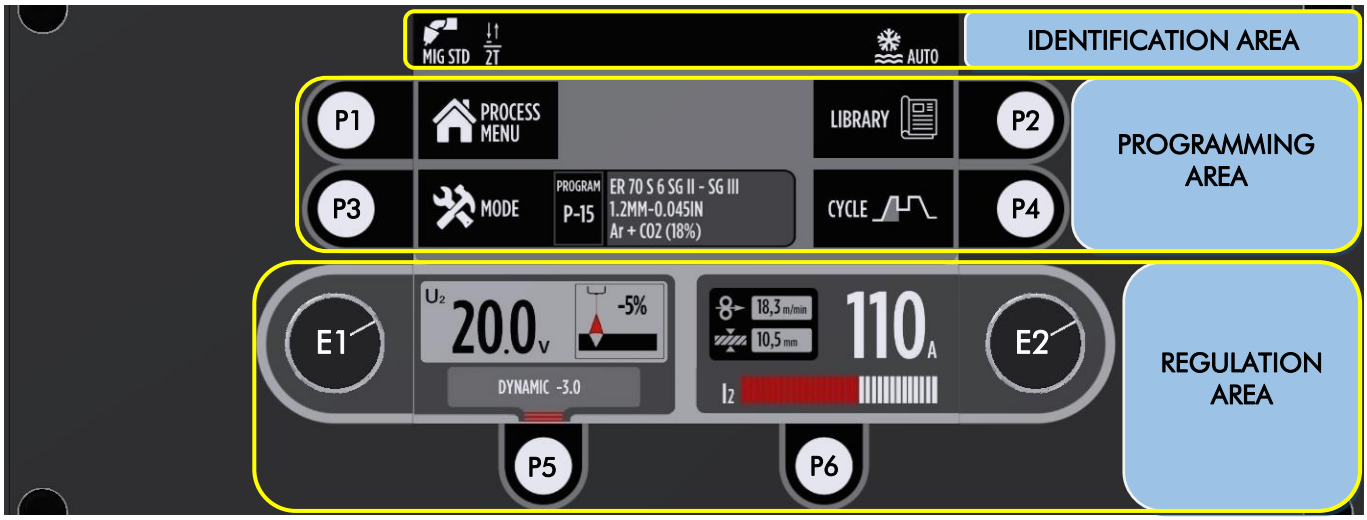
3. START-UP. OPERATION AND ADJUSTMENT CONTROLS.

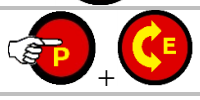
3.1. OPERATION CONTROLS.

FRONT CONTROL PANEL	REAR CONTROL PANEL	DESCRIPTION		
		A		Control panel
		B		Negative terminal
		C		ON/OFF switch
		D		Pre-installation Panel Kits
		EN		Wire Feeder Signal Connector
		F		Power supply cable
		G		Positive terminal
		H		Cooling connection access

3.2. TFT CONTROL PANEL.

Each of the screen areas will be exclusively completed with the options available for each selected process and configuration, thus allowing a simpler and more precise regulation of the equipment.



AREA	DESCRIPTION	ACTION	
IDENTIFICATION	Shows the current configuration of the equipment.		
PROGRAMMING	Setting of welding configuration parameters.		PRESS
REGULATION	Setting of welding configuration parameters. P5+E1 – P6+E2 Secondary regulation of values		ROTATE
	Setting of Secondary Value Regulation.		PRESS + ROTATE

3.2.1. IDENTIFICATION AREA.

It is possible to view the current configuration of our equipment at all times. Only the icons of each process and configuration appear.

POSITION	DESCRIPTION
1	Welding process.
2	Torch operation mode.
3	Setting details of Operation mode.
4	Current Screen Information.
5	Information above equipment SETUP configuration.

3.2.2. PROGRAMMING AREA.

From this section of the panel we can access the main programming parameters of the equipment.

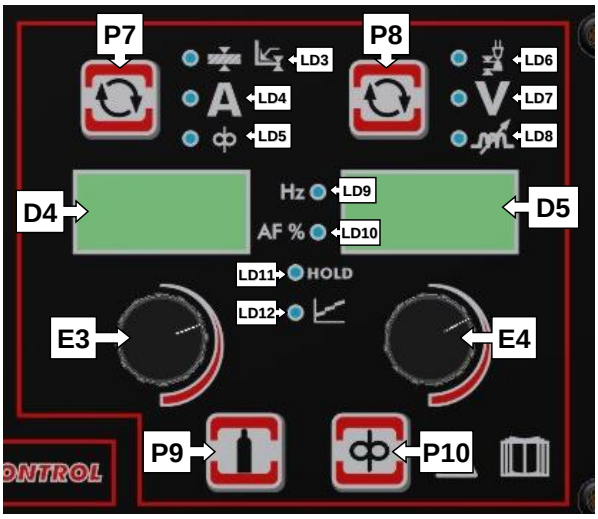
KEY	ACTION	
P1		Return to Main Menu
P2		Access to Programme Library
P3		Access to Operation Mode
P4		Access to Cycle Parameters

3.2.3. REGULATION AREA

POSITION	DESCRIPTION
I_2 Main Regulation	Welding intensity setting.
Intensity bar	Regulation point regarding maximum intensity of equipment.
U_2 Main Correction	Welding Voltage Setting.
Secondary Correction	Arc Dynamic Setting
Further information	User Reference Information: • Wire speed. • Indicative thickness. • Arc Graphics.

3.2.4. D-GPS UNIVERSAL CONTROL. (See D-GPS Manual).

The system is used in remote controls and wire feeders.



LED INDICATORS

LD 3	Regulation by Reference Thickness.
LD 4	Welding Intensity Regulation.
LD 5	Wire Speed Regulation.
LD 6	Arc Correction Regulation.
LD 7	Welding Voltage Regulation.
LD 8	Regulation of Dynamic Welding Correction.
LD 9	Pulse Frequency Regulation. (Pulsed TIG process).
LD 10	Arc Force Regulation (MMA Process).
LD 11	HOLD Mode Indication (memorised parameters).
LD 12	Globular Transfer Mode Indication.

CONTROL PANEL BUTTONS	
P7	Selection of parameter (LD3÷LD5) – Regulation (E3) – Visualisation (D4)
P8	Selection of parameter (LD6÷LD8) – Regulation (E3) – Visualisation (D4)
P9	Gas Purge.
P10	Wire Purge.
REGULATING ENCODERS	
E3	Wire speed (LD5). (MANUAL MIG **MODE**).
	Regulation of selected parameter with P7 (LD3÷LD5). (**SYNERGIC MIG MODE**).
	Welding intensity regulation. (**MMA / TIG Process**).
E4	Regulation of selected parameter with P8 (LD7÷LD8). (MANUAL MIG **MODO**).
	Regulation of selected parameter with P8 (LD6÷LD8). (**SYNERGIC MIG MODO**).
	Arc Force Regulation. (**MMA Process**).
	Regulation of pulsed frequency (**TIG PULSE Process**).

3.3. EQUIPMENT START-UP SEQUENCE.

In this chapter of the manual, we will develop the process selection, as well as the regulation of the equipment control parameters.

When we switch on our equipment, it will carry out an initial check with the configuration installed in it. We can view the configured parameters on the power-up screen:

Below we detail the sequence of appearance of icons on the home screen:

ICON	ACTION
	Gas purge check.
	Ventilation system check.
	Cooling system check.
	Selected language check
	Check completed successfully.

During the power-up sequence, the serial number and software version of the equipment will be displayed on the screen.

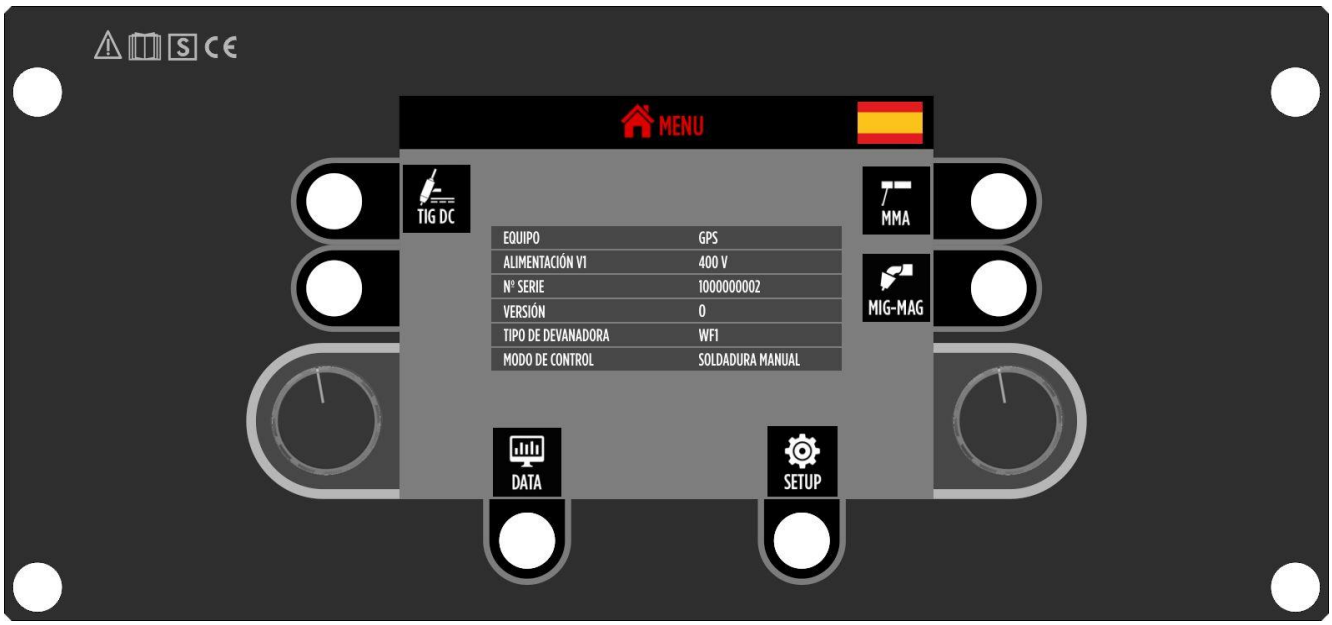
ICON	ACTION
	**MAINTENANCE NOTICE** IF SOMETHING WORKS INCORRECTLY AND AN ERROR IS DETECTED, THE EQUIPMENT WILL STAY ON THIS SCREEN

If everything works perfectly, it will go to the "Main Menu" screen or, if the equipment has already been used, to the last screen used in welding.

3.4. MAIN MENU SCREEN.

PROCESS MENU

The home screen or Main Menu allows the user to select the desired welding process as well as the adjustment of equipment configuration parameters.



LABEL	KEY	ACTION	
TIG DC	P1	P	Enter to DC TIG Welding Mode
MMA	P2		Enter to MMA Welding Mode
MIG-MAG	P4		Enter to MIG-MAG Welding Mode
DATA	P5		Enter to DATA ❶
SETUP	P6		Enter to SETUP Configuration

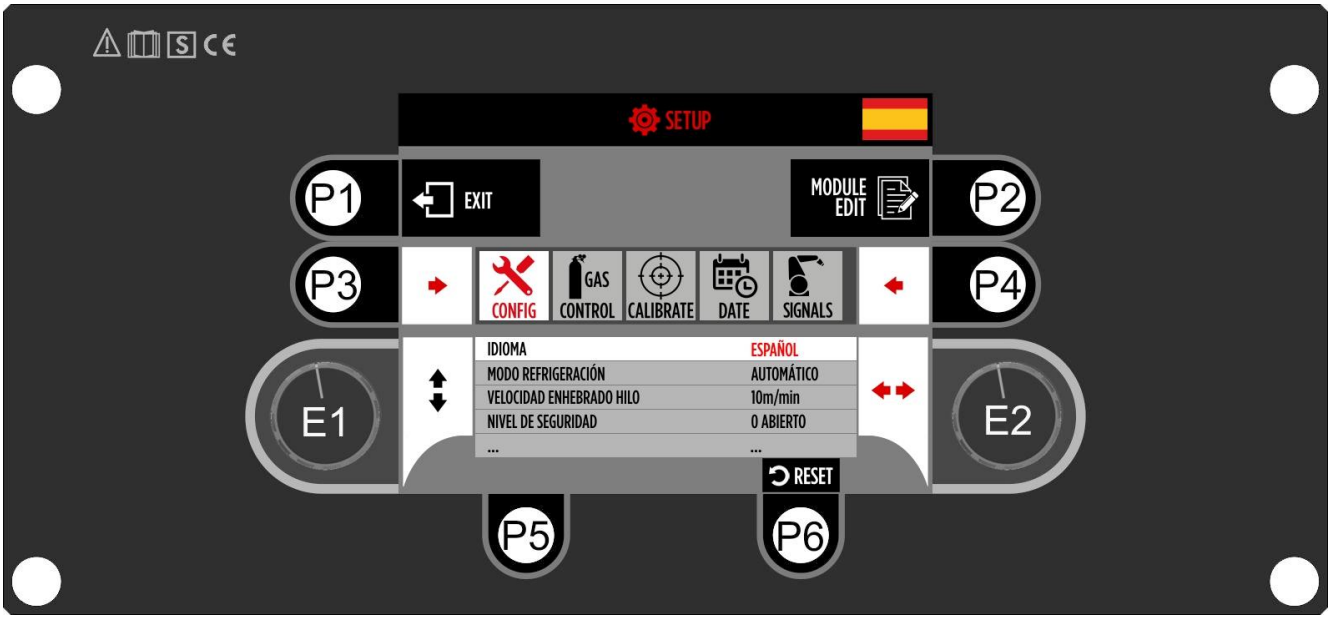
❶ The installation of an external module is required.

THIS SCREEN WILL DISPLAY THE PRODUCT IDENTIFICATION DATA:

- NAME
- POWER
- SERIAL No.
- INSTALLED SOFTWARE VERSION
- TYPE OF WIRE FEEDER
- CONTROL MODE

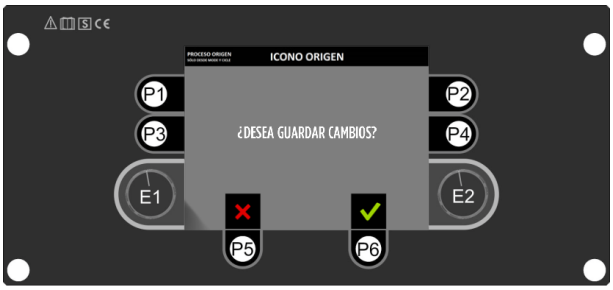
3.5. EQUIPMENT CONFIGURATION SETUP.

Before using the equipment, it is recommended to adjust the equipment configuration parameters to our usage preferences.



LABEL	KEY	ACTION	
EXIT	P1	P	Return to Main Menu.
MODULE EDIT	P2		Access to Module Enabling.
→	P3		Navigation Right by SEPUP.
←	P4		Navigation Left by SEPUP.
	E1	E	Parameter selection to modify. (Lighted bar).
	E2		Parameter modification. (Text in red).

At the end of the parameter setting, we will exit SETUP with the P1 key, the system asking a confirmation question prior to saving the modifications.



After the various configuration settings have been made, the system icons will appear in the identification bar of the screen.

3.5.1. SETUP CONFIG.

DESCRIPTION (E1)	VARIABLE RANGE (E2)	RESET	PROCESS		
			MMA	TIG	MIG
LANGUAGE	SPANISH-ENGLISH-FRENCH-FRENCH-GERMAN-ITALIAN	SPANISH	☑	☑	☑
COOLING MODE	SWITCH-ON/OFF-AUTOMATIC	OFF		☑	☑
WIRE THREADING SPEED	1-24	10 M/MIN		☑	☑
SECURITY LEVEL	0 OPEN-1-2-3 CLOSED	0	☑	☑	☑
ACTION 2ND TORCH BUTTON	CORRECTION - PRG LIBRARY	CORRECTION		☑	☑
CENTRO DE CONTROL	AUT-NoC-000-001…	000	☑	☑	☑
UNIT OF MEASUREMENT	MILLIMETRES-INCHES	MILLIMETRES			☑
TIG STRIKING MODE	EXT. MODULE LIFT ARC-HF ❶	LIFT ARC		☑	
WIRE FEEDING SYSTEM	WF1, WF2	WF1			☑
CONTROL MODE	MANUAL-INTERFACE R-INTERFACE IBC	MANUAL ❷		☑	☑

❶ The installation of an external module is required.
❷ The recognition is automatic; no selection is required.

3.5.1.1. COOLING MODE SELECTION.

ICON	DESCRIPTION	REGULATION E2	
No icon	Cooling Mode switched off. • The cooling system is disabled. • Protection system disabled due to lack of pressure. • The equipment is operative without water pressure.		OFF
	Cooling Mode switched on • The cooling activation does not occur until the welding torch button is pressed. • The cooling will be activated permanently.		ON
	Automatic Cooling Mode • The cooling activation occurs when the welding torch button is pressed. • If, 20 seconds after having pressed the torch, we have not started welding, the cooling will disconnect. • When the welding operation ends, the cooling system will remain activated for a maximum of 120 s.		AUTO

ICON	COOLING ERROR
	The protection system, due to lack of pressure, opens a contact when the pressure of the coolant does not exceed a minimum pre-set value. In these conditions, with a lack of water pressure, the welding machine is not operative and an error code will appear on the screen.

3.5.1.2. SECURITY LEVEL SELECTION.

The parameter setting limits the actions available to the user per action area. It does not require an access confirmation password, only level selection.

ICON	REGULATION E2		DESCRIPTION	DESCRIPTION
		0 OPEN	Expert Mode	Allows modification of all available parameters. • Change intensity and correction parameters. • Change Mode. • Change Cycle Parameters. • Upload and save files.
		1	Advanced Mode	It permits change intensity and correction parameters during welding. It enables memories to be uploaded and saved.
		2	Easy Mode	It allows welding by varying the current parameter only. It enables memories to be uploaded.
		3 CLOSED	Basic Mode	It only allows welding without changing current parameters. It enables memories to be uploaded.

3.5.1.2.1. ACCESS RESTRICTIONS.

LEVEL 0 - All open (Expert)

	P1	P2	P3	P4	P5	P6	E1	E2
MAIN MENU	☑	☑	☑	☒	☑	☒	☒	☒
EQUIPMENT SETUP	☑	☒	☒	☒	☒	☒	☒	☒
QUESTION CONFIRMATION	☒	☒	☒	☒	☑	☑	☒	☒
No-load adjustment	☑	☑	☑	☑	☑	☑	☑	☑
NO-LOAD REGULATION	☒	☒	☒	☒	☑	☒	☑	☑
HOLD	☑	☑	☑	☑	☑	☑	☑	☑
OPERATION MODE	☑	☑	☒	☒	☒	☑	☑	☑
PARAMETERS CYCLE	☑	☑	☒	☒	☒	☑	☑	☑
PROGRAMME FILE	☑	☑	☑	☑	☒	☒	☒	☒
SAVE	☑	☑	☑	☒	☒	☑	☑	☑
UPLOAD	☑	☑	☑	☒	☒	☒	☑	☑
CONSULT	☑	☒	☑	☒	☑	☑	☑	☑

LEVEL 1 - Advanced

	P1	P2	P3	P4	P5	P6	E1	E2
MAIN MENU	☒	☒	☒	☒	☒	☑	☒	☒
EQUIPMENT SETUP	☑	☒	☒	☒	☒	☒	☒	☑
QUESTION CONFIRMATION	☒	☒	☒	☒	☑	☑	☒	☒
No-load adjustment	☑	☑	☒	☒	☑	☒	☑	☑
NO-LOAD REGULATION	☒	☒	☒	☒	☑	☒	☑	☑
HOLD	☑	☑	☑	☑	☑	☑	☑	☑
Operation mode	☒	☒	☒	☒	☒	☒	☒	☒
Cycle parameters	☒	☒		☒	☒	☒	☒	☒
PROGRAMME FILE	☑	☒	☑	☑	☒	☒	☒	☒
SAVE	☑	☑	☑	☒	☒	☑	☑	☑
UPLOAD	☑	☑	☑	☒	☒	☒	☑	☑
CONSULT	☒	☒	☒	☒	☒	☒	☒	☒

LEVEL 2 - Easy

	P1	P2	P3	P4	P5	P6	E1	E2
MAIN MENU	☒	☒	☒	☒	☒	☑	☒	☒
EQUIPMENT SETUP	☑	☒	☒	☒	☒	☒	☒	☑
QUESTION CONFIRMATION	☒	☒	☒	☒	☑	☑	☒	☒
No-load adjustment	☑	☑	☒	☒	☒	☒	☒	☑
NO-LOAD REGULATION	☒	☒	☒	☒	☒	☒	☒	☑
HOLD	☑	☑	☑	☑	☑	☑	☑	☑
Operation mode	☒	☒	☒	☒	☒	☒	☒	☒
Cycle parameters	☒	☒	☒	☒	☒	☒	☒	☒
PROGRAMME FILE	☑	☒	☒	☑	☒	☒	☒	☒
SAVE	☒	☒	☒	☒	☒	☒	☒	☒
UPLOAD	☑	☑	☑	☒	☒	☒	☑	☑
CONSULT	☒	☒	☒	☒	☒	☒	☒	☒

LEVEL 3 - Closed (Basic)

	P1	P2	P3	P4	P5	P6	E1	E2
MAIN MENU	☒	☒	☒	☒	☒	☑	☒	☒
EQUIPMENT SETUP	☑	☒	☒	☒	☒	☒	☒	☑
QUESTION CONFIRMATION	☒	☒	☒	☒	☑	☑	☒	☒
No-load regulation	☑	☑	☒	☒	☒	☒	☒	☒
WELDING REGULATION	☒	☒	☒	☒	☒	☒	☒	☒
HOLD	☑	☑	☑	☑	☑	☑	☑	☑
Operation mode	☒	☒	☒	☒	☒	☒	☒	☒
Cycle parameters	☒	☒	☒	☒	☒	☒	☒	☒
PROGRAMME FILE	☑	☒	☒	☑	☒	☒	☒	☒
SAVE	☒	☒	☒	☒	☒	☒	☒	☒
UPLOAD	☑	☑	☑	☒	☒	☒	☑	☑
CONSULT	☒	☒	☒	☒	☒	☒	☒	☒

☒ NOT PERMITTED ☑ PERMITTED

IN SECURITY LEVELS 1 TO 3, PRESSING 2" ON P1 WILL ALLOW DIRECT ACCESS TO SETUP CONFIGURATION.

3.5.1.3. 2ND TORCH BUTTON ACTION.

When we use torches that incorporate a double button system, we can choose the action controlled by the secondary button:

REGULATION E2		DESCRIPTION
	Correction	We will act on the correction value selected in the equipment.. e.g. Pulsed frequency
	Programme	Increase or decrease for each press 1 programme from the list of available programmes.

3.5.1.4. CONTROL CENTER SELECTION.

During the start-up sequence, the equipment assigns a numbering to each of the available controls, by means of which we can select from where we regulate the equipment.

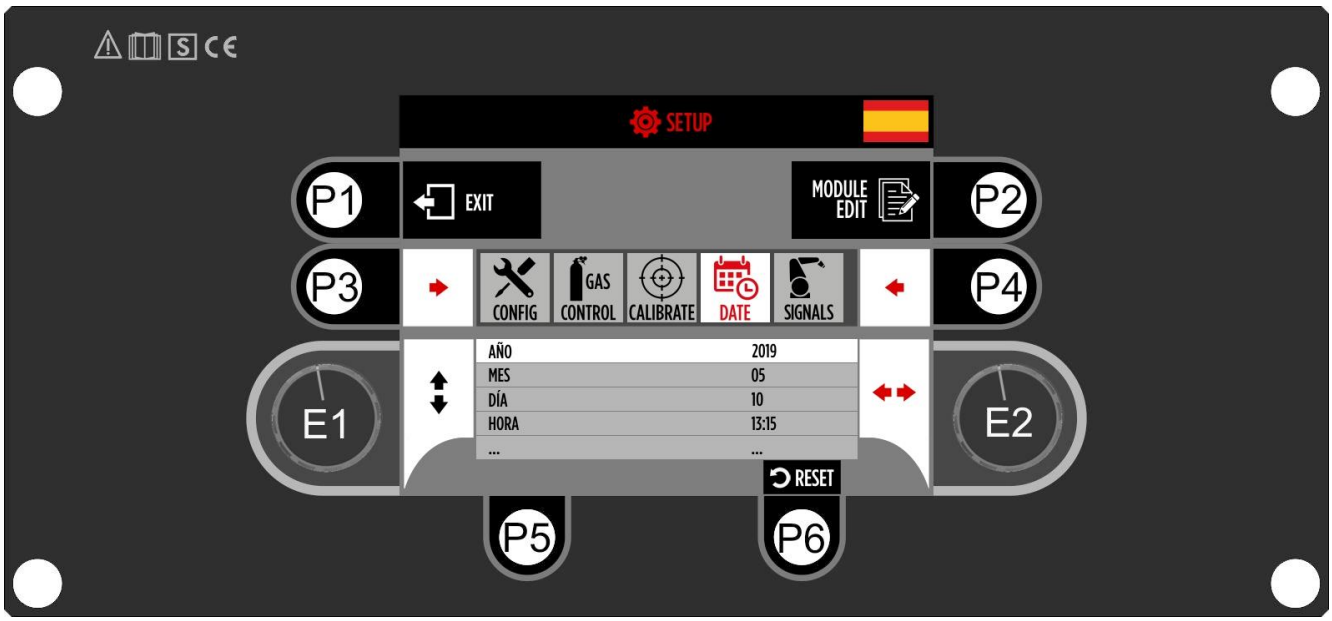
REGULATION E2		DESCRIPTION
	AUT	Automatic selection of highest number available. Power source < Wire feeder < Remote control.
	NoC	Installation with wire feeder without setting panel. Control from power supply panel.
	000	Control from power supply panel.
	001	Control from wire feeder panel

3.5.1.5. WIRE FEEDING SYSTEM SELECTION.

Allows more precise adjustment of the configuration parameters of the different available wire feeders.

REGULATION E2		DESCRIPTION
	WF1	Parameter setting for manual use wire feeders. .
	WF2	Parameter setting for robotic installations wire feeders.

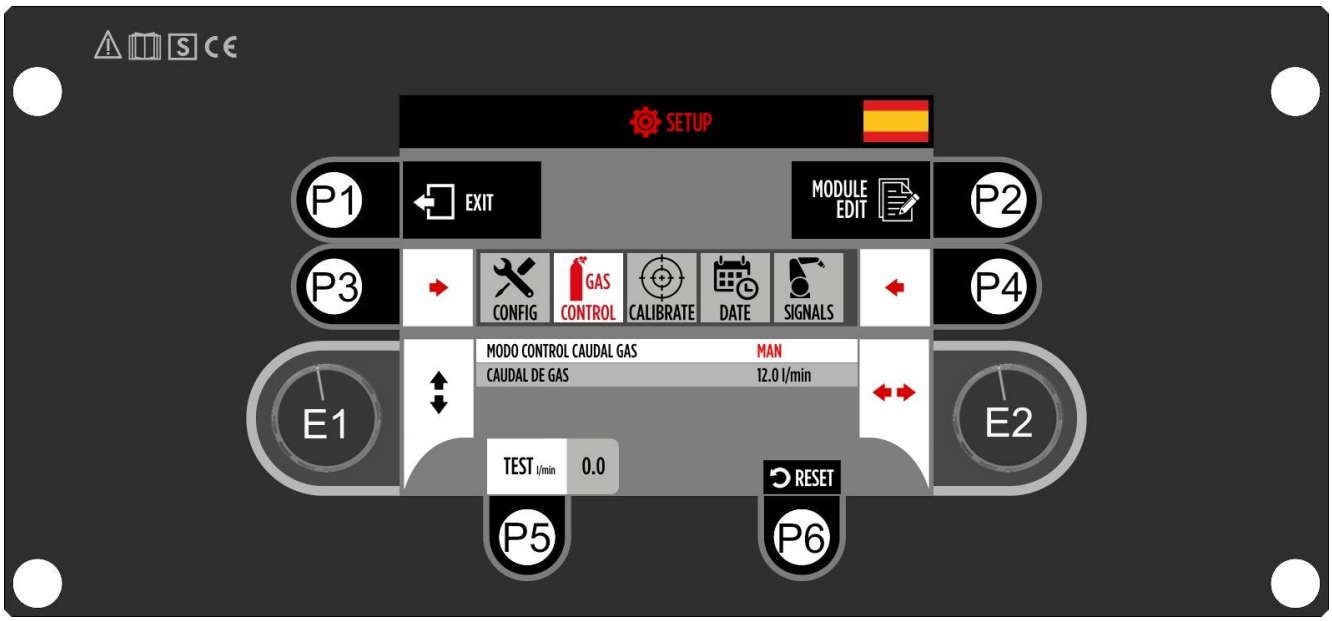
3.5.2. SETUP DATE.



DESCRIPTION (E1)	VARIABLE RANGE (E2)	RESET
Year	2000-2099	---
Month	1-12	---
Day	1-31	---
Hour	0-23	---
Minutes	0-59	---
Time zone	UTM-12 ÷ UTM+12	UTM

- The factory RESET does not affect the calendar SETUP.

3.5.3. SETUP GAS CONTROL.

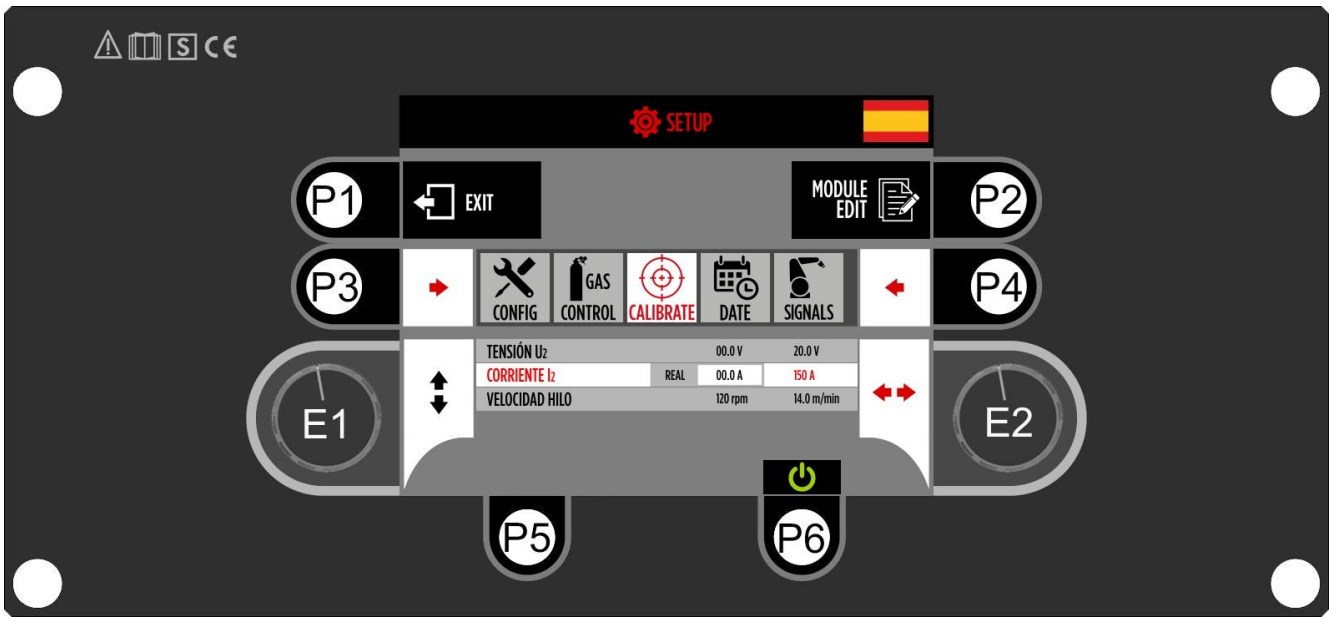


DESCRIPTION (E1)	VARIABLE RANGE (E2)	RESET
FLOW CONTROL MODE	MANUAL-SYNERGIC-OFF ❶	OFF
GAS FLOW	0 ÷ 50	12 l/min.
SYNERGIC CORRECTION	-10.0 ÷ 10.0	0 l/min.

❶ The installation of an external module is required.

KEY	ACTION	
P5		Gas Flow Test Activation

3.5.4. SETUP CALIBRATE.



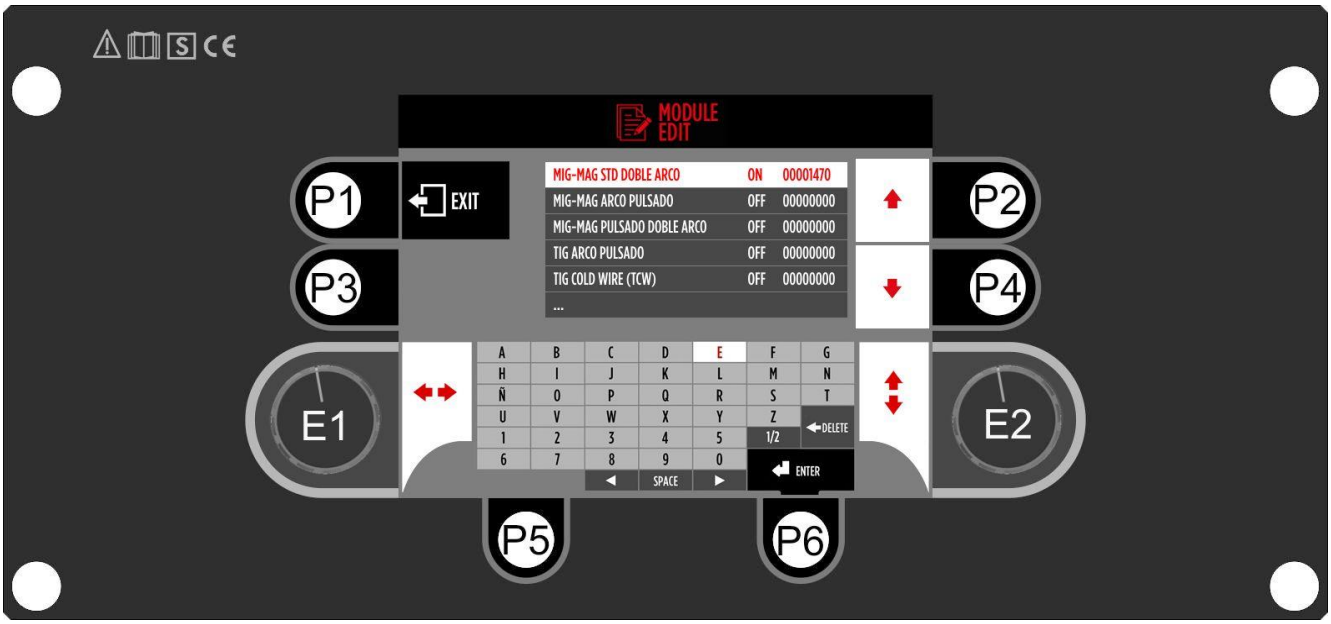
DESCRIPTION (E1)	VARIABLE RANGE (E2)	RESET
VOLTAGE	12.0 ÷ 42.0	--- V
Current	10 ÷ 500	--- A
WIRE SPEED	1.0 ÷ 24.0	--- m/min

❶ The installation of an external module is required.

KEY	ACTION	
P6		Activation/Deactivation of calibration mode. • Real voltage - current reading • Calculated wire speed for tachometer

3.5.5. MODULE EDIT.

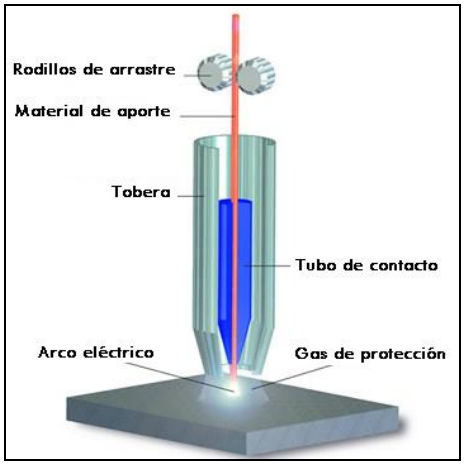
This menu allows the activation of the different welding modules available in the equipment. Each enabling code is independent per module and is associated with the serial number of the equipment, so you must request the modules from your commercial agent.



LABEL	KEY	ACTION	
EXIT	P1	P	Return to SETUP.
↑	P2		Select up.
↓	P4		Select down.
	E1	E	Navigate left/right. (Illuminated character).
	E2		Navigate up/down. (Illuminated character).
ENTER	P6	P	Enter character.

4. MIG PROCESS.

Continuous wire, semiautomatic or wire welding, also known as MIG-MAG (Metal Inert-Active Gas), GMAW or 135-136 process, forms part of the welding processes by electric arc. Therefore, before starting the requested welding jobs, we must bear in mind the basic principles of the process.

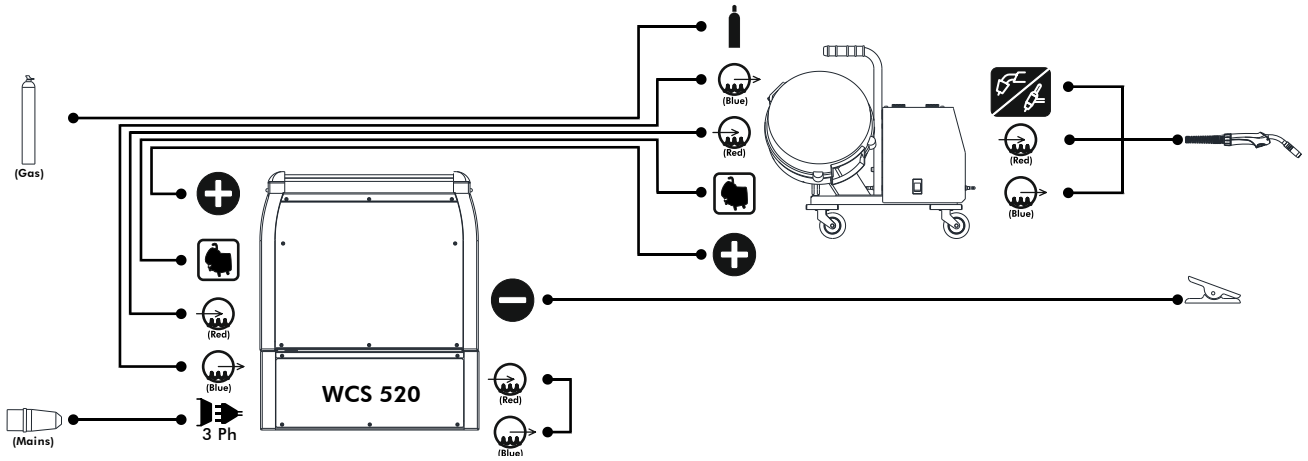


In this process, the electric arc is maintained between the solid wire that works as a continuous electrode and the work piece. The arc and the melted welding are protected by an inert or active gas atmosphere. The gas protection guarantees a continuous and even welding bead, as well as a bead free from impurities and slag.

The process can be used in the majority of metals and the range of wires in different alloys and applications is almost infinite. Its flexibility is the most representative characteristic of the MIG/MAG method, as it permits welding low alloy steel, stainless steel, aluminium and copper, in thicknesses above 0.5 mm and in all positions.

4.1. MIG WELDING. INSTALLATION AND START-UP.

As it is a modular system, we can choose our equipment configuration, water-cooled or air-cooled, recommending the use of cooled facilities, since the power developed by the equipment requires thermal control systems to avoid technical problems.



Cooled MIG/MAG Installation

NOTES TO BE TAKEN INTO ACCOUNT IN THE COOLING INSTALLATION PROCESS:

Read the WCS Cooling Module Instructions Manual.

- The tank filling process must be carried out with extensions and torches connected to the circuit, with the pump charging the circuit and refilling the tank as it is consumed.
- In general terms, we advise AUTOMATIC cooling control mode, however, if the stoppage alternation is frequent, lasting for less than 5 min, we recommend ON cooling mode.
- Work must never be carried out with the cooling mode OFF with a water cooled torch, as there would be a risk of fault due to overheating.

4.1.1. START-UP. PRELIMINARY OPERATIONS FOR MIG/MAG WELDING.

1st) Make sure the mains voltage is 400V/ 440V.

2nd) Change the polarity if it is necessary. Polarity to negative (with Flux-cored wire without gas).

3rd) Depending on the wire diameter, fit the groove of the suitable drive roll to the work to be carried out.

4th) Choose suitable gas to wire type to be welded. If gas cylinders are placed on the transport trolley, check that they are well secured by the bottle-holder system. Check that the safety chain is perfectly fastened.

5th) Install the regulator and connect gas hose checking that there are no leakages throughout the whole circuit. Gas flow must be between 8-16 l/min, depending on the welding power.

6th) In cooled systems, verify the connection between cooling module to the machine.

7th) Fit the wire reel into the drive roll support axle.

8th) Fit the welding wire into the wire feeding system. Do not force the wire pressure lever, as if this is too tight, it can cause the forming of loops and if the lever is too slack, the wire could slip. (MIG/MAG).

9th) Once the wire has been fitted, we can then connecting up the torch to Euro-connector.

10th) In cooled system, connect the torch cooling hoses to cooling module respecting the blue and red colours *(cooled system)*.

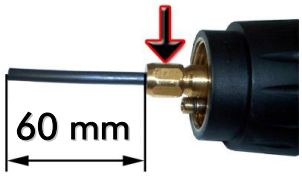
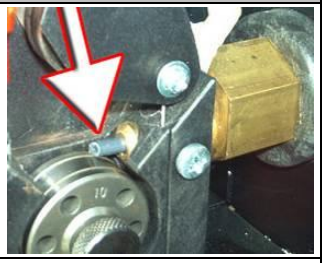
11th) Purge the gas by means of torch button, checking that the flow is between 8 and 16 l/min. Carry out a purge wire by means of wire button.

12th) In cooled systems, switch on the cooling and check that coolant is within the indicated levels *(cooled system)*.

4.1.2. ALUMINIUM WELDING. RECOMMENDATIONS FOR ITS INSTALLATION.

Welding aluminium can result in a complicated wire feeding problem if a series of basic measures during the installation process is not taken.

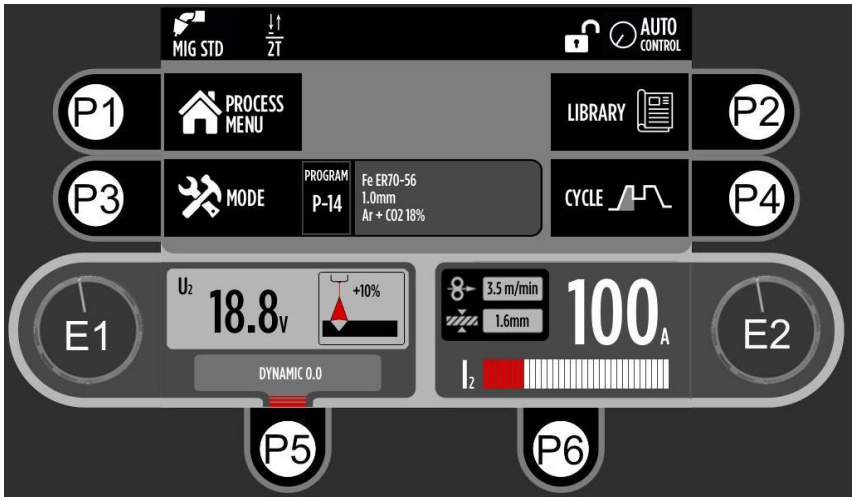
We advise a length of no more than 3 m, inserting polyamide liner as described in the pictures below

1st	2nd	3rd	4th
			
In the case of liners without stop at contact tip, leave the liner as near as possible to the contact tip.	Screw the liner fastening stop.	Secure the liner conduit with the locknut and trim the excess liner leaving it at the right measurement.	Leave the liner as close as possible to the motor drive roll.

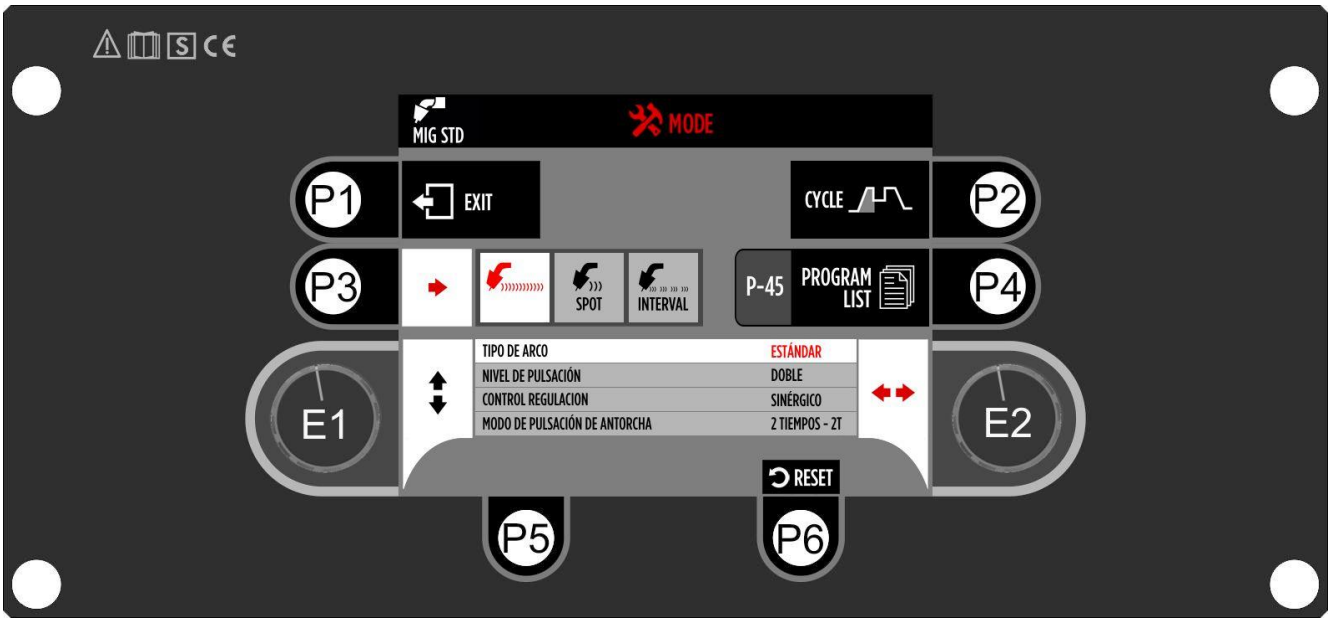
Incorporate complete KIT of upper drive rolls for aluminium Ref. 42316227 for diam. 1.0 - 1.2 mm.

At least the lower drive rolls incorporated when welding aluminium must have type "U" groove format, so that the pressure on the wire does not produce its deformation. With this KIT, we can replace the upper (flat) drive rolls with others that incorporate a "U" shaped groove, which will reduce the deformation of the aluminium wire to a minimum.

4.2. MIG PROCESS – OPERATION MODE SELECTION.



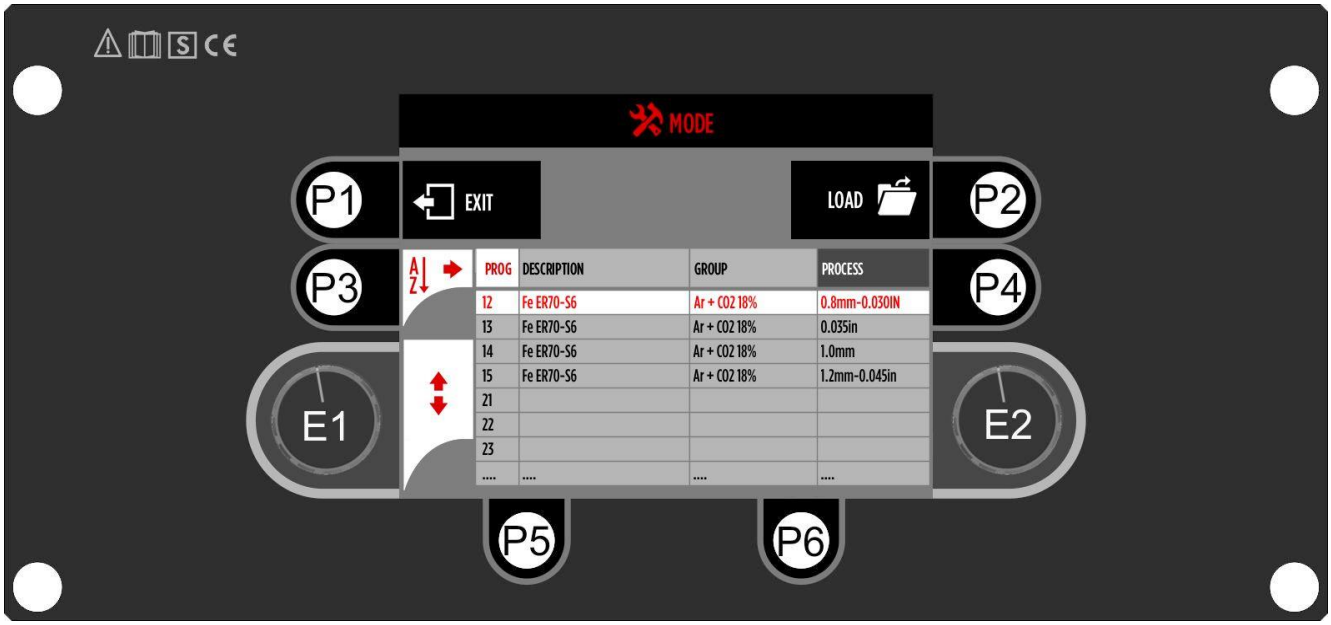
Starting from the standard configuration, we will access the OPERATION MODE Menu, where we can select different welding modes and arc types.



WELDING MODE			SPOT	INTERVAL
		Standard Use	Time-controlled weld bead.	Bead intervals with predetermined time
ARC TYPE	STANDARD	🏭	🏭	🏭
	PULSED	☑	☑	☑
PULSATION LEVEL	SIMPLE	🏭	🏭	🏭
	DOUBLE	☑		☑
REGULATION CONTROL	MANUAL	🏭	🏭	🏭
	SYNERIC	☑	☑	☑
TORCH PULSE MODE	2 Strokes	🏭	🏭	🏭
	4 Strokes	☑		☑

🏭 Factory value
☑ Available for selection

4.2.1. MIG PROCESS - PROGRAMME LIST.

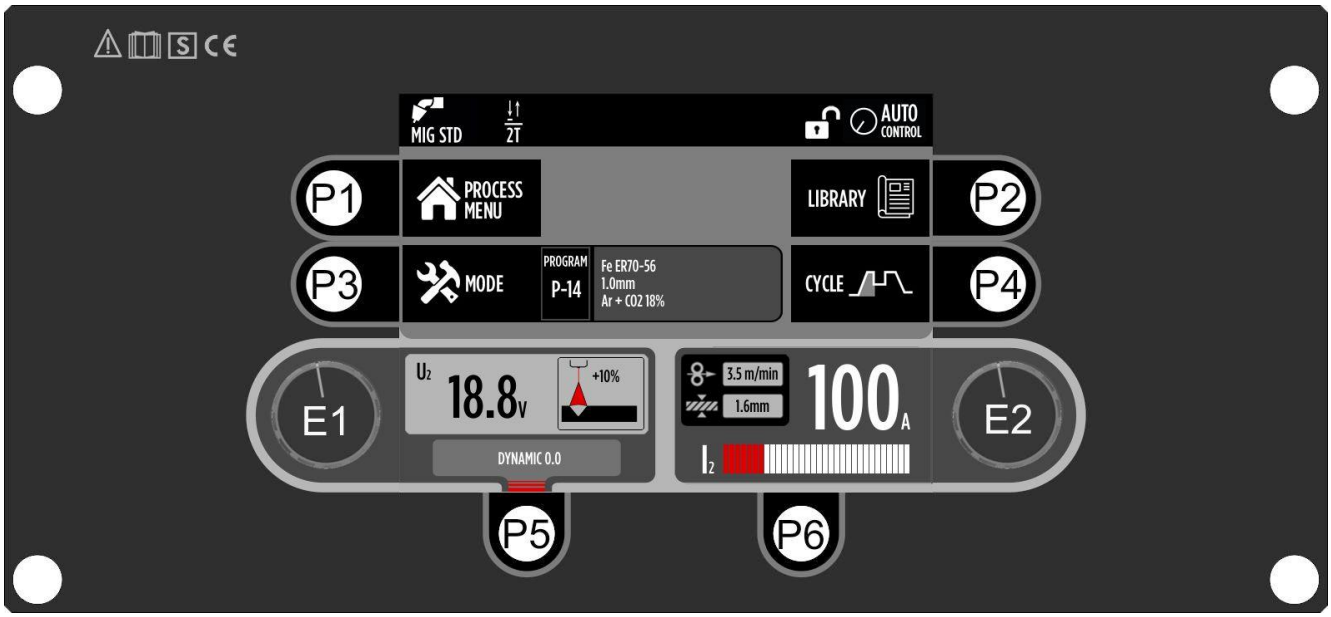


KEY	ACTION	DESCRIPTION
P1		Return to Main Menu
P2		Load Synergy Programme
P3		Sort by No. / Description (Filler material) / Group (Shielding gas)
E1		Navigate up in programme list.
E2		Navigate down in programme list.

4.2.2 MIG PROCESS (STD + PULSED ARC).

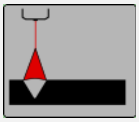
THE PULSED ARC TYPE REQUIRES THE ENABLING OF A SPECIFIC PROCESS MODULE.

THE APPLICATION OF THE PULSED CURRENT PERMITS ADAPTING THE HEAT INPUT TO THE WELDING DEMANDS, MARQUED FOR THE POSITION, TYPE OF JOINT AND THICKNESS, AS WELL AS A CONSIDERABLE REDUCTION IN THE NUMBER OF SPATTERS.



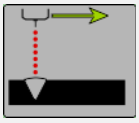
KEY	ACTION	DESCRIPTION
P1	Return to Main Menu	
P2	Access to Programme Library	
P3	Access to Operation Mode / Synergic Programme Selection	
P4	Access to Cycle Parameters	It accesses to the specific cycle of the selected mode.
P5	Select Secondary Value	Temporarily places value in leading position.
E1	Modify Main Correction	It adjusts the welding arc correction.
	Modify Secondary Correction	It adjusts the dynamic welding correction.
E2	Modify Main Value	It adjusts the welding intensity.

THE EQUIPMENT SHALL PROVIDE AN INDICATIVE REFERENCE THICKNESS AS WELL AS THE REPORTED WIRE SPEED.



ARC CORRECTION

- **Negative setting: Closed Arc, tendency to short circuit. Ideal for applications with very tight angles and long Stick Out.**
- **Positive setting: Open Arc, temperature increase. Recommended for the execution of wider beads.**

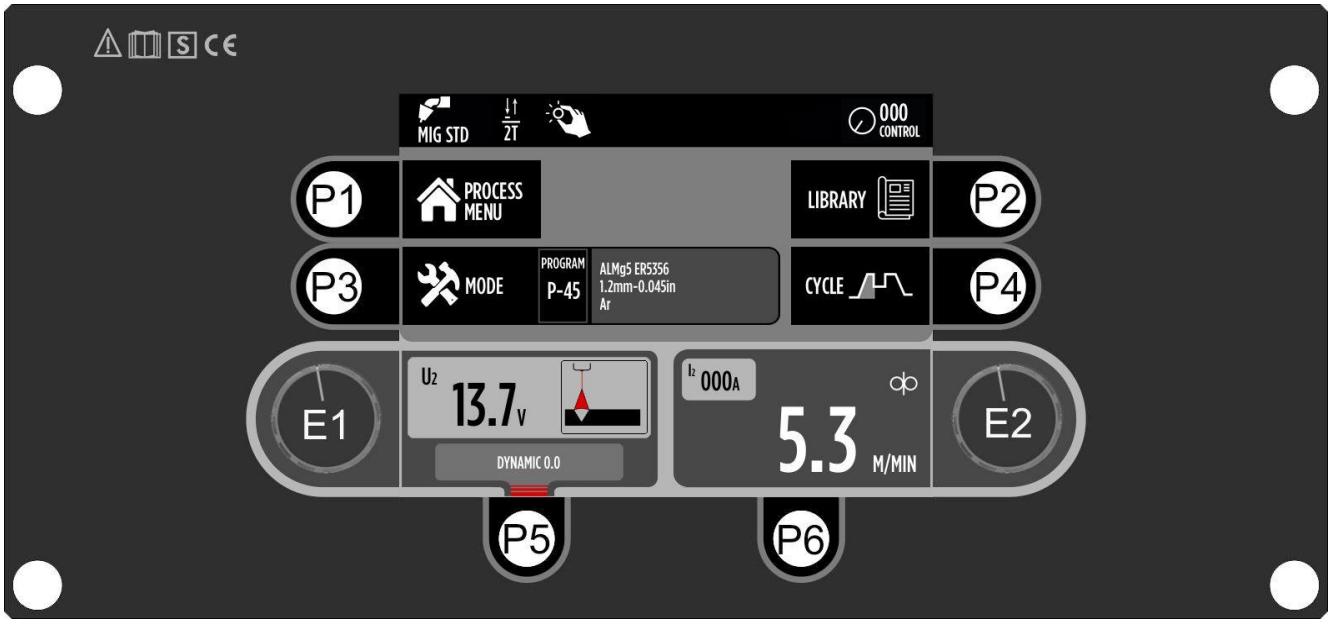


DYNAMIC CORRECTION

- **Negative setting: Reduction of drop size and increase of forward speed. The arc becomes harder, and there are more spatters.**
- **Positive setting: Increase of drop size and reduction of forward speed. The arc becomes softer and the heat input increases.**

4.2.3 MIG PROCESS – MANUAL CONTROL (STD + PULSED ARC).

It allows to regulate the wire speed and the welding tension independently of the synergic curve.



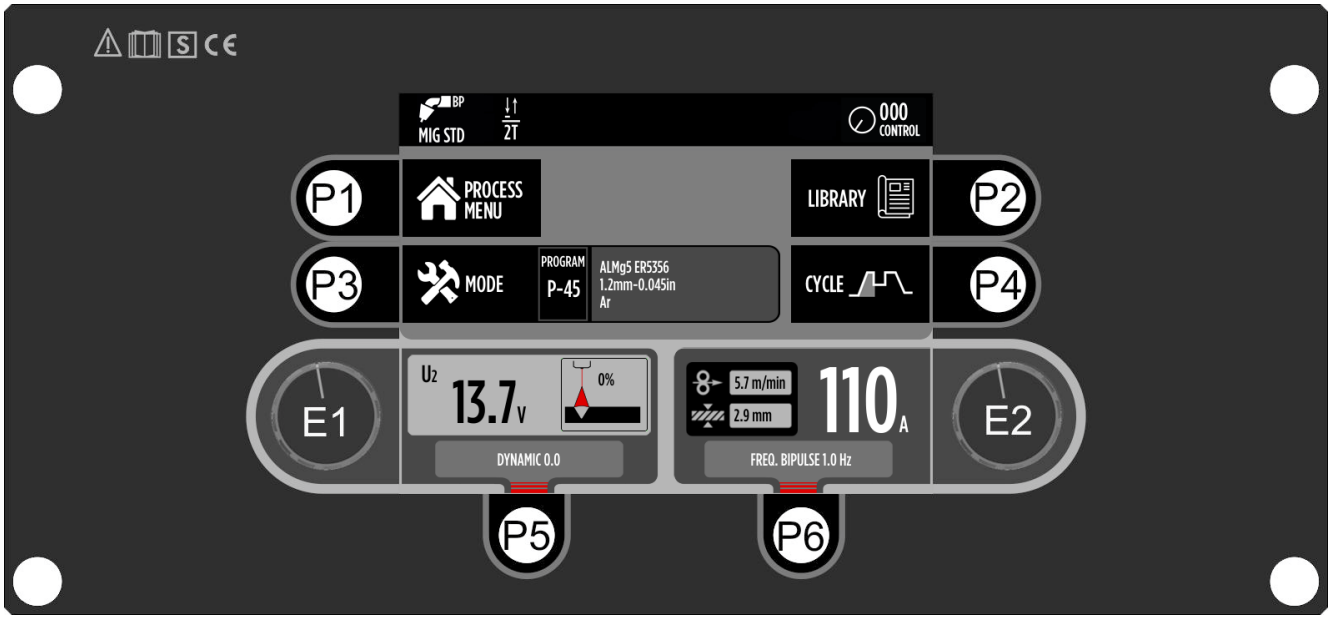
KEY	ACTION	DESCRIPTION
P1	Return to Main Menu	
P2	Access to Programme Library	
P3	Access to Operation Mode / Synergic Programme Selection	
P4	Access to Cycle Parameters	It access to the specific cycle of selected mode.
P5	Select Secondary Value	Temporarily places value in leading position.
E1	Modify Main Value	It adjusts the Welding Voltage.
	Modify Secondary Value	It adjusts the Welding Dynamic.
E2	Modify Main Value	It adjusts the Wire Speed.

4.2.4 MIG PROCESS - DOUBLE ARC (STD + PULSED).

THIS REQUIRE THE ENABLING OF A SPECIFIC PROCESS MODULE.

The purpose of this type of arc is to obtain greater control over the filler metal. The result is a succession of 2 intensities that overlap like a bead, each impulse guaranteeing its penetration and partial hardening. It permits adapting the heat input to the welding demands, marked the position, type of joint and thickness to be welded.

The bottom intensity is used to preheat and prepare the melting pool, whilst the peak intensity will produce the melting of the material. The pulsed frequency regulation (FREQ.BIPULSE) adjusts the number of times the intensity is changed per second.

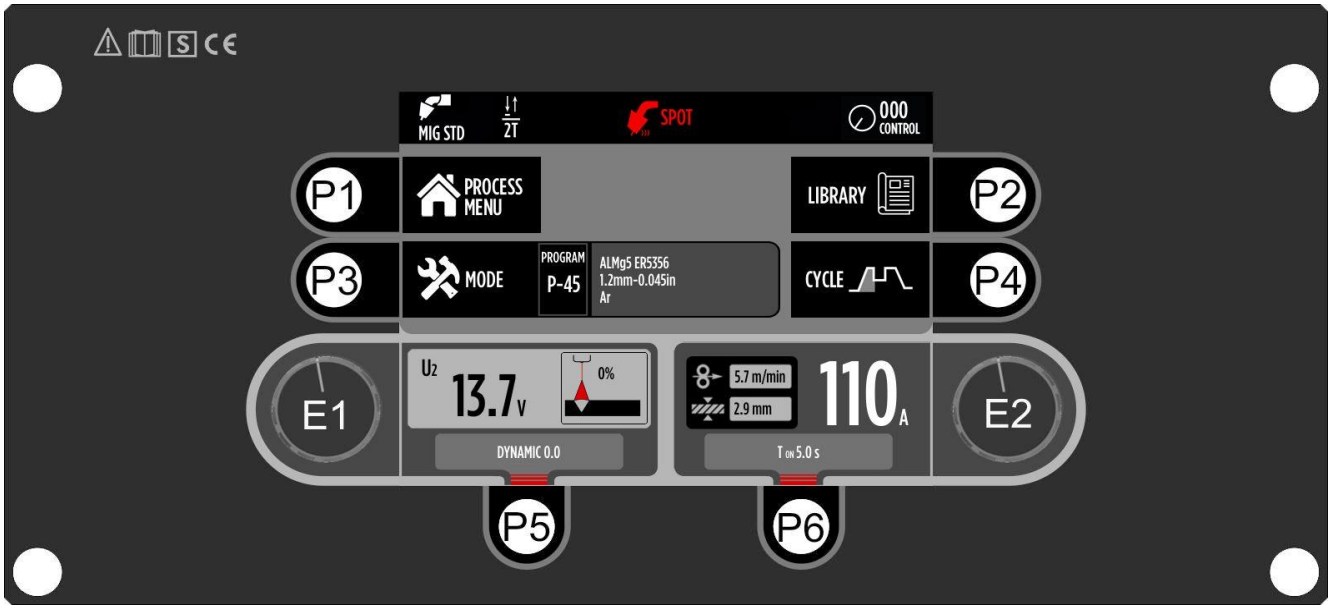


KEY	ACTION	DESCRIPTION
P1	Return to Main Menu	
P2	Access to Programme Library	
P3	Access to Operation Mode / Synergic Programme Selection	
P4	Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
P5	Select Secondary Correction	Temporarily places value in leading position.
P6	Select Secondary Value	
E1	Modify Main Correction	It adjusts the welding arc correction.
	Modify Secondary Correction	It adjusts the dynamic welding correction.
E2	Modify Main Value	It adjusts the welding intensity.
	Modify Secondary Value	It adjusts double arc frequency.

Low frequency will provide us with more heat penetration, marking the bead surface more.
On the contrary, a high-frequency will provide less heat and deformation to the joint, marking the surface less.

4.2.5 MIG PROCESS – SPOT MODE (STD + PULSED ARC).

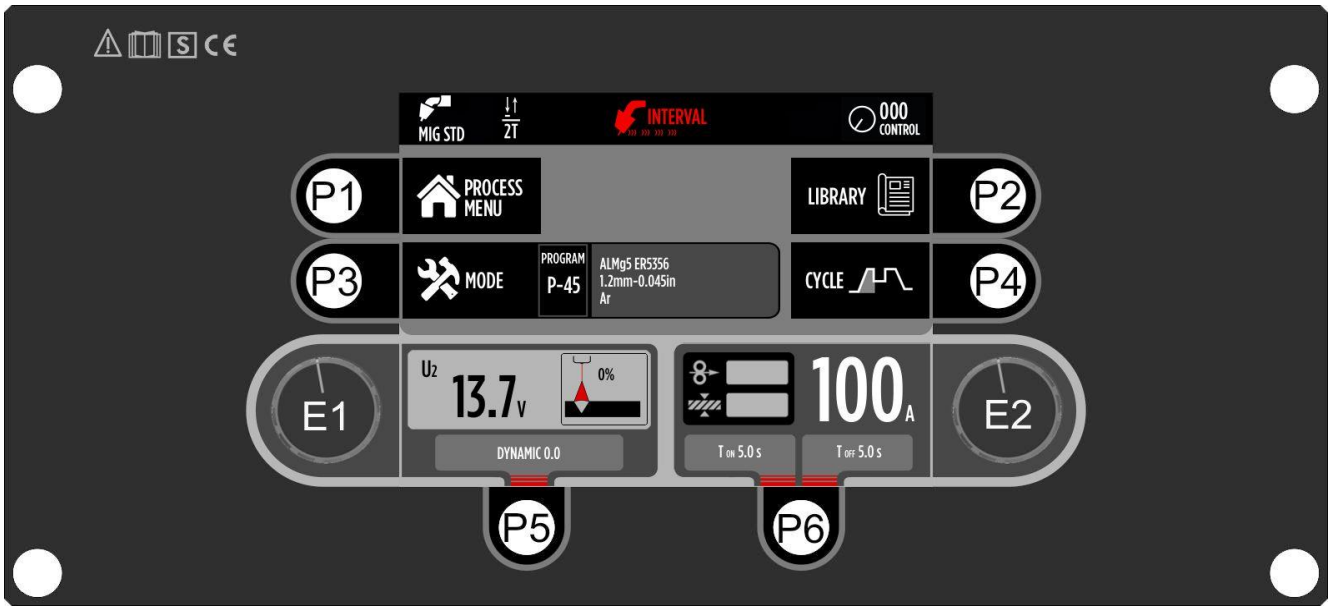
This mode of operation permits carrying out welding beads of a given time (TON control).



KEY	ACTION	DESCRIPTION	
P1		Return to Main Menu	
P2		Access to Programme Library	
P3		Access to Operation Mode / Synergic Programme Selection	
P4		Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
P5		Select Secondary Correction	Temporarily places value in leading position.
P6		Select Secondary Value	
E1		Modify Main Correction	It adjusts the welding arc correction.
		Modify Secondary Correction	It adjusts the dynamic welding correction.
E2		Modify Main Value	It adjusts the Welding Intensity.
		Modify Secondary Value	It adjusts the Welding Time.

4.2.6. MIG PROCESS – INTERVAL MODE (STD + PULSED ARC).

It allows the performance of correlative weld beads of determined duration (TON) and controlled time between them (TOFF).

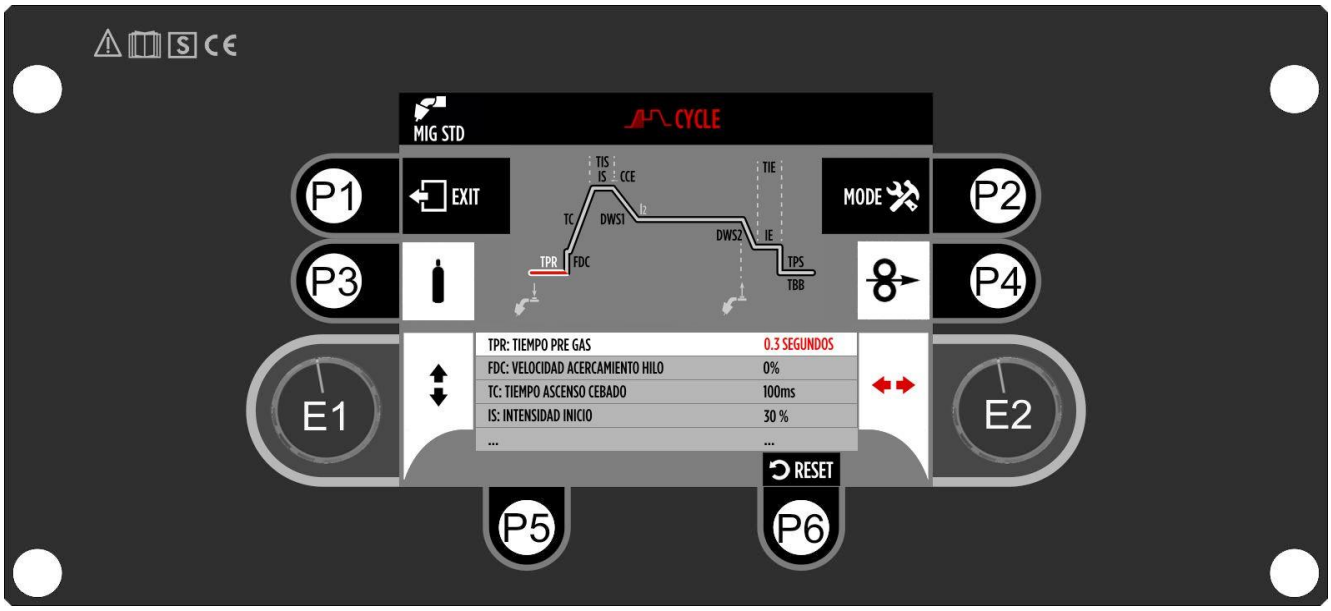


KEY	ACTION	DESCRIPTION	
P1		Return to Main Menu	
P2		Access to Programme Library	
P3		Access to Operation Mode / Synergic Programme Selection	
P4		Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
P5		Select Secondary Correction	Temporarily places value in leading position.
P6		Select Secondary Value	
E1		Modify Main Correction	It adjusts the welding arc correction.
		Modify Secondary Correction	It adjusts the dynamic welding correction.
E2		Modify Main Value	It adjusts the Welding Intensity.
		Modify Secondary Value	It adjusts the Welding Time.
			It adjusts the stopping time between beads.

4.3. CYCLE PARAMETERS – MIG PROCESS.

CYCLE

From this screen we will adjust the values that define the welding cycle. The cycle graph and parameter selection table will change based on the welding mode selection.



KEY	ACTION		DESCRIPTION
P1		Return to Source Process	Requests to confirm changes in case of modification.
P2		Access to Operation Mode	It accesses to Selected Process Mode
P3		Gas Purge	
P4		Threading of wire	
P6		Restore factory settings	Restores original factory settings.
E1		Select parameter	Selected parameter with blank bar. When browsing the parameter selection table, the corresponding segment of the upper cycle graph will illuminate simultaneously.
E2		Modify parameter	

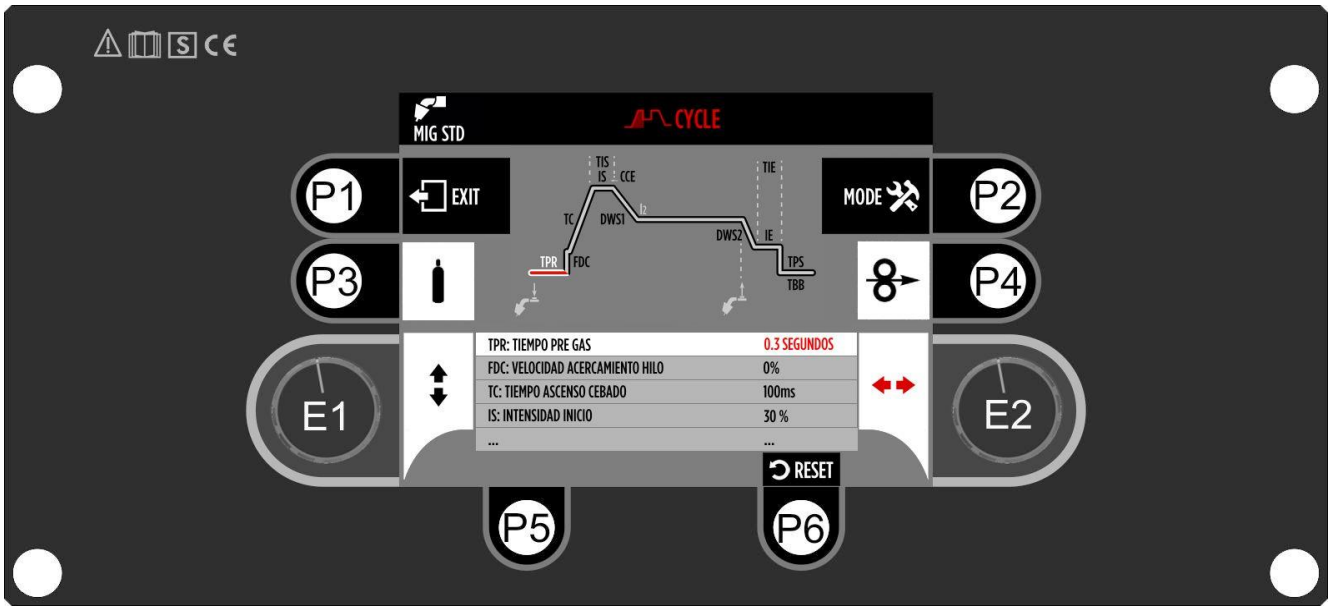
Each of the different cycles will be composed of different regulation parameters that will vary depending on the selected operating mode:

PARAMETER	DESCRIPTION	FUNCTION	REMARKS	UNIT	RESOLUTION
FDC	Wire approach speed	It adjusts the approach speed.		%	1
TPR	Pre-gas time	It facilitates the arc ignition		Seconds	0.1
TC	Striking ascent ramp time	Softens the arc ignition		Milliseconds	1
IS	Starting intensity	It reduces the striking cracks.		%	1
TIS	Start current time	Carry -out preheating of material	In 2S mode only	Seconds	0.1
CCE	U2 Striking Correction	Customise the striking		%	1
DWS1	Ramp Is → I2	It reduces the initial stress		Seconds	0.1
CBP	U2 Correction (I2 High)	Arc customising	BIPULSE only	%	1
DBP	Double arc difference	Arc customising - Heat reduction.		%	1
DCL	Time % (I2 High)	It balances the pulse for heat control.		%	1
DWS2	Ramp I2 → IE	It reduces the end stress		Seconds	0.1
IE	Final intensity	It reduces the crater cracks.		%	1
TIE	Final intensity time	It reduces the crater size	In 2S mode only	Seconds	0.1
TBB	Burn Back Time	Adjust final wire length		Milliseconds	10
TPS	Post-gas time	Prevents bead rust.		Seconds	0.1
CCT	Current Change Time	Transition time between active arc memories		Milliseconds	10

4.3.1. CYCLE PARAMETERS – MIG PROCESS.

CYCLE

From this screen we will adjust the values that define the welding cycle. The cycle graph and parameter selection table will change based on the welding mode selection.



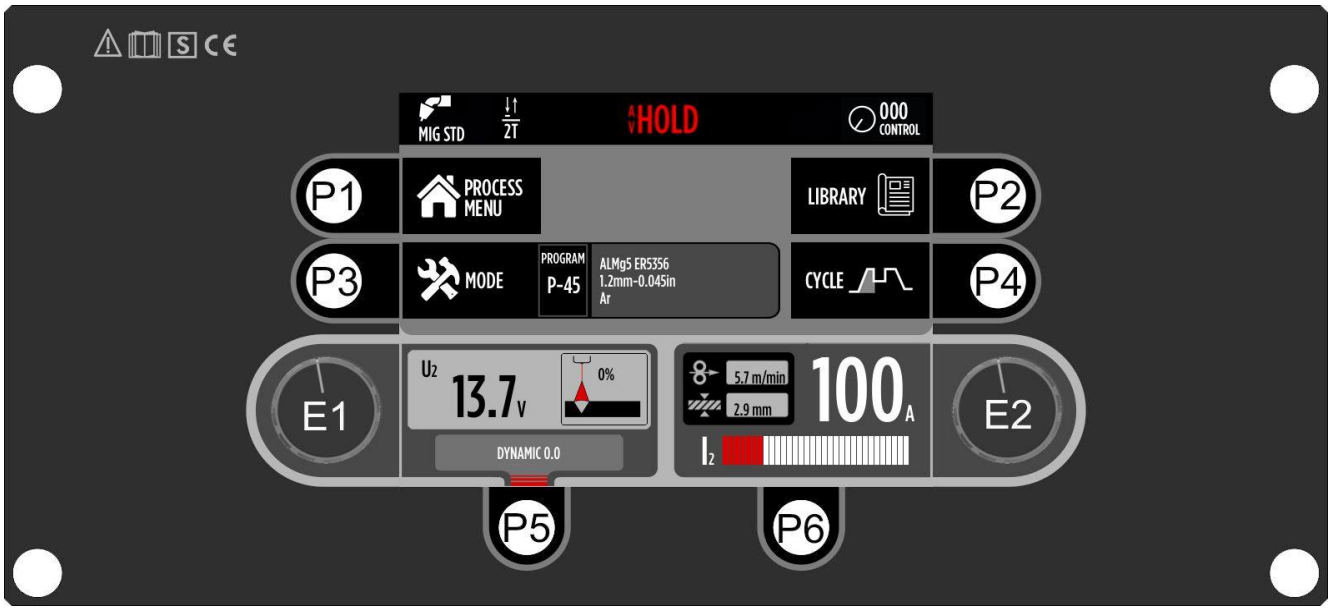
KEY	ACTION		DESCRIPTION
P1		Return to Source Process	Requests to confirm changes in case of modification.
P2		Access to Operation Mode	It accesses to Selected Process Mode
P3		Gas Purge	
P4		Threading of wire	
P6		Restore factory settings	Restores original factory settings.
E1		Select parameter	Selected parameter with blank bar. When browsing the parameter selection table, the corresponding segment of the upper cycle graph will illuminate simultaneously.
E2		Modify parameter	

Each of the different cycles will be composed of different regulation parameters that will vary depending on the selected operating mode:

PARAMETER	DESCRIPTION	FUNCTION	REMARKS	UNIT	RESOLUTION
FDC	Wire approach speed	It adjusts the approach speed.		%	1
TPR	Pre-gas time	It facilitates the arc ignition		Seconds	0.1
TC	Striking ascent ramp time	Softens the arc ignition		Milliseconds	1
IS	Start current	It reduces the striking cracks.		%	1
TIS	Start current time	Carry -out preheating of material	In 2S mode only	Seconds	0.1
CCE	U2 Striking Correction	Customise the striking		%	1
DWS1	Ramp Is → I2	It reduces the initial stress		Seconds	0.1
CBP	U2 Correction (I2 High)	Arc customising	BIPULSE only	%	1
DBP	Double arc difference	Arc customising - Heat reduction.		%	1
DCL	Time % (I2 High)	It balances the pulse for heat control.		%	1
DWS2	Ramp I2 → IE	It reduces the end stress		Seconds	0.1
IE	Final current	It reduces the crater cracks.		%	1
TIE	Final intensity time	It reduces the crater size	In 2S mode only	Seconds	0.1
TBB	Burn Back Time	Adjust final wire length		Milliseconds	10
TPS	Post-gas time	Prevents bead rust.		Seconds	0.1
CCT	Current Change Time	Transition time between active arc memories		Milliseconds	10

4.4. HOLD MODE.

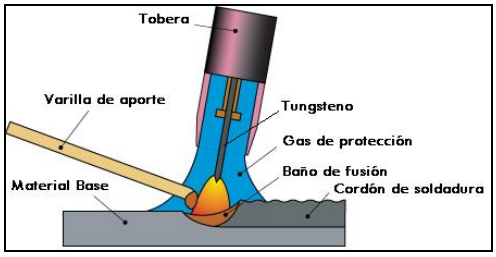
At the end of the welding process, the HOLD icon will appear automatically on the regulation screen.



KEY	ACTION	
P1-P2-P3-P4-P5-P6		Return to no-load regulation screen.
E1-E2		

5. TIG PROCESS.

Welding with tungsten or wolfram electrode, also known as TIG (Tungsten Inert Gas), GTAW or 141 process, forms part of the welding processes by electric arc. Therefore, we must bear in mind the basic principles of the process before starting the requested welding jobs.



In the TIG process, the electric arc is established between the part to be welded and a non-consumable electrode. Meanwhile, the air ionisation and protection against contamination will be carried out by gaseous atmosphere that flows through the torch.

The passage of current will generate the necessary heat to melt the materials to be welded.

APPLICATIONS

This equipment can be used for welding any type of material. Its application is not economical in thicknesses of more than 10 mm. For higher ranges, we must use other combined processes for filling passes.

The great advantage of this welding method is, basically, to obtain more resistant and ductile beads, which are also less sensitive to corrosion than the other procedures, as the protective gas prevents contact between the atmosphere and the melt bath.

Reduction of deformation or slag inclusions, as well as clean and even welding, due to the reduction of fumes and spatters, are other advantages of this system.

The bead obtained therefore has a good surface finish, which can be improved with simple finish operations, which has a favourable impact on the production costs.

One disadvantage is the need to provide a continuous gas flow and the cost this represents. Furthermore, this welding method requires highly specialised manpower, which also increases costs. Therefore, it is not one of the most commonly used methods but it is reserved for joints with special surface finish and precision needs.

In order to obtain greater control over the filler metal, pulsed current can be used. The result is a succession of spots that overlap like a bead, each impulse guaranteeing its penetration and partial hardening.

This process is adapted for all those applications where we have to limit the heat input, either due to thickness, deformation or metallurgic transformations.

It is especially recommended for welding pipes as it is less sensitive to position variations.

Most materials can be welded with direct current (carbon steels, stainless steels, titanium, bronze,…), except aluminium and magnesium.

Connecting the torch to the negative pole allows limited electrode wear because most of the heat is concentrated on the part being welded. The electrode diameter recommendation changes depending on the selected welding current.

5.1. TIG WELDING. INSTALLATION AND START-UP.

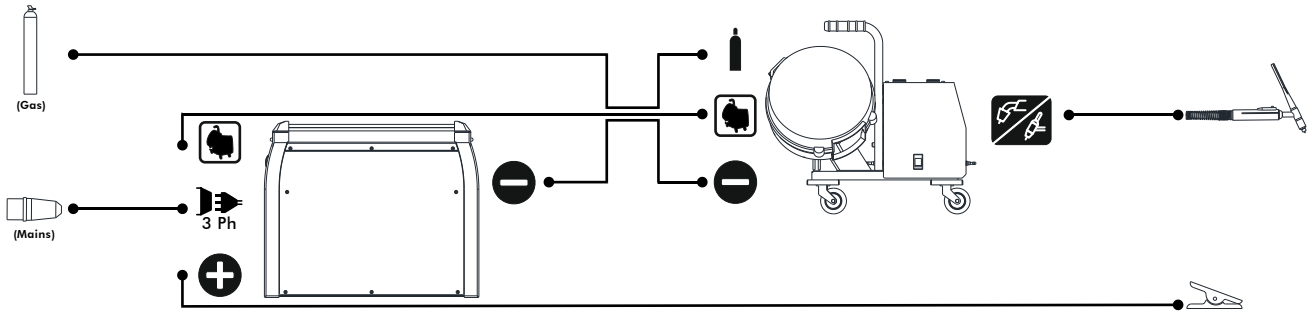
Before starting to read the next section, we recommend you recall the identification of elements and connectors described in section 3.1. Operating controls.

The equipment has a TIG welding system with contact arc striking or Lift Arc, in other words, it will be necessary to establish contact the between the tungsten and the plate to establish the electric arc. Its ignition will be generated when the contact between both polls are separated.

5.1.1. TIG SYSTEM INSTALLATION.

We will use specific torches with Euro-connector to manage the passage of the current and control the solenoids valve from the torch button. We connect the polarity to the negative pole.

If installing a remote control we will make the connection to CN1 TELENET, the connector CN2 (TORCH CONTROL) will be used in applications with multiple button torches.



Air cooled TIG Installation Graphic. Torch to negative pole.

5.1.2. TIG SYSTEM START-UP.

1st) Make sure the mains voltage is 400V/ 440V.

2nd) Verify that the torch polarity is negative.

3rd) Check that the gas is Argon and make sure that the cylinders are well secured to bottle-holder system.

4th) Install the regulator and connect gas hose checking that there are no leakages throughout the whole circuit.

5th) Connect the TIG torch.

6th) Connect the supply cable with the suitable plug to the relevant three-phase tap.

7th) Purge gas by means of the torch button, checking that the flow is between 6 and 12 l/min.

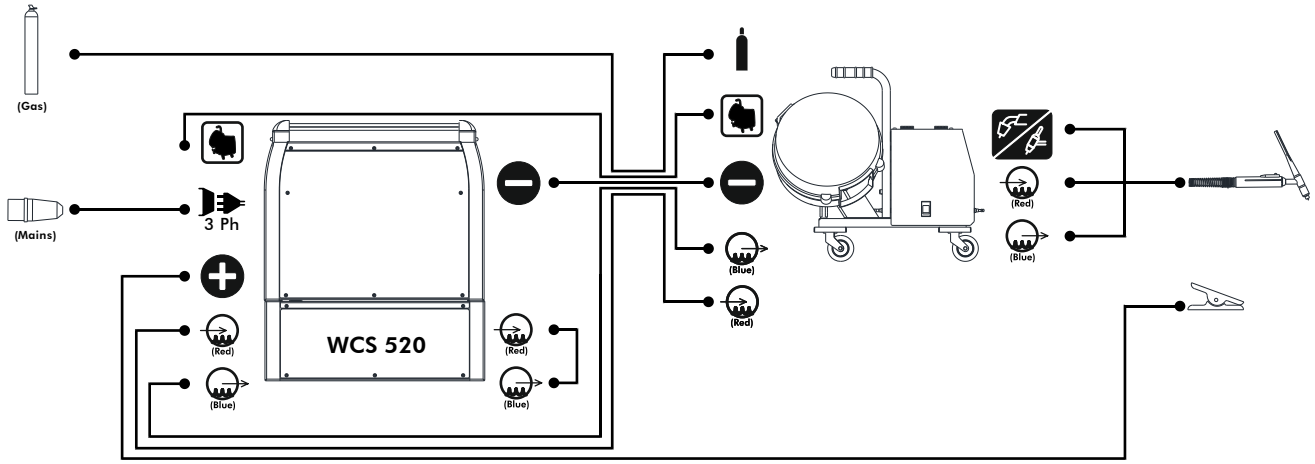
Before starting to weld we must confirm that the torch consumables have been correctly installed, and that the correct choice of type and diameter of electrode has been made, depending on the material to be welded.

5.1.3. COOLED TIG SYSTEM INSTALLATION.

We confirm the selection of polarity and connect the mass in the opposite pole to that selected.

We will use specific torches to manage the passage of the current and the solenoids valve control from the torch button.

We connect welding torch-connector and the cooling sleeves to the rapid plugs according to the colour identification code (Blue: Output - Red: Return).



Installation graphic of TIG cooled.

5.1.4. COOLED TIG SYSTEM START-UP.

1st) Make sure the mains voltage is 400 V.

2nd) Verify that the torch polarity is negative.

3rd) Check that the gas is Argon and make sure that the cylinders are well secured to bottle-holder system.

4th) Install the regulator and connect gas hose checking that there are no leakages throughout the whole circuit.

5th) Connect the cooling module to machine.

6th) Connect the TIG torch.

7th) Respecting the colours blue and red (**Blue/Red**), connect the hoses torch to cooling module.

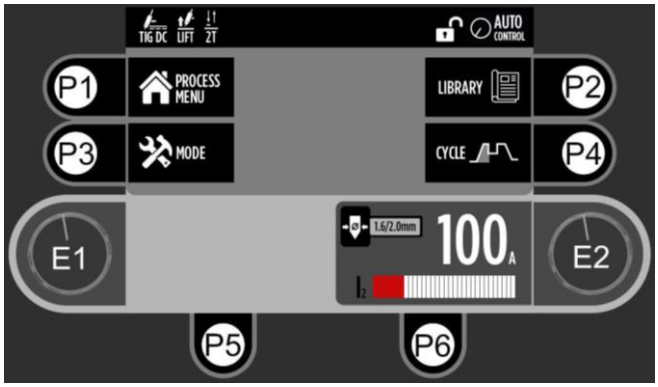
8th) Connect the supply cable with the suitable plug to the relevant three-phase tap.

9th) Purge gas by means of the button, checking that the flow is between 6 and 12 l/min.

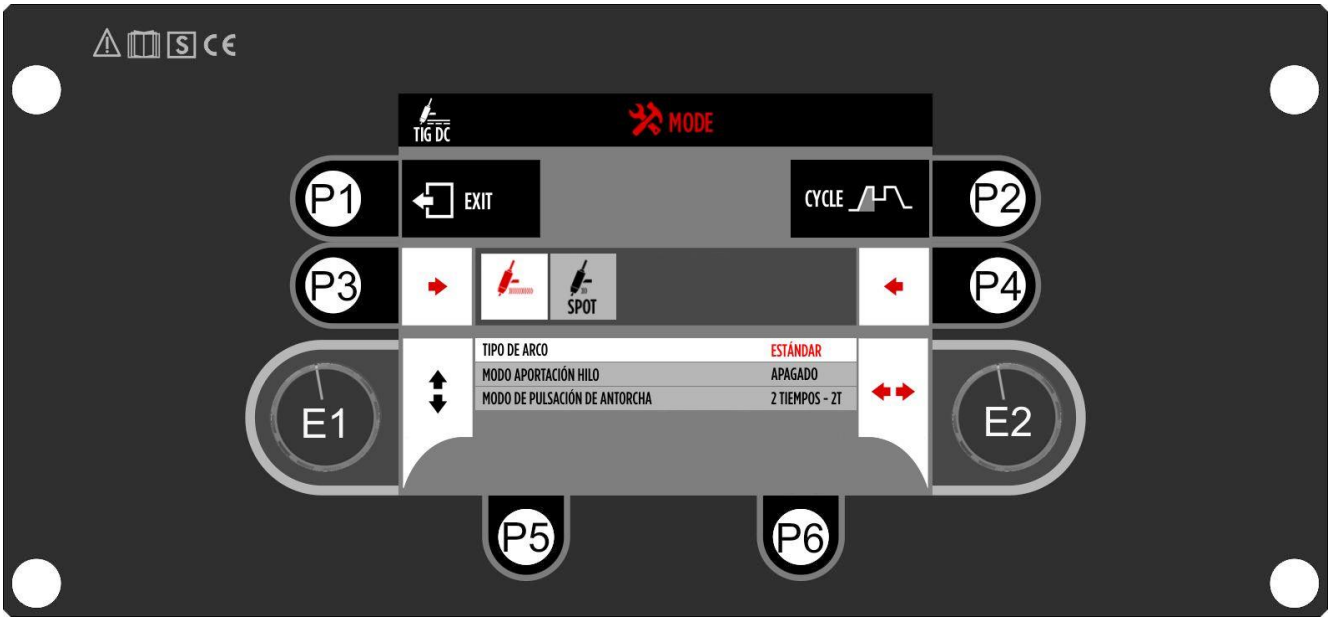
10th) Switch on the cooling module and check that coolant is within the specified levels.

11th) Select in the Control Panel within the cooling process between the options Switch-on or Automatic (REF.: ON/AUT).

5.2. DC TIG PROCESS – OPERATION MODE SELECTION.



Starting from the standard configuration, we will access the OPERATION MODE Menu, where we can select different welding modes and arc types.

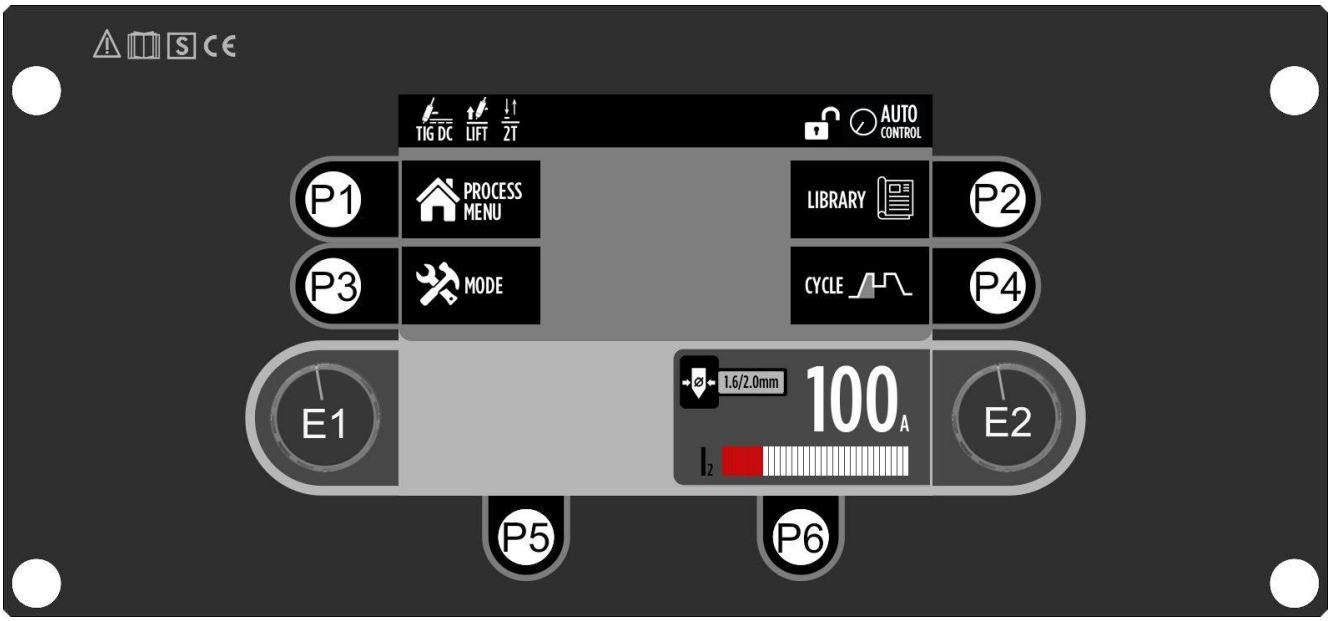


WELDING MODE			
		Standard Use	Time-controlled weld bead.
ARC TYPE	STANDARD	🏭	🏭
	PULSED	☑	☑
	BIPULSED	☑	
TORCH PULSE MODE	2 Strokes	🏭	🏭
	2 Special Strokes	☑	
	4 Strokes	☑	
	4 Special Strokes	☑ *Except BIPULSE arc type.*	
WIRE INPUT MODE	ON	🏭	
	OFF		

🏭 Factory value
☑ Available for selection

5.2.1. DC TIG PROCESS STD ARC.

The start and end welding mode is controlled by the pulse torch system. (See Operation Mode for selection - Cycle Parameters for viewing), the arc is a direct current standard.

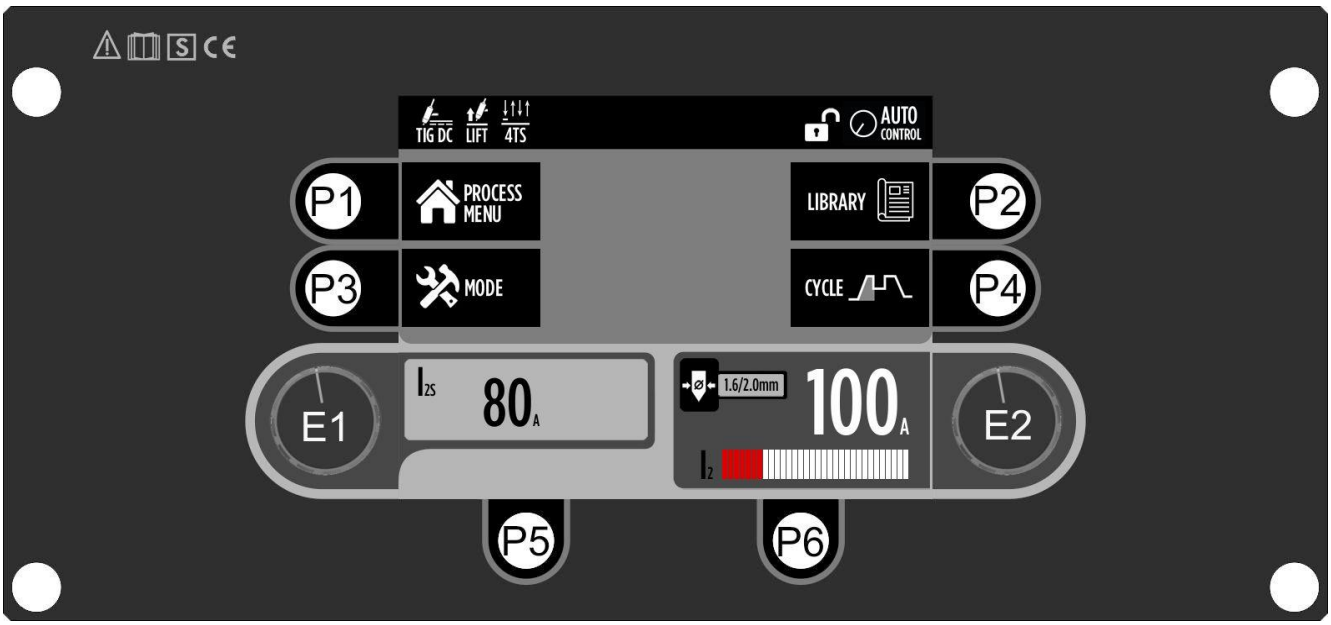


KEY	ACTION		DESCRIPTION
P1		Return to Main Menu	
P2		Access to Programme Library	
P3		Access to Operation Mode	
P4		Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
E2		Modify Main Value	It adjusts the Welding Intensity.

THE TEAM WILL RECOMMEND THE USE OF A DIAMETER OF TUNGSTEN IN LINE WITH THE WELDING INTENSITY.

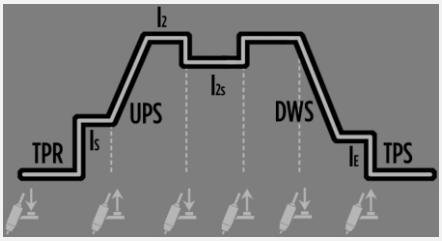
5.2.1.1. DC TIG PROCESS - STD ARC - CONTINUOUS MODE - 4SS.

This torch pulse mode allows the use of a 2nd welding intensity (Control I_2 s) that will be managed after pressing the torch button.



KEY	ACTION	DESCRIPTION
P1	Return to Main Menu	
P2	Access to Programme File	
P3	Access to Operation Mode	
P4	Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
E1	Modify Main Correction	It adjusts the 2nd Welding Intensity.
E2	Modify Main Value	It adjusts the Welding Intensity.

4SS CYCLE OPERARION DETAIL

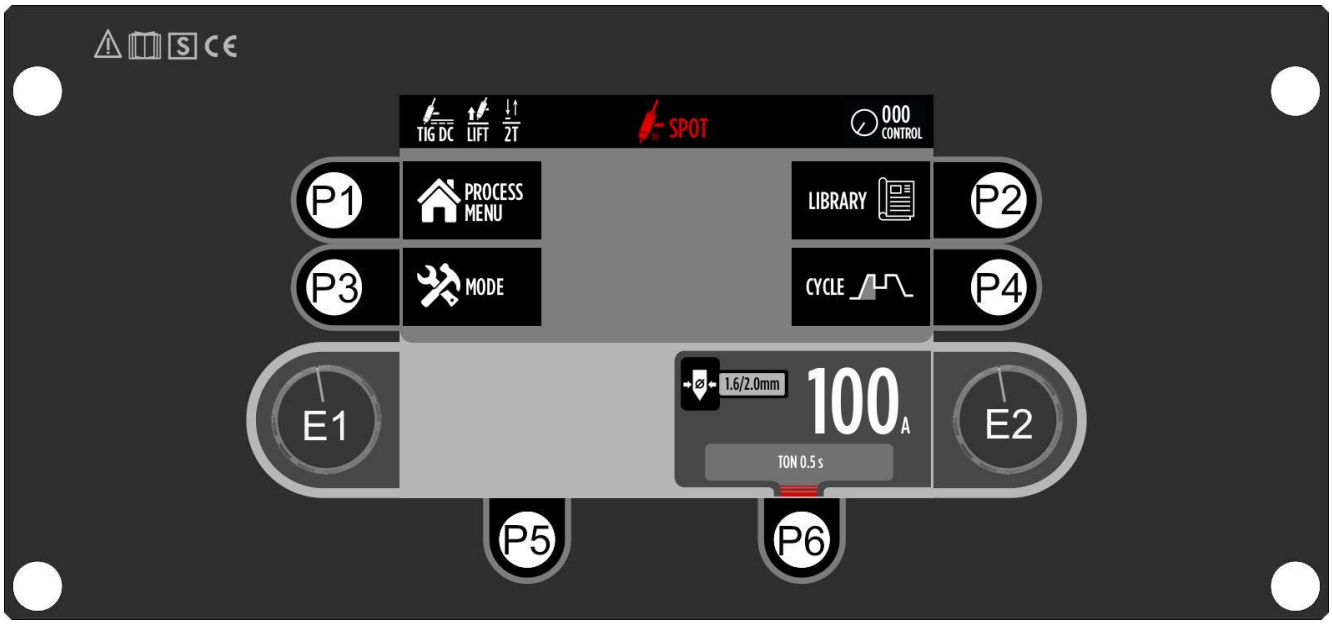


Cycle parameter graphic

- We press the trigger to start welding in "IS".
- Whilst we will keep the button pressed we maintain “IS”.
- We release the button and switch to working intensity I_2 .
- Slightly press the torch trigger to switch to I_2 s.
- Slightly press the torch trigger again to switch to I_2 .
- (We can repeat this cycle as many times as we want.)
- Press and hold the torch button for "IE".
- Whilst we will keep the push button pressed we maintain “IE”.
- We release the push-button and stop welding.

5.2.3. DC TIG PROCESS - STD ARC - SPOR MODE.

This mode of operation permits carrying out welding beads of a given time (TON control).



KEY	ACTION	DESCRIPTION
P1	Return to Main Menu	
P2	Access to Program File	
P3	Access to Operation Mode	
P4	Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
P6	Select Secondary Value	The secondary value is temporarily placed in leading position.
E2	Modify Main Value	It adjusts the Welding Intensity.
		It adjusts the Welding Time.

5.2.4. DC TIG PROCESS - PULSED ARC.

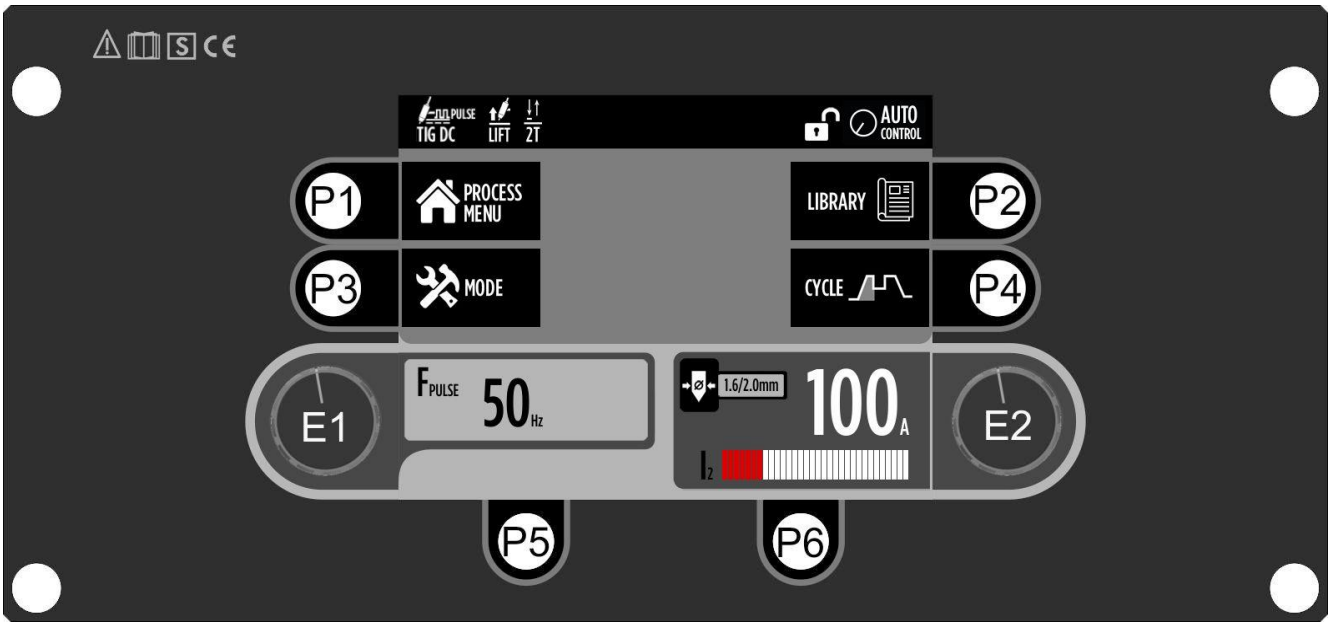
THIS REQUIRE THE ENABLING OF A SPECIFIC PROCESS MODULE.

The purpose of this type of arc is to obtain greater control over the filler metal. The result is a succession of 2 intensities that overlap like a bead, each impulse guaranteeing its penetration and partial hardening.

The bottom intensity *(Control Ib on cycle parameters)* is used to preheat and prepare the melting pool, whilst the peak intensity *(Control I2)* will cause the material to melt. The application of the pulsed current permits adapting the heat input to the welding demands, which are determined by the position, type of joint and thickness.

The pulsed frequency regulation (Control Fpulse) adjusts the number of times the intensity is changed per second.

Low frequency will provide us with more heat penetration, marking the bead surface more.
On the contrary, a high-frequency will provide less heat and deformation to the joint, marking the surface less.

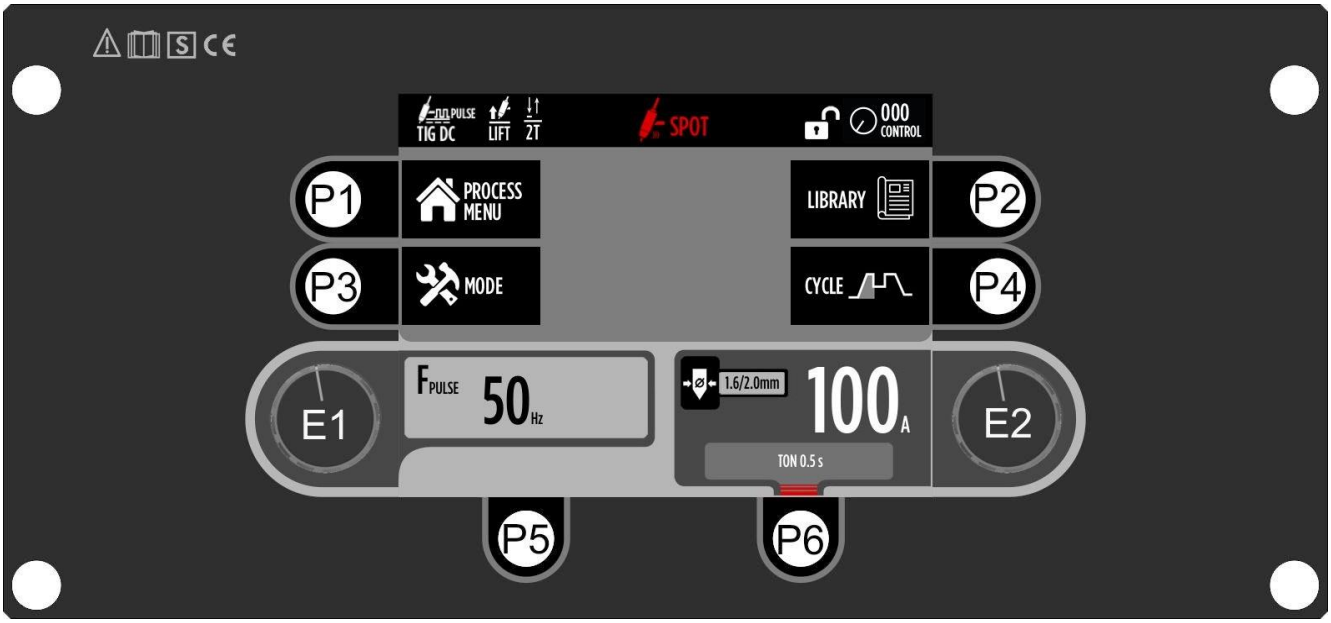


KEY	ACTION		DESCRIPTION
P1		Return to Main Menu	
P2		Access to Program File	
P3		Access to Operation Mode	
P4		Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
E1		Modify Main Correction	It adjusts the pulse frequency.
E2		Modify Main Value	It adjusts the Welding Intensity.

5.2.5. DC TIG PROCESS - STD ARC - SPOR MODE.

This operation mode permits carrying out welding beads, with a pulsed arc, of a given time (TON control).

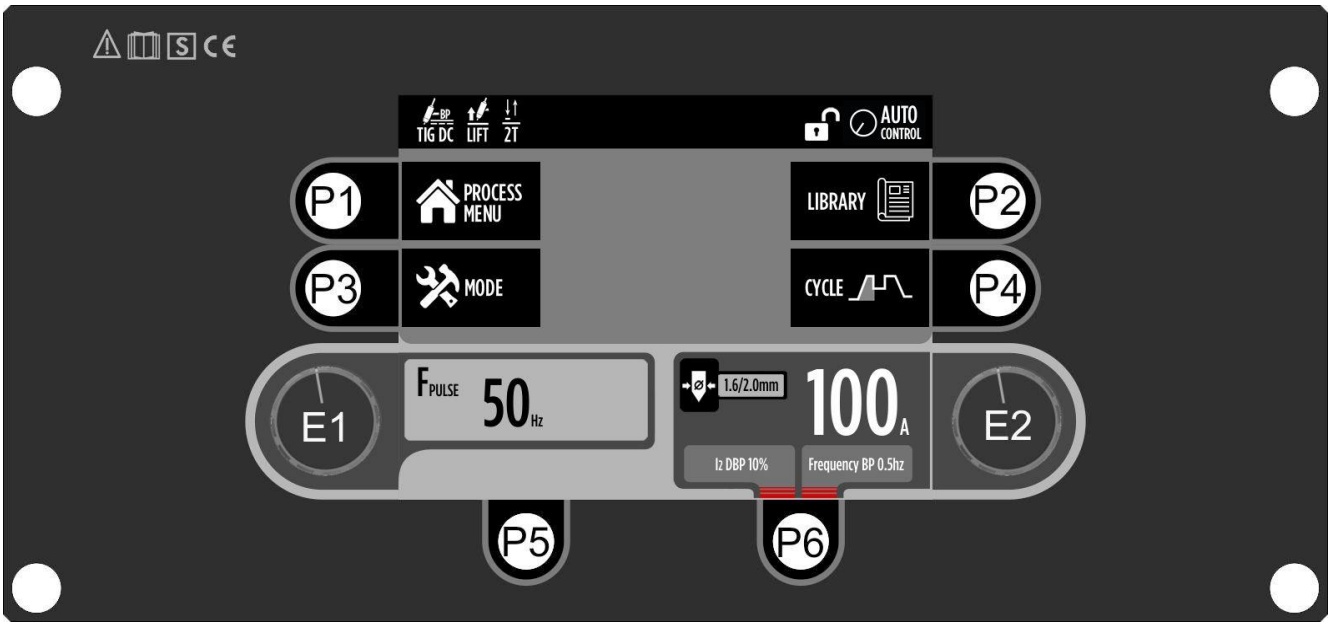
The pulsed frequency regulation (Control Fpulse) adjusts the number of times the intensity is changed per second.



KEY	ACTION	DESCRIPTION
P1	Return to Main Menu	
P2	Access to Programme File	
P3	Access to Operation Mode	
P4	Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
P6	Select Secondary Value	The secondary value is temporarily placed in leading position.
E1	Modify Main Correction	It adjusts the pulse frequency.
E2	Modify Main Value	It adjusts the Welding Intensity.
		It adjusts the Welding Time.

5.2.6. DC TIG PROCESS - DOUBLE PULSED ARC.

This arc combines two welding currents (Control I2 DBP), both pulsed arc (Control F press), alternated in a defined time (Control frequency BP). In this manner we can obtain two beads with superficial finishes to suit our needs.

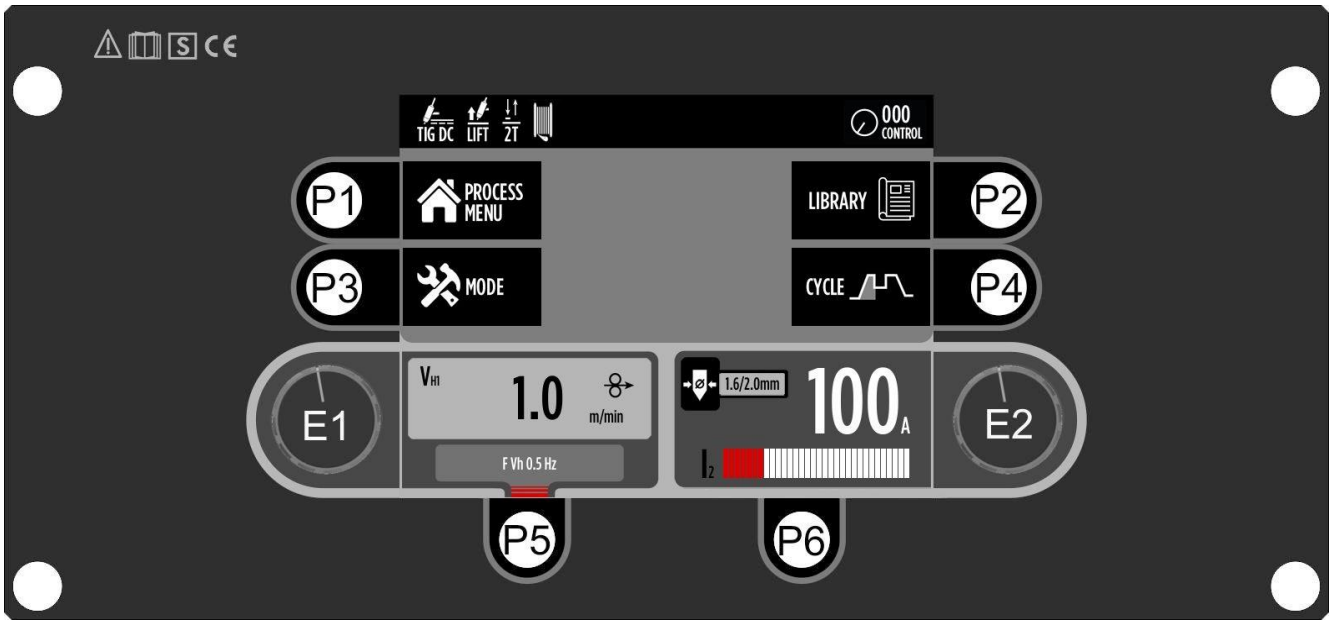


KEY	ACTION	DESCRIPTION
P1	Return to Main Menu	
P2	Access to Programme File	
P3	Access to Operation Mode	
P4	Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
P6	Select Secondary Value	The secondary value is temporarily placed in leading position.
E1	Modify Main Correction	It adjusts the pulse frequency.
E2	Modify Main Value	It adjusts the Welding Intensity.
		It adjusts the 2nd intensity %
		It adjusts double arc frequency.

5.2.7. DC TIG PROCESS - WIRE INPUT MODE = ON.

This mode of operation allows the use of the equipment wire feeder as an automatic wire input system to the TIG process. The wire input speed (VH1) and its frequency (FVH) will be adjusted.

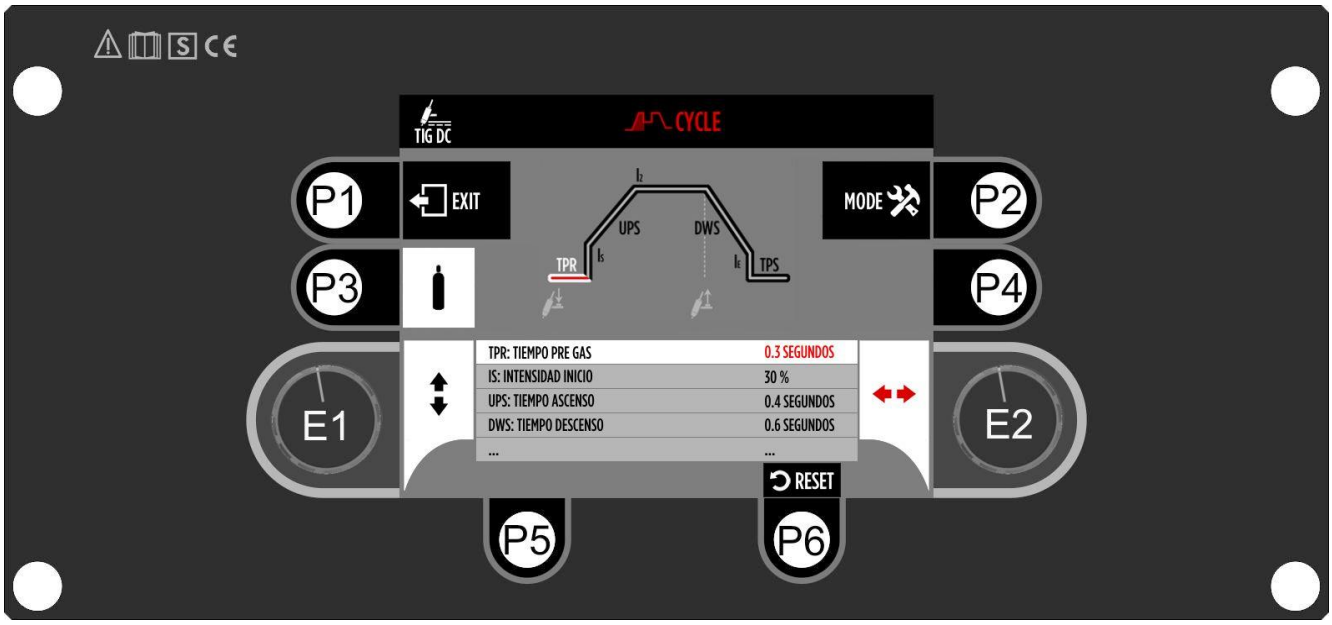
THIS REQUIRE THE ENABLING OF A SPECIFIC PROCESS MODULE.



KEY	ACTION		DESCRIPTION
P1		Return to Main Menu	
P2		Access to Programme File	
P3		Access to Operation Mode	
P4		Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
E1		Modify Main Correction	It adjusts the wire input speed.
			It adjusts the wire input frequency.
E2		Modify Main Value	It adjusts the welding Intensity.

5.3. CYCLE PARAMETERS – DC TIG PROCESS.

From this screen we will adjust the values that define the welding cycle. The cycle graph and parameter selection table will change based on the welding mode selection.



KEY	ACTION		DESCRIPTION
P1		Return to Source Process	Requests to confirm changes in case of modification.
P2		Access to Operation Mode	It accesses to Selected Process Mode
P6		Restore factory settings	Restores original factory settings.
E1		Select parameter	Selected parameter with blank bar. When browsing the parameter selection table, the corresponding segment of the upper cycle graph will illuminate simultaneously.
E2		Modify parameter	

Each of the different cycles will be composed of different regulation parameters that will vary depending on the selected operating mode:

PARAMETER	DESCRIPTION	FUNCTION	REMARKS	UNIT	RESOLUTION
VH2	Secondary Wire Speed	It permits the use of a 2nd wire speed.	If WIRE = ON only	%	1
BBH	Time ON wire 1	Brake the wire before switching to I_2 .		%	1
TPR	Pre-gas time	It facilitates the arc ignition.		Seconds	0.1
IS	Start current	It reduces the striking cracks.		%	1
TIS	Start current time	Carry -out preheating of material.	2SS Mode only	Seconds	0.1
UPS	Ascent ramp time	It reduces the initial stress.		Seconds	0.1
IB	Base current	Heat reduction.	PULSE - BIPULSE only	%	1
Dcl	Duty cycle	It balances the pulse for heat control.		%	1
TCP	Pulse fall time	Softens the I_2 -IB transition.		Milliseconds	10
DWS	Descent ramp time	It reduces the end stress.		Seconds	0.1
IE	Final current	It reduces the crater cracks.		%	1
TIE	Final intensity time	It reduces the crater size.	2SS Mode only	Seconds	0.1
TPS	Post-gas time	Prevents bead rust.		Seconds	0.1
CCT	Current Change Time	Transition time between active arc memories.		Milliseconds	10

5.3.1. CYCLE GRAPHICS – DC TIG PROCESS.

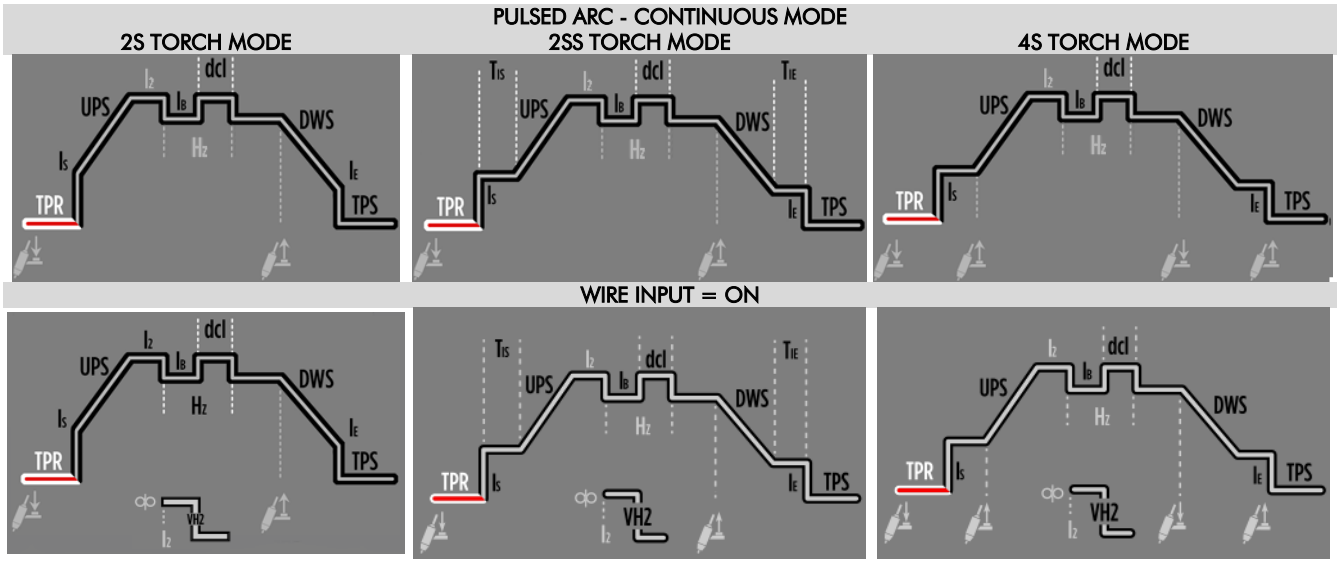
Selected parameter

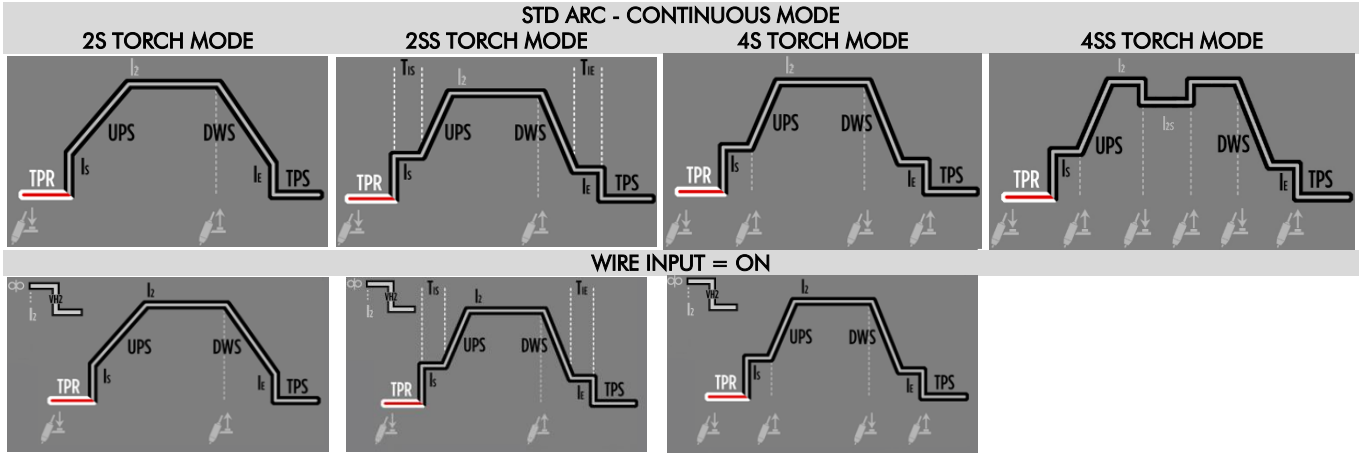

Selected segment

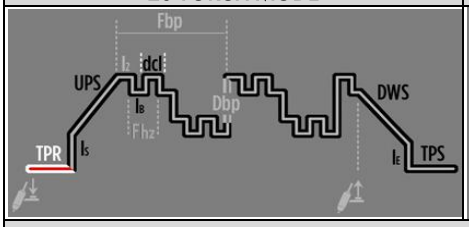
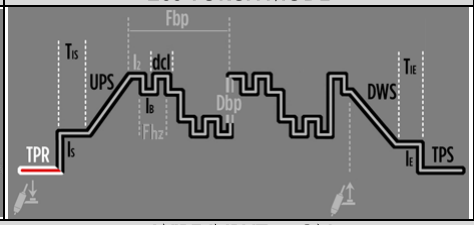
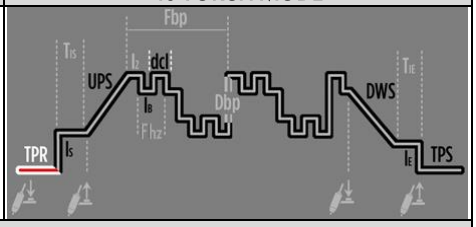
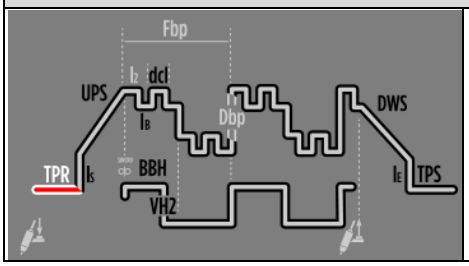
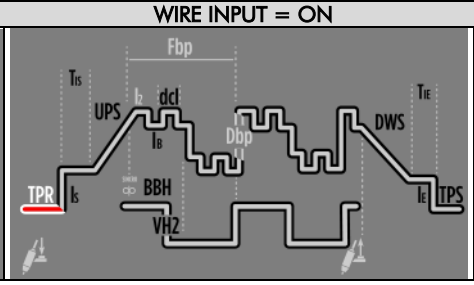
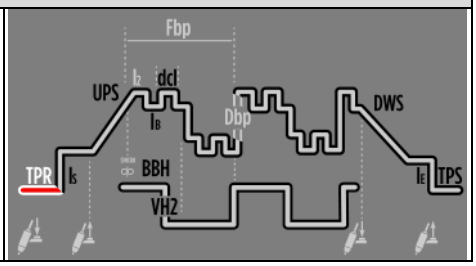
Unselected parameter

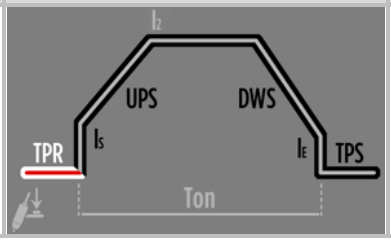
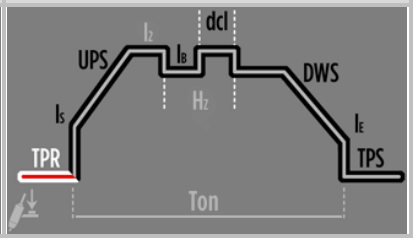

Unselected segment


Identity Parameter





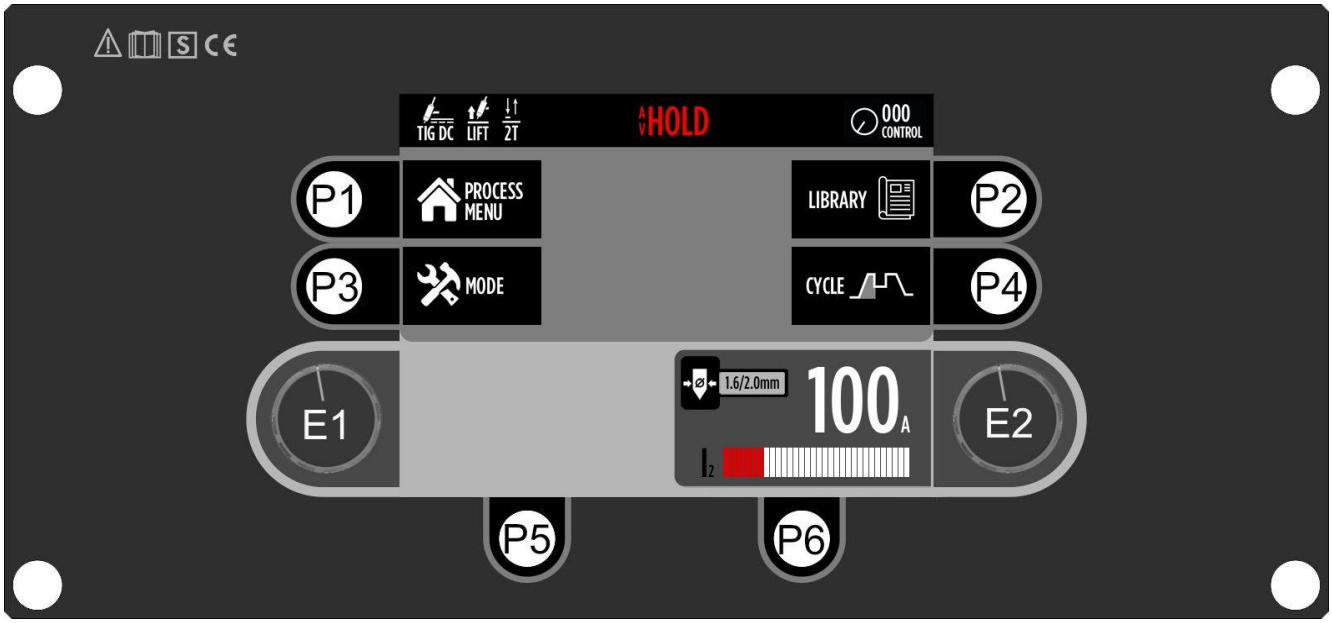
<table>
<tr><th colspan="3">BIPULSED ARC - CONTINUOUS MODE</th></tr>
<tr><th>2S TORCH MODE</th><th>2SS TORCH MODE</th><th>4S TORCH MODE</th></tr>
<tr><td> 
</td><td> 
</td><td> 
</td></tr>
<tr><th colspan="3">WIRE INPUT = ON</th></tr>
<tr><td> 
</td><td> 
</td><td> 
</td></tr>
</table>

<table>
<tr><th colspan="3">SPOT MODE</th></tr>
<tr><th>ARC</th><th>STD</th><th>PULSE</th></tr>
<tr><td>2S TORCH MODE</td><td> 
</td><td> 
</td></tr>
</table>

PARAMETER	DESCRIPTION	FUNCTION	REMARKS	UNIT	RESOLUTION
VH2	Secondary Wire Speed	It permits the use of a 2nd wire speed	If WIRE = ON only	%	1
BBH	Time ON wire 1	Brake the wire before switching to I_2 .		%	1
TPR	Pre-gas time	It facilitates the arc ignition		Seconds	0.1
IS	Start current	It reduces the striking cracks.		%	1
TIS	Start current time	Carry -out preheating of material	2SS Mode only	Seconds	0.1
UPS	Ascent ramp time	It reduces the initial stress		Seconds	0.1
IB	Base current	Heat reduction.	PULSE - BIPULSE only	%	1
Dcl	Duty cycle	It balances the pulse for heat control.		%	1
TCP	Pulse fall time	Softens the I_2-IB transition		Milliseconds	10
DWS	Descent ramp time	It reduces the end stress.		Seconds	0.1
IE	Final current	It reduces the crater cracks.		%	1
TIE	Final intensity time	It reduces the crater size	2SS Mode only	Seconds	0.1
TPS	Post-gas time	Prevents bead rust.		Seconds	0.1
CCT	Current Change Time	Transition time between active arc memories		Milliseconds	10

5.4. HOLD MODE.

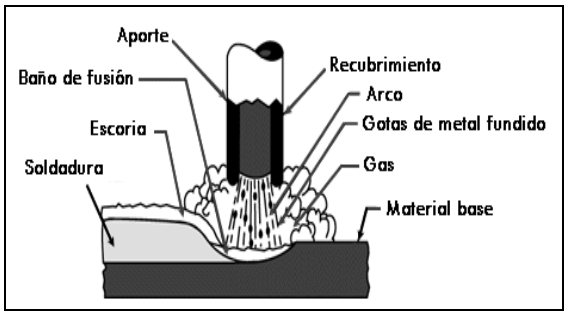
At the end of the welding process, the HOLD icon will appear automatically on the regulation display.



KEY	ACTION	
P1-P2-P3-P4-P5-P6		Return to no-load regulation screen.
E1-E2		

6. MMA PROCESS.

Welding with coated electrode, also known as MMA (Manual Metal Arc), SMAW or 111 process, forms part of the welding processes by electric arc. Therefore, before starting the requested welding jobs, we must bear in mind the basic principles of the process.



Electric arc welding with coated electrode is a process whereby the metal between the part and a coated metal electrode is melted.

As the electrical current circulates through the electrode, heat increases at the end of the electrode that produces an arc that melts the core or rod of the electrode, burning its coating. Thus obtaining the appropriate atmosphere to transfer the molten metal from the core of the electrode to the melt bath in the base material.

These drops of molten metal fall coated with molten slag from the melting of the arc coating. The slag floats on the surface and forms, above the welding bead, a protective layer of cast metal, controlling the bead cooling speed and avoiding the oxidation of the filler metal.

APPLICATIONS

This welding process is especially recommended for repair and maintenance welding, manufacture and installation of pipes, as well as outdoor assembly work. Production and repair welding in naval construction, storage tanks, structures, pressure containers, oil refineries, boilers and any type of piping, are some of its application sectors.

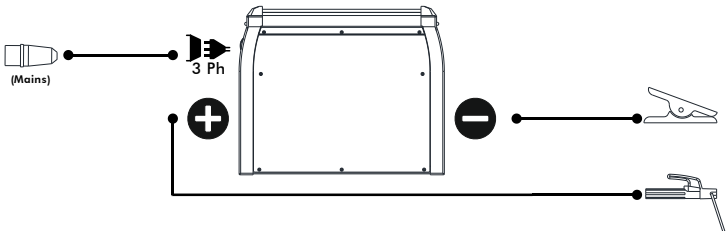
The main characteristics of the process are its simplicity and its low price, making it a practical and excellent procedure for offshore use or outdoor work.

However, the welding procedure with coated electrode is not suitable for its automation or semi-automation; its application is essentially manual.

If electrodes are used in less favourable conditions (with humidity, with no preheating, etc.) we can improve the welding features by adjusting the control parameters in manual process.

6.1. MMA SYSTEM INSTALLATION.

Disconnect the communication and wire feeder cables. Connect the terminals depending on the type of electrode to be used and install the remote control, if needed, in the **TELENET** connector.



MMA installation graphic.

INFO **Electrode-holder clamp polarity depend on the electrode (consult the characteristics provided by the manufacturer)**

6.2. MMA SYSTEM START-UP.

1st) Make sure the mains voltage is 400V/ 440V.

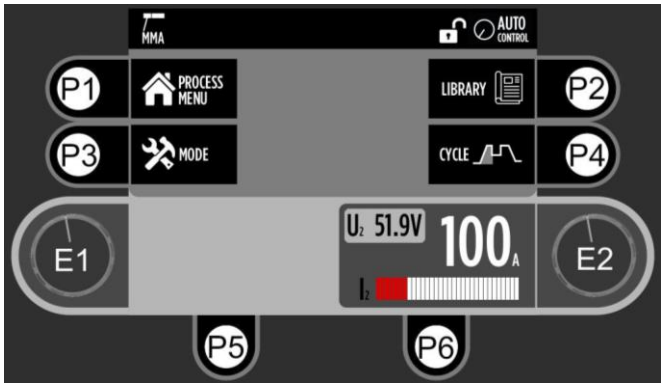
2nd) Connect electrode-holder clamp to polarity recommended by the electrode manufacturer. Normally to positive pole.

3rd) Connect earth clamp to welding table or piece to be welded. Check the correct connection of welding masses.

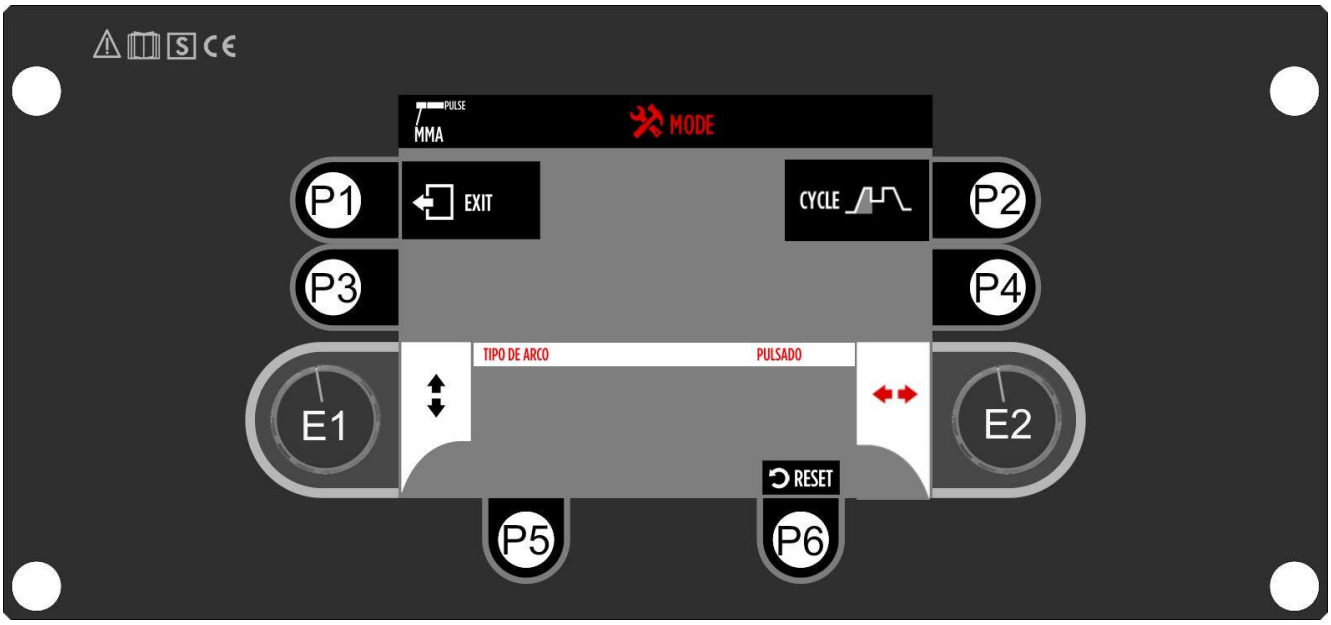
4th) Verify that electrodes are dry. If necessary, preheat electrodes for at least one hour with a heater.

5th) Connect the supply cable with the suitable plug to the relevant tap.

6.3. MMA PROCESS – OPERATION MODE SELECTION.

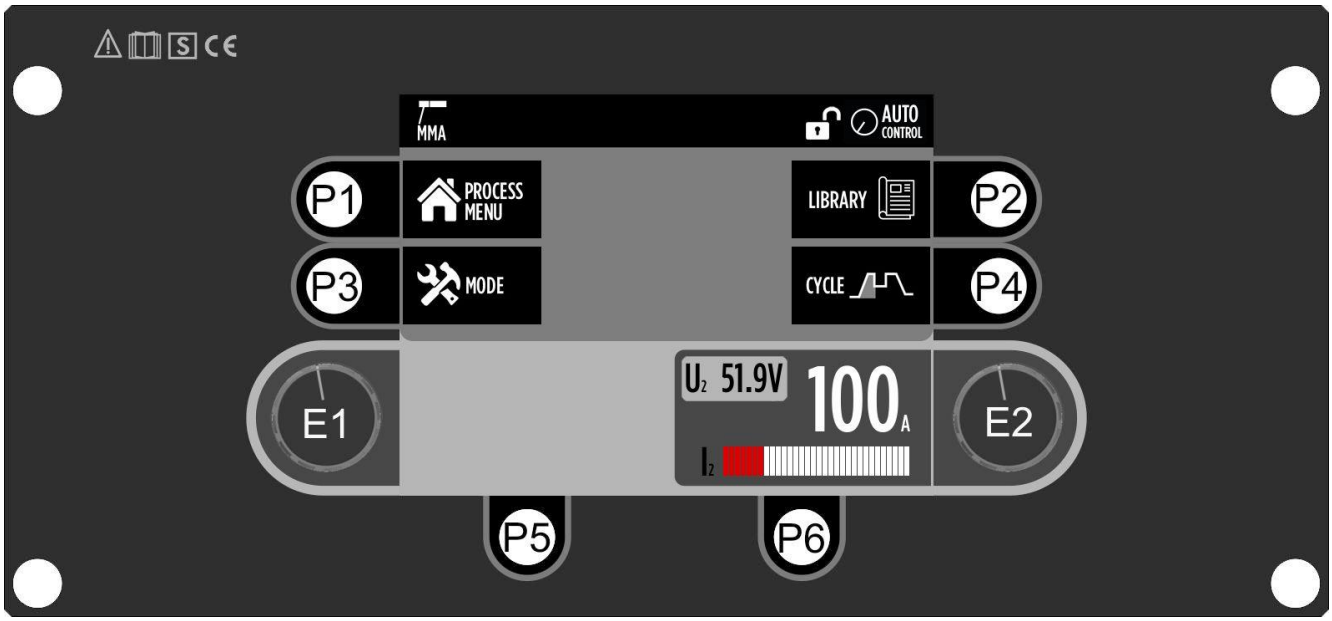


Starting from the standard configuration, we will access the OPERATION MODE Menu, where we can select different welding modes and arc types.



KEY	ACTION		DESCRIPTION
P1		Return to Main Menu	
P2		Access to Programme File	
P6		Parameter RESET.	It adjusts to factory parameters.
E1		Modify Main Correction	It adjusts the arc reinforcement % during welding.
E2		Modify Main Value	It adjusts the welding Intensity.

6.3.1. STANDARD MMA PROCESS.



KEY	ACTION	DESCRIPTION	
P1		Return to Main Menu	
P2		Access to Programme Library	
P3		Access to Operation Mode	
P4		Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
E2		Modify Main Value	It adjusts the welding Intensity.

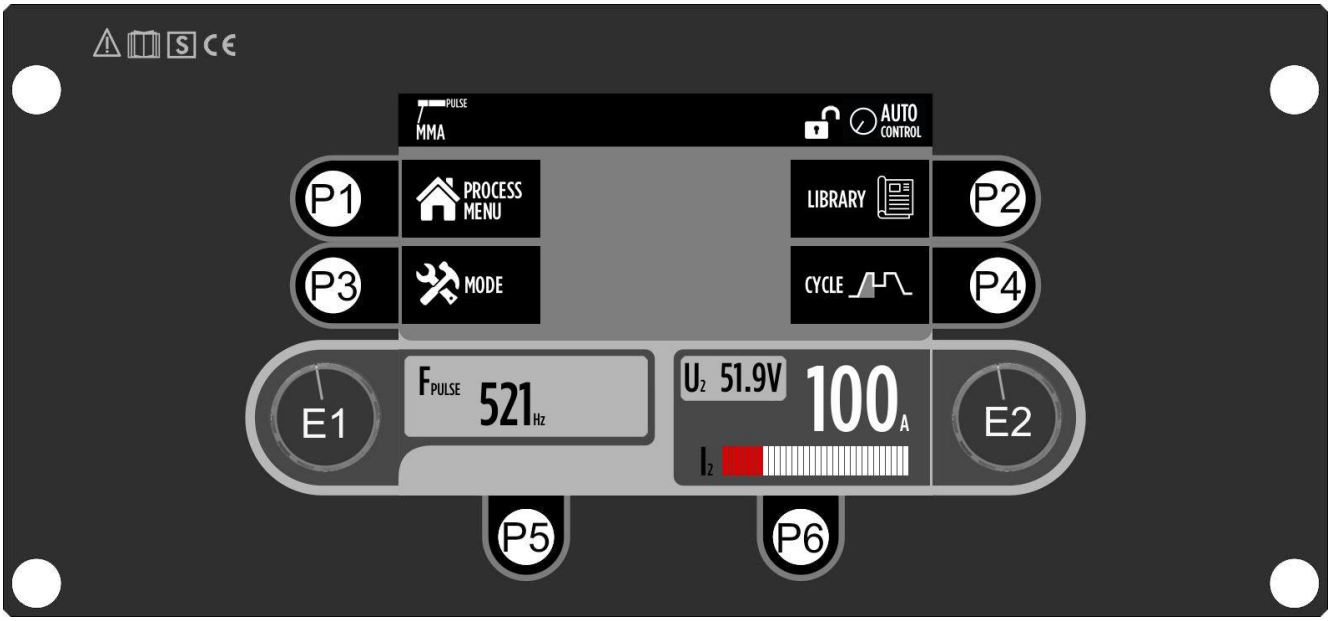
6.3.2. PULSED MMA PROCESS.

The purpose of this type of arc is to obtain greater control over the filler metal. The result is a succession of 2 intensities that overlap like a bead, each impulse guaranteeing its penetration and partial hardening.

The bottom intensity *(Control Ib on cycle parameters)* is used to preheat and prepare the melting pool, whilst the peak intensity *(Control I2)* will cause the material to melt. The application of the pulsed current permits adapting the heat input to the welding demands, which are determined by the position, type of joint and thickness.

The pulsed frequency regulation (Fpulse) adjusts the number of times the intensity is changed per second.

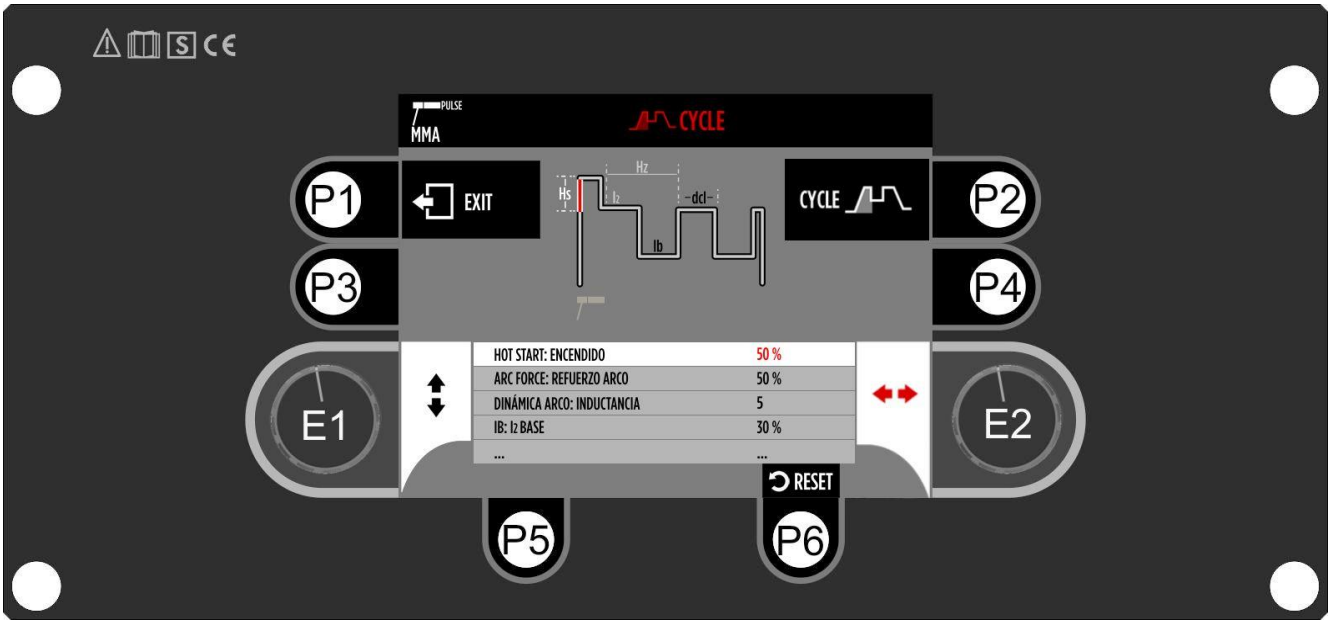
Low frequency will provide us with more heat penetration, marking the bead surface more. On the contrary, a high-frequency will provide less heat and deformation to the joint, marking the surface less.



KEY	ACTION		DESCRIPTION
P1		Return to Main Menu	
P2		Access to Programme File	
P3		Access to Operation Mode	
P4		Access to Cycle Parameters	It accesses to the specific cycle of selected mode.
E1		Modify Main Correction	It adjusts the pulse frequency.
E2		Modify Main Value	It adjusts the welding Intensity.

6.4. CYCLE PARAMETERS – MMA PROCESS.

From this screen we will adjust the values that define the welding cycle. The cycle graph and parameter selection table will change based on the welding mode selection.



KEY	ACTION		DESCRIPTION
P1		Return to Source Process	Requests to confirm changes in case of modification.
P2		Access to Operation Mode	It accesses to Selected Process Mode
P6		Restore factory settings	Restores original factory settings.
E1		Select parameter	Selected parameter with blank bar. When browsing the parameter selection table, the corresponding segment of the upper cycle graph will illuminate simultaneously.
E2		Modify parameter	

Each of the different cycles will be composed of different regulation parameters that will vary depending on the selected operating mode:

PARAMETER	DESCRIPTION	FUNCTION	REMARKS	UNIT	RESOLUTION
HS	Hot Start	It facilitates the arc ignition		%	1
	Arc force	It reduces the arc decompensations.		%	1
	Inductance	It adjusts the Arc Dynamic		--	--
IB	Base current	Heat reduction.	PULSE only	%	1
DCL	Duty cycle	It balances the pulse for heat control.		%	1
TCP	Pulse fall time	Softens the I_2-IB transition		Milliseconds	10

6.4.1. CYCLE GRAPHICS – MMA PROCESS.

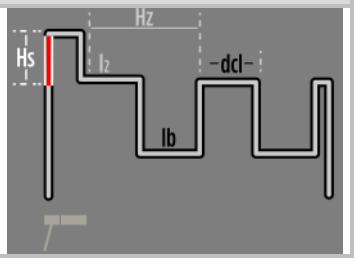
Selected parameter


Selected segment

Unselected parameter

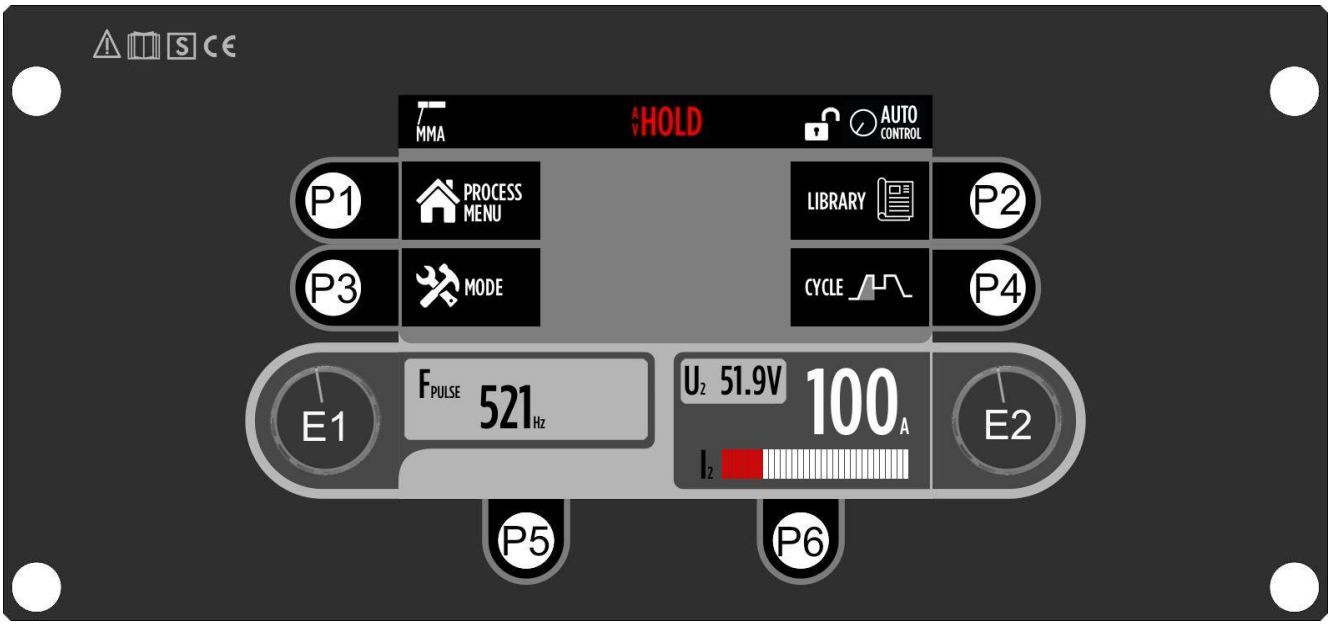

Unselected segment


Identity Parameter

STD	PULSE
	

6.5. HOLD MODE.

At the end of the welding process, the HOLD icon will appear automatically on the regulation display.

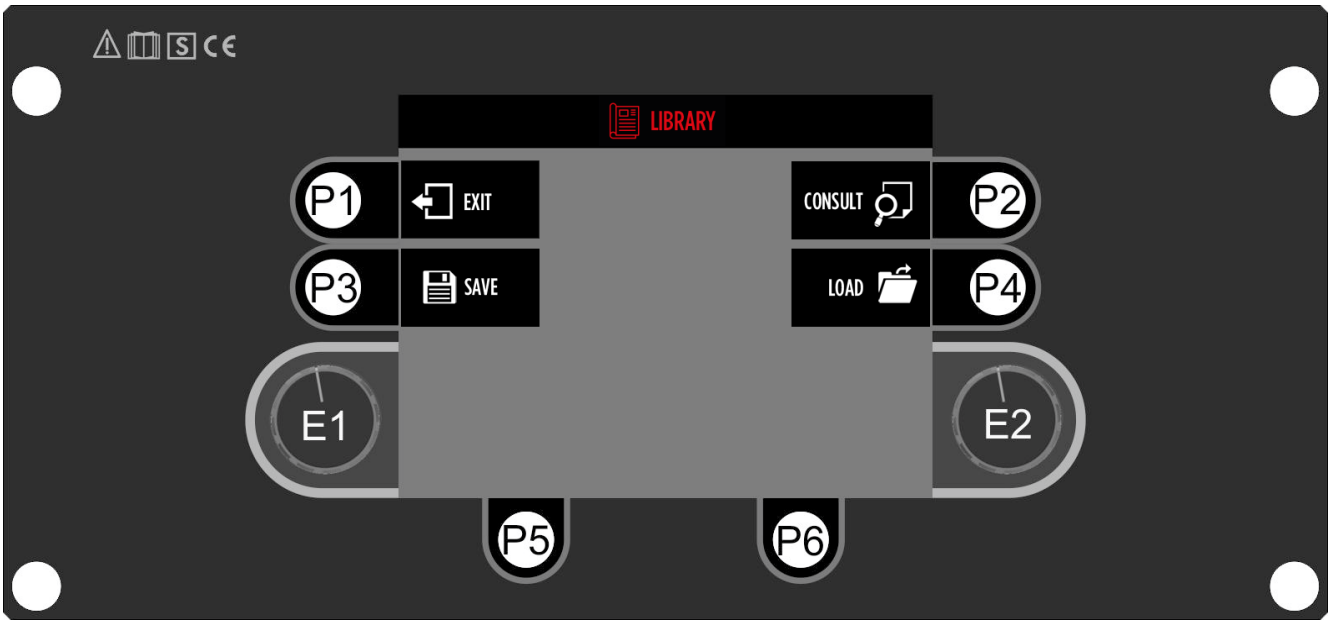


KEY	ACTION	
P1-P2-P3-P4-P5-P6		Return to no-load regulation screen.
E1-E2		

7. PROGRAMME FILE

LIBRARY

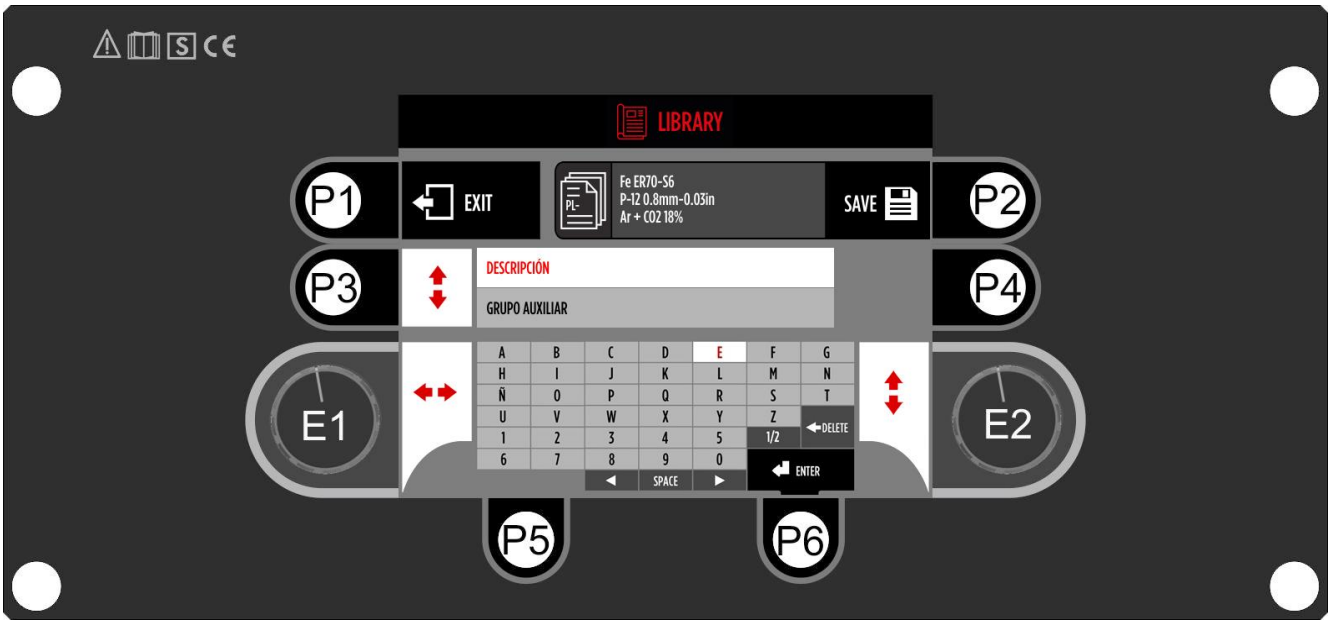
From this screen we can manage the file of welding programmes by process which is available on the equipment.



KEY	ACTION		DESCRIPTION
P1		Return to Source Process	Return to no-load regulation screen.
P2		Consult file	It accesses the Programme Consult List
P3		Save file	A new memory programme is generated.
P4		Upload file	Uploads the programme for its further utilisation.

7.1. SAVE FILE.

Once the welding modes and parameters have been adjusted, if we wish, we can generate programme files so that this regulation is available in future applications.

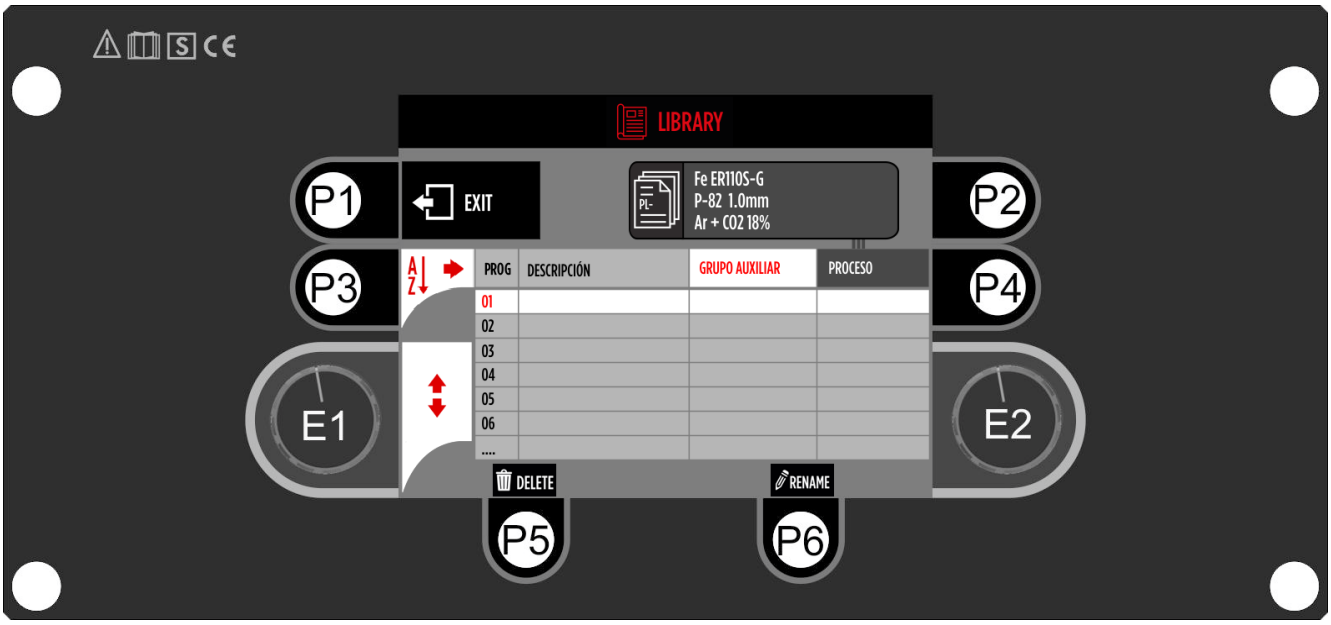


KEY	ACTION		DESCRIPTION
P1		Return to Source Process.	No changes will be saved.
P2		Save programme.	It save the introduced description and group.
P3		Select field to be entered.	Selected field with blank bar.
E1		Navigate horizontally by keyboard.	Selected parameter with blank cell.
E2		Navigate vertically by keyboard.	
P6		Enter value	Insert selected data.

THE SAVING PROCESS WILL BE COMPLETED BY INCLUDING THE FILE IN THE PROGRAMME TABLE, REMAINING LIT UP FOR SELECTION (SEE LOADING THE FILE).

7.2. CONSULT FILE.

The file management will be carried out by means of a selection table which allows the global viewing of all the available files.



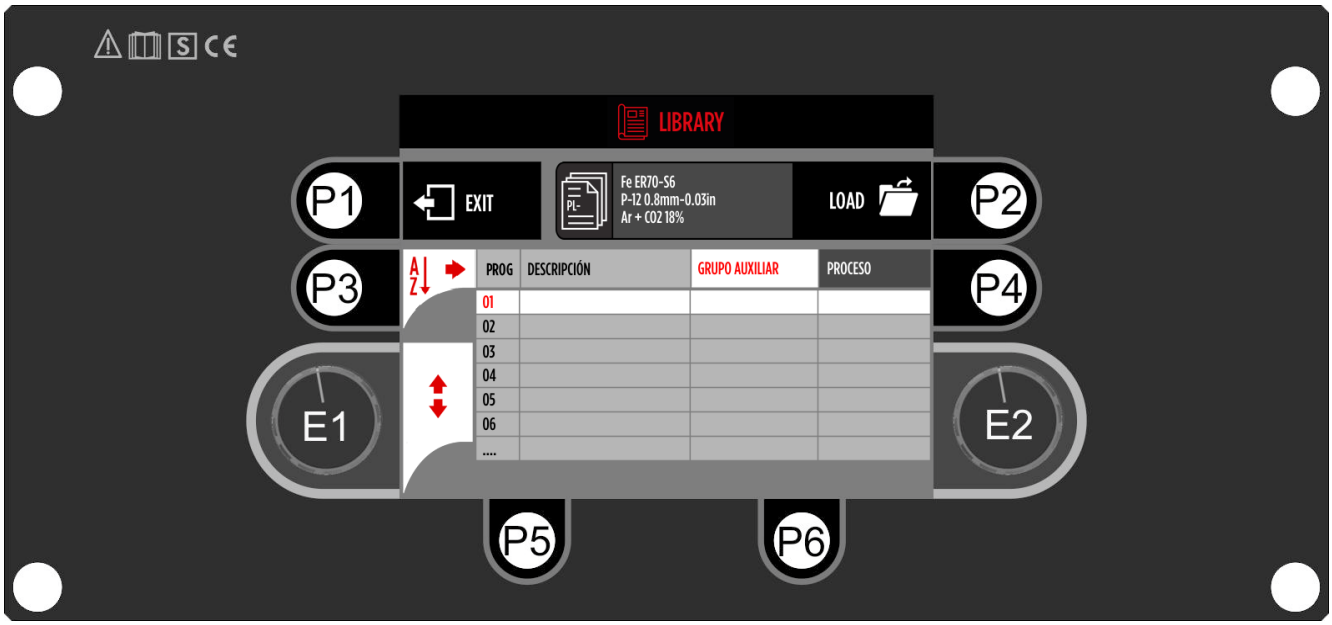
KEY	ACTION		DESCRIPTION
P1		Exit.	Return to File Menu.
P3		Sort.	It sorts alphabetically by Programme No., description or group.
E1 E2		Select programme.	Selected programme with blank line.
P5		Delete.	Delete selected programme.
P6		Rename.	Opens the selected programme with backup routine.

The deletion or renaming of programs will request confirmation of action:

KEY	ACTION	
P5		Cancel
P6		Confirm

7.3. UPLOAD FILE.

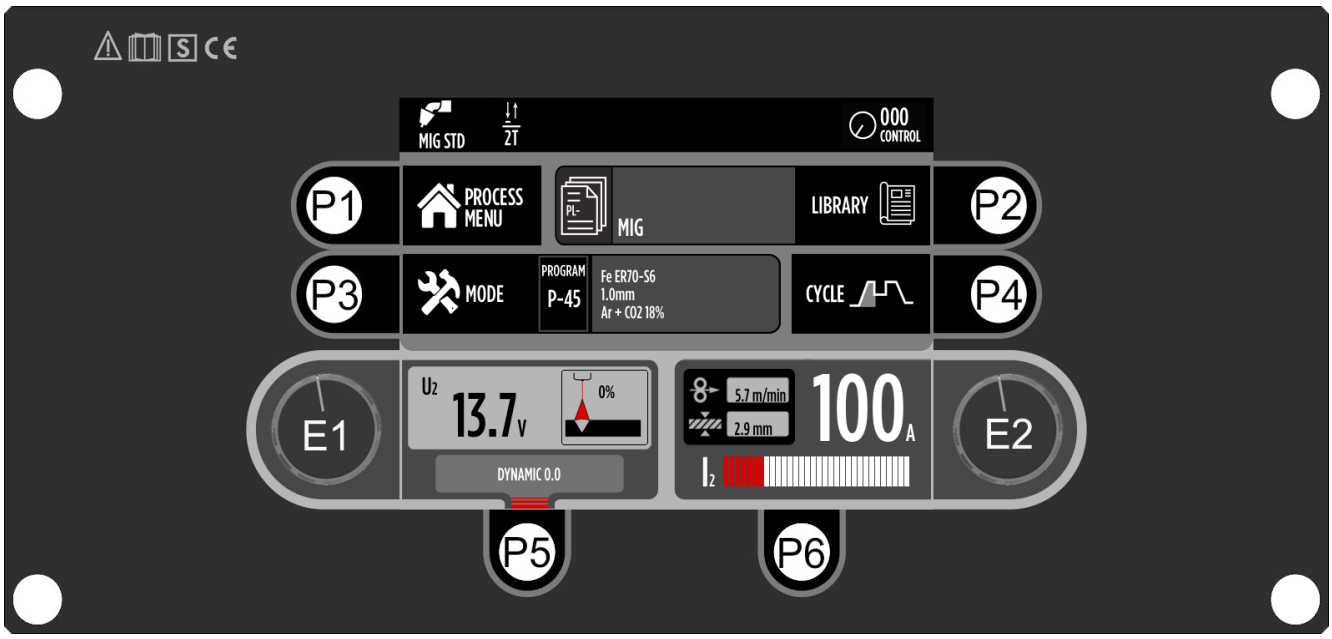
Programme loading will be carried out by means of a selection table which allows the global visualization of all the available files.



KEY	ACTION		DESCRIPTION
P1		Exit.	No changes will be saved.
P2		Upload programme.	It uploads de selected programme.
P3		Sort.	It sorts alphabetically by Programme No., description or group.
E1		Select programme.	Selected programme with blank line.

7.3.1. FILE PLAYBACK MODE.

The file playback mode will display the programme data and allows full viewing and regulation of programme parameters.

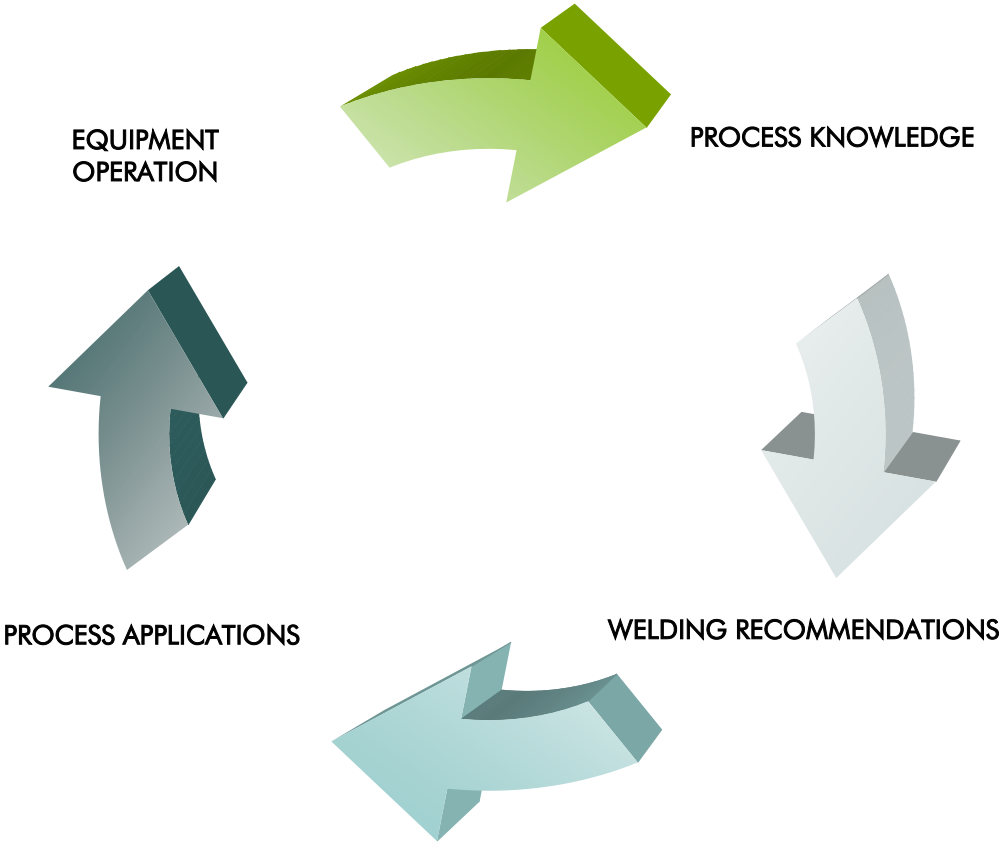


KEY	ACTION		DESCRIPTION
P1		Exit the programme	It will ask if the changes are saved in the programme.
P2		Access to Programme File.	We perform a backup routine to generate a programme from one that has already been created.
P3		Access to Operation Mode.	Mode Modification in Memory.
P3		Access to Cycle.	Modification of Cycle Parameters in Memory.
E1		Main Correction Regulation	Modification of Correction in Memory.
E2		Main Value Regulation	Modification of Intensity in Memory.
P5		Secondary Correction Selection	Modification of Correction in Memory.

8. WELDING RECOMMENDATIONS.

In the next chapter of this manual we will develop in depth the actual welding process aspects associated with the equipment, as well as the recommendations for use and most commonly used applications.

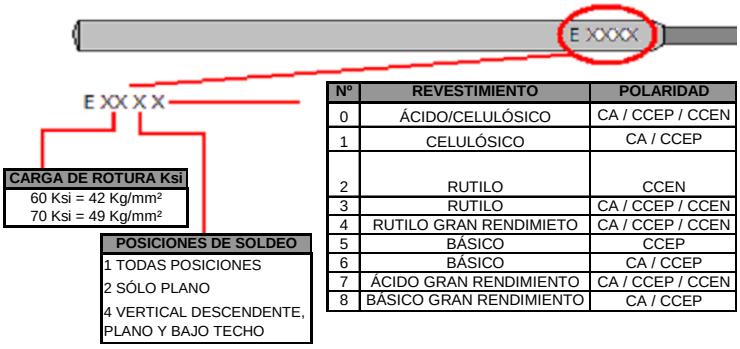
We must remember that to achieve more efficient results with GPS, it is essential to know the basic regulation concepts explained in this manual, general knowledge of the process to be used, the practical welding recommendations and the general applications of each one of the programmes available in the equipment.



Greater knowledge of each one of the points mentioned will increase the welding efficiency of the equipment, improving production times and the quality of the joint welded.

8.1. MMA PROCESS. RECOMMENDATIONS.

1. Depending on the type of electrode to be used, we will adapt their welding intensity, always respecting the manufacturer's recommendations indicated on the electrode box.
2. We will select type of current and polarity as indicated by the electrode designations (printed on each unit).



Nº	REVESTIMIENTO	POLARIDAD
0	ÁCIDO/CELULÓSICO	CA / CCEP / CCEN
1	CELULÓSICO	CA / CCEP
2	RUTILO	CCEN
3	RUTILO	CA / CCEP / CCEN
4	RUTILO GRAN RENDIMIETO	CA / CCEP / CCEN
5	BÁSICO	CCEP
6	BÁSICO	CA / CCEP
7	ÁCIDO GRAN RENDIMIENTO	CA / CCEP / CCEN
8	BÁSICO GRAN RENDIMIENTO	CA / CCEP

Electrode identification graphic.

3. The coating of the electrodes used must not have any defects and due to their high hygroscopic power (they absorb and retain humidity) they must be submitted to a drying process, respecting the manufacturer's recommendations. The use of electrodes in unfavourable humidity conditions, will cause faulty striking, increase of porosity, arc interruptions and the appearance of cracks in the cooling phase.
4. If electrodes are used in less favourable conditions (with humidity, with no preheating, etc.) we can improve the welding features by adjusting the control parameters in manual process.

- HOT START: This will increase the start intensity, in percentage terms, to facilitate arc striking.
- ARC FORCE: It will reduce possible arc decompensations caused by height variations, adjusting the tension.

5. We will respect the appropriate cable sections for each welding intensity.

   The movement of electrical charges during the welding phase is restricted by the limits of the conductor cable, which will offer resistance to their movement.

   This resistance is greater when:

   1. Greater is its length
   2. Smaller is its diameter
   3. Smaller conductive nature has the cable.

   If we consider: **Voltage = Resistance x Intensity**, we will observe that with fixed resistance values, the intensity and voltage are directly proportional and therefore the increase or decrease of one of the values affects the other in the same direction.

Intensidad	Sección mímima necesaria mm²									
	Distancia entre máquina y lugar de trabajo (metros)									
Amperios	15	25	30	40	50	60	70	80	90	100
100	25	25	35	35	35	35	50	50	50	50
150	35	35	50	50	50	50	70	70		
200	35	50	50	70	70	70				
250	35	50	70	70	70					
300	50	70	95	95						
350	50	70	95							
400	50	70	95							

GOMA	
130034	1 x 25 mm² (hasta 230 A)/(up to 230 A)
130035	1 x 35 mm² (hasta 300 A)/(up to 300 A)
130037	1 x 50 mm² (hasta 350 A)/(up to 350 A)
130038	1 x 70 mm² (hasta 400 A)/(up to 400 A)
130040	1 x 95 mm² (hasta 500 A)/(up to 500 A)
ACRÍLICO	
130044	1 x 25 mm² (hasta 230 A)/(up to 230 A)
130045	1 x 35 mm² (hasta 300 A)/(up to 300 A)
130047	1 x 50 mm² (hasta 350 A)/(up to 350 A)
130048	1 x 70 mm² (hasta 400 A)/(up to 400 A)
130095	1 x 95 mm² (hasta 500 A)/(up to 500 A)

Voltage drops in the welding circuit will cause reductions of the effective intensity in the welding arc and will force us to increase the output intensity in the machine, reducing the duty factor of the equipment.

6. We must assure a good heart connection, because a bad contact of the mass will cause this to heat up, the current passage will be interrupted and the arc will disappear.

   It is advisable for this cable to be as short as possible. We will thus reduce the electromagnetic disturbances.

   Whenever electric current circulates, a circular magnetic field is generated around the conductor. This magnetic field is generated from the connection of the negative pole to the positive pole. This phenomenon produces deviation of the electric arc that is called magnetic blow out.

   This phenomenon occurs at the ends of the parts and will appear in applications with direct currents. In welding with alternating current, this is overridden in each cycle as there is a change in direction of the current.

To minimise the effect of the magnetic blow-out:

- Welding must be carried out as far away as possible from the mass.
- Place tabs at the ends of pieces.
- Reduce arc length.
- Incline the torch in the opposite direction to the field.
- Reduce the current intensity to a minimum, as the magnetic field intensity is directly proportional to the circulating current.

7. Finally, we will take into consideration the influence of the arc length.

- NORMAL ARC (4 mm): Used with any kind of electrodes.
- LONG ARC (7mm): If it is too long, it loses force and protection capacity that may generate porosity.
- SHORT ARC (2mm): Used with basic electrodes. Too short an arc may be erratic and produce short circuits during the welding phase.

8.2. TIG PROCESS. RECOMMENDATIONS.

This process is used to weld materials with high thermal conductivity, such as copper, but also to weld steel where the use of tungsten electrodes alloyed with thorium or lanthanum cerium, etc. is advised, with different percentages depending on their application, which are given a touch colour based on the alloying percentage and characteristic, such as for instance 2% red or grey: the electrode diameter changes depending on the welding current chosen.

Tipo de electrodo		Estabilidad de arco	Cebado de arco	Duración del electrodo	Resistencia a la temperatura
Torio 0,5%	AZUL	**	*	*	**
Torio 1%	AMARILLO	*	**	**	**
Torio 2%	ROJO	*	***	**	**
Cerio 2%	GRIS	**	*	**	**
Lantano 1%	NEGRO	**	***	***	***
Lantano 1,5%	ORO	**	***	***	***

Ø	AMARILLO	ROJO	GRIS	NEGRO	AZUL	ORO
1,6	750161C	750162C	750163C	750164C	750165C	750166C
2,4	750241C	750242C	750243C	750244C	750245C	750246C
3,2	750321C	750322C	750323C	750324C	750325C	750326C

TIG electrode selection comparative graphic

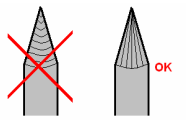
MATERIAL	INTENSIDAD EN AMPERIOS X MM DE ESPESOR
ACEROS AL CARBONO	30
ACEROS INOXIDABLE	30-33
COBRE	70

Toberas cerámica / Ceramic nozzles — 3 unidades/ 3 units

6298B5	6444B5	6445B5	6446B5	6447B5
GR.4	GR.5	GR.6	GR.7	GR.8

Material	Espesor	Ø Tungsteno	Amperios	Nº Tobera
Acero carbono y acero inoxidable	1,0	1,0	20 -50	4
	1,5	1,0 / 1,6	40 - 80	5
	2,0	1,6	50 - 90	5
	3,0	1,6 / 2,4	70 - 120	6
	4,0	2,4	100 - 160	7
	6,0	3,2	120 - 200	7
Cobre y aleaciones de cobre	1,0	1,0	60 - 80	4
	1,5	1,6	100 - 150	5
	3,0	2,4	160 - 240	6

TIG welding intensities recommendation tables

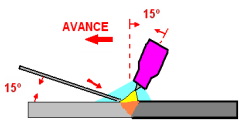


The shape of the electrode tip will directly affect the stability of the electric arc.

It is preferable to select as fine an electrode as possible, concentrating the electric arc and reducing the melting pool.

The sharpening, in case of direct current, must be between 1.5 and 2 times the electrode diameter. With a length of twice its diameter and being sharpened lengthwise to facilitate the current transmission.

WELDING EXECUTION



The **filler material** must have the same nature as the weld metal, verifying that it is humidity-free and selecting the appropriate diameter in agreement with the thickness to be welded.

During the welding, we must maintain the end of the rod within the action field of the protection gas, to prevent its contamination.

In thicknesses of less than 3 mm and with the right edge preparation, the filler metal is not always necessary.

8.3. MIG-MAG PROCESS. RECOMMENDATIONS.

Before analysing in depth the different welding options that GPS develops, we must contemplate a series of data that have a general influence on all the work programmes.

The wires must be free from dust, grease, impurities and humidity. The metal dust adheres easily to the wire on the reels, and may even saturate the liner of the torch giving rise to the appearance of problems. To prevent this, the feed system must be cleaned regularly maintaining the wire in the conditions recommended by the manufacturer.

Another recommendation is to use greater diameter fillers, whenever possible, to reduce the wire feeding problems derived.

We must use the wire feeding rollers recommended for each type of wire, verifying the state of the pressure rollers, which with use may suffer wear and generate problems in the wire feeding process (the wire slips).

V: Carbon steel, stainless steel* and CuSi.

U: Aluminium.

Z: Flux-cored.

* If feeding problems are detected with stainless steel, replace the nearest roller to the wire reel with a grooved one (Z).

Excessive pressure of the clamping knob will be harmful for the system as we run the risk of squashing the wire, increasing its diameter in one of these axes and increasing the resistance on the liner and varying the feed continuity.

We must continuously control the arc length (distance from the base metal to the non-melted end of the filler material). Since the greater the electrode extension for a given intensity the greater is the deposition rate and lesser the penetration.

Approximately 90% of the energy is concentrated in the arc and 10% in the wire, therefore, the longer the arc the greater the tension.

The greater the end of the wire, the less the penetration will be, increasing the appearance of spatters.

Depending on the material that we wish to weld (stainless, aluminium, ...) and due to its very nature, the use of start and end currents will be recommended (See cycle parameters).

This method is recommended to minimise the problems caused during arc-striking due to low energy input at that time. The materials mentioned above require an increase in intensity to establish the arc in a more gentle way, thus reducing initial spatters, excess stress and the reduction of the risk of micro cracks-cracks appearing.

PULSED ARC WELDING

Due to the basic principles of the process, the first information that we must take into consideration is the proportion of CO_2 in the gas mix. The greater the percentage of carbon dioxide in the mix, the worse it will be to obtain the pulse arc, and it will be difficult to obtain with percentages over 20% the total gas content.

The nature of the shielding gas itself has a direct influence on the transfer of the metal. On its own, CO_2 generates greater penetration, it improves the physical properties of the joint and increases its resistance to impact and corrosion. However, the active nature of the gas produces more bulky welding beads, with worse aspect and increases the spatters.

The lower the CO2 content in the gas mix, the greater the electric arc height developed by the process. Therefore, to compensate the modification in the arc height (ha) we must correct the arc towards negative.

Due to the increase in temperature absorbed by the torch, as during the pulsed arc welding its heating temperature increases, it is recommended to continuously cool the welding torch, thus reducing the use of consumables, faults and downtimes.

Likewise we must bear in mind the thermal diffusion of the torch consumables, as if the temperatures increases, this will cause an increase in dilation, which will generate greater contraction on cooling. This will slow down the wire feeding when it passes through the contact tip.

Excess pressure on the wire feeding rollers will be harmful for the system as we run the risk of squashing the wire, increasing its diameter in one of its axes and increasing the resistance in the liner. It will also, cause of variation in the feed uniformity, changing one of the essential arc parameters, the wire speed.

DOUBLE ARC WELDING

The dual pulsed arc welding system is recommended to execute welding beads that need to have a very good aesthetic aspect. Especially indicated for aluminium alloy joints, where we require a more controlled heat input, obtaining more even beads.

This work mode enables the user to achieve welding with more marked surface aspect, and it is optimal for automated or robotised applications, where the movement speed and the height of the torch are constant features.

ALUMINIUM WELDING

The dynamic behaviour of the aluminium presents greater arc stability than in steel, which is the result of the use of 100% Argon as shielding gas, which facilitates the arc transmission.

With respect to the differences between magnesium and silicon alloys, we can observe an increase in malleability in alloys with silicon, which may generate greater feed problems.

Due to the increase in temperature absorbed by the torch during pulsed arc welding, certain feed limitations in its use arise. The welding torch should be continuously cooled.

Furthermore, due to the typical feed limitations of the material, aluminium is highly malleable, so the use of torches that are as short as possible is recommended (2-3 m).

The most critical point when welding aluminium is at the exit from the rollers, as from this point, the wire is submitted to compression, meaning that it can easily roll up bend, or break.

It is recommendable to try to reduce the friction produced by the wire to a minimum to try to achieve a quality feed. To this end we can carry out the following adjustments:

1. Firstly, we must talk about cleanliness. The wires must be free from dust, grease, impurities and humidity. The metal dust adheres easily to the wire on the aluminium reels, and may even saturate the liner of the torch giving rise to the appearance of problems. To prevent this, the feed system must be cleaned regularly maintaining the wire in the conditions recommended by the manufacturer.
2. Use different diameter fillers, whenever possible, to reduce the derived wire feeding problems.
3. Use of Push-Pull torches. They include a feed system in the torch casing, which is synchronised with that of the equipment, so that a coordinated "push and feed" job is carried out minimising the feed problems. The use of this type of torch is recommended for lengths of over 6 m.
4. Reduce the actual torch resistance: Reducing its length, the neck shape (the straighter the better) or replacing the liner with graphite or Teflon.
5. Use of "U" feed rollers and verification of the state of the pressure rollers, which with use, may suffer wear and generate feed problems (example: the wire slips].
6. Excessive pressure of the clamping knob will be harmful for the system as we run the risk of squashing the wire, increasing its diameter in one of these axes and increasing the resistance on the liner.

We must adjust the liner to the diameter of the wire used in the welding and decrease the distance between the exit from the roller and the liner. (Example: if this distance is great, the wire bends and breaks).

7. The end of the liner must be brass to prevent the heat from the pistol burning the Teflon sleeve, permitting the distribution of the current along 100 mm, thus avoiding current concentration at the contact tip. Possible energy concentration in the wire will produce short circuits that will slow it down when it comes out of the pistol, producing jamming in the entry of the liner and the rollers.
8. Due to the aluminium dilation coefficient, almost double that of steel, when the wire heats at the contact tip, the diameter increases by a greater proportion, so the diameter of the hole of the contact tip must be bigger, with a slightly greater tolerance than for steel. Therefore, the use of special contact tips for aluminium is recommended.

8.4. WELDED APPLICATIONS ACCORDING TO SYNERGIC PROGRAMME.

8.4.1. CARBON STEEL WELDING.

The wire used for the process has a copper coating on the filler material enabling it to increase the electric conductivity, allowing the current to flow more easily, guaranteeing arc stability and protecting the wire from oxidation.

Used in welding structural steel sheets and sections in the construction of bridges, cranes and commercial vehicles, the thermal reduction during the welding process prevails as the heat input has a great influence on the transformations of the material properties, especially when welding high resistance fine-grained steels.

Applications:

8.4.2. CO2 WELDING.

It is characterised by its high heat input and its fast welding speed. The end of the wire remains at the same level as the surface of the part so there is practically no arc height.

Recommended for welding carbon steels in applications with great penetration and my input speeds, removing importance from the outer aspect of the bead.

As a general rule, this welding mode tends to result in a lot of spatters, but on working at high intensity ranges, the crater that occurs in the melting pool, reduces its passage to the outside. However, the incorporation of the specific synergic program in GPS will reduce the number of low intensity spatters and will facilitate welding, increasing the arc stability.

The inert gas is used in traditional applications whilst pure carbon dioxide (CO2) has become established as the best solution with respect to weldability, mechanical properties and cost efficiency. The use of pure CO2 represents an additional saving up to 4 times less in relation to the processes that uses mixes with argon.

Applications:

8.4.3. WELDING WITH COPPER FREE FILLER MATERIAL.

Applications welded with copper-free wires are similar to those associated with traditional carbon steel welding. The basic difference lies in the lack of copper in the coating of the filler material.

In traditional applications, depending on the pressure level, the wire surface suffers the loss of copper particles, producing irregular wire feeding, the saturation of the torch and possible arc instability problems, welding defects (it can produce a greater risk of hot cracking and a reduction of the impact properties), increase of repairs, loss of productivity and increase of manufacturing costs.

In applications with copper-free wires, we eliminate their negative effects without losing the optimal characteristics of a good filler. It has even feed, facilitates arc stability and reduces spatters; it improves cleanliness and increases the life of consumables and of the feed systems (up to 3 times more), reducing downtimes and maintenance times, improving productivity,…

It has, no harmful effects on the welder or for the environment, either, and it is especially recommended for automated or robotised processes.

Used to weld structural components with resistance increase requirements. It reduces spatters and increases material deposition rate.

Recommended for welding large thicknesses.

Applications:

8.4.4. WELDING WITH LOW CO2 CONTENT.

As we have developed, pulsed arc welding has application limitations when the CO_2 content of the shielding gas mix is higher than 20%.

To make it easier to obtain quality arcs, avoiding additional equipment adjustment, GPS includes specific welding programmes with gas mixes of less than 10%.

Applications:

8.4.5. WELDING WITH FLUX-CORED WIRE AND SHIELDING GAS.

On a production level, these are more economical processes than the normal ones as the production capacity increases, reducing the general manufacturing costs derived from the use of a more economical shielding gas (Argon - CO_2 15%).

The protection is guaranteed due to the fact that all the metal particles transferred in the arc are completely covered with slag to prevent reactions with shielding gas.

It permits welding in all the positions, being ideal for overlapping welding and it has excellent mechanical properties with easy elimination of the slag, smooth bead surface and radiographic quality. Furthermore, the reduced formation of oxide permits welding several layers without having to clean between layers.

Recommended for welded joints and repairs on primed pieces, with remains of oils (lubricants), grease that prevents the perfect execution of the welding process, which may generate an increase of pores and spatters.

Soft steel and fine grain metal flux-cored wire causes constant arc spray transfer of the welding arc with minimum spatters. Resulting especially suitable to weld coated base metals in naval construction, for steel constructions and bridges.

Applied to stainless steel, it presents a reduction of spatters and heating of the material, therefore there is less risk of weakening. Increasing the travel speeds and reducing the cleaning and descaling level prior to welding represents time and money saving.

Applications:

8.4.6. WELDING WITH FLUX-CORED WIRE WITHOUT SHIELDING GAS (SELF-SHIELDED).

The need to work in Offshore applications, without the need for shielding gas, to replace applications welded by coated electrode, due to its low production capacity. They generate the inclusion of synergic programmes that permit FCAW welding with self-protected wires.

These are flux-cored wires that include a metal dust on the inside with elements that will generate the protective atmosphere during the welding process.

To correctly melt these wires the polarity (CCEN) will have to be changed, modifying the welding position, as it is welded in the same way as the electrodes, in the welding travel direction, but with considerably higher stick out than in wires with gas.

Applications:

8.4.7. STAINLESS STEELS WELDING.

In general lines, the execution of welded joints in applications with stainless steel does not differ too much from welding carbon steels. It is true that the intensity adjustment values are similar, however, the great difference lies in the basic need for gaseous protection or backing elements in the welding penetration.

The increasing demand by industry and especially by the chemical industry for this steel with high mechanical and physical properties under conditions of corrosion and high temperatures, increases the demand in stainless steel applications.

In exposure conditions at high temperatures (between 650 and 700°C) the film of oxide becomes thicker, forming an impenetrable barrier with the high heat resistance properties that are required. However, stainless steel is stainless at ambient temperature, but in melting conditions, it becomes a highly oxidisable material. In such a way that the effect of the oxygen situated on the back of the joint, will accelerate its oxidising effect and chrome carbides will appear very easily.

The welding process results in the heating and cooling of the melting area and the thermally affected area. The duration of this heating cycle varies depending on the thickness and type of material to be welded, as well as on the adjustment parameters used to make the bead. This heat cycle has a direct influence on the precipitation of chrome carbides, increasing their size and speed of appearance, the longer they remain at high temperatures.

During the welding process and as a result of the increases in temperature we submit the part to, metallurgy problems may arise that affect the weldability of these materials. The tendency to cracking, material weakening or inter-granular corrosion are risks that we must contemplate and reduce to a minimum when welding stainless steels, reducing the heat input as much as possible to avoid critical transformations.

8.4.8. WELDING WITH 308L Si FILLER METAL.

Its high silicon content, which improves the application of the welded deposit, achieving cleaner beads and higher application speed, permits obtaining highly atmospheric corrosion resistant joints. Once welded, it provides surface temperatures that vary between -196°C and 400°C.

Recommended for welding austenitic stainless steel type 304 and 304L, stabilised of type 321 and for 301, 302 and 308 joints, it is used especially when there is a risk of inter-granular corrosion.

Applications:

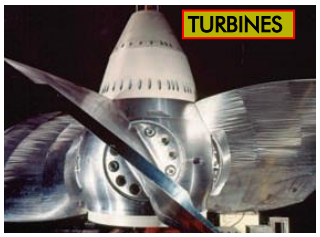
8.4.9. WELDING WITH 316LSi FILLER METAL.

The 316 stainless steels are very resistant to pitting caused by corrosion in the presence of sulphurous acid is indifferent concentrations and perform well at low amperage.

With a service temperature of up to 350ºC, it can weld steals types 308, 310Mo, 309Mo, CrNiMo steel, austenitic stainless type 316 and 316L, and stabilised, type 316Ti.

Note: It increases the resistance to inter-granular corrosion and general corrosion conditions. High resistance to corrosion in acid means and hydrochloric solutions.

Applications:



8.4.10. ARGON-CO_2 (2%) WELDING.

The percentage of CO2 in the gas mix burns the carbon, and in applications with stabilised CrNi, its aim is to avoid the formation of chrome carbides, that is the impoverishment of the welded joint. However, neither CrMo nor austenitic steel must be used due to the risk of oxidation of the chrome and the appearance of carbides, respectively, which would reduce the corrosion resistance.

During welding, the carbon and chrome combine to form chrome carbides. Each carbide molecule contains approximately 95% chrome. This precipitation will remove approximately half the available chrome from the solid solution, reducing the corrosion resistance.

Applications:

8.4.11. ARGON- O2 (2%) WELDING.

With a mix that uses O^2, carbon combustion does not occur, decreasing the arc cone and the risk of cracking, favouring arc stability.

This gas mix is especially recommended for thin plates and difficult places, presenting good penetration and very fine drops.

Used in work of responsibility that requires X-rays.

Applications:

8.4.12. GALVANISED STEELS AND DISSIMILAR MATERIALS WELDING.

In joint welding processes with copper alloys, the same or similar. Welding is heterogeneous, as it is carried out with different filler materials to the base material.

In this type of joints, the preparation of the parts to be welded becomes especially important, as to permit gases, produced during the welding, to escape, and for no pores or defects to appear in the welding bead, a slight separation must be maintained between the parts to be joined together.

The application of galvanised materials, used to increase the corrosion protection of the base metal, is especially recommended to manufacture and repair bodywork, exhaust pipes, coffee-maker water tanks, joints in galvanised installations.

Apart from the protection against corrosion, this type of welding reduces the heat input in the joint and reduces cleaning work carried out after welding galvanised materials.

The galvanised layer is a film of zinc that coats the entire plate and that is applied via electrolysis. Then the primers are applied and finally the colour layers and varnishes. This is basically the protection of a galvanised plate against corrosions.

In conditions that favour oxidation (daily life), the zinc film is the first to oxidise, as this covers the entire plate and the actual zinc oxide forms a new film around the plate which also acts as a protective layer. Thus, whilst zinc oxidises, steel does not.

This type of welding is called MIG Brazing. This type of welding is carried out in inert gas atmosphere (around 10 l/minutes), such as Argon and it is called strong welding.

Bearing in mind that zinc melts at 419°C and evaporates at 908°C, whilst steel melts at 1550°C and evaporated 2500°C. When we weld with steel wire or electrode, we need it to heat above 1550°C for it to melt with the plates and form the joint when it hardens, but with these temperatures, apart from melting the zinc we evaporate it, so when we weld we have eliminated the protection from the plate at that point. We have always been able to observe that the first place where oxide appears is in a welding that we have carried out.

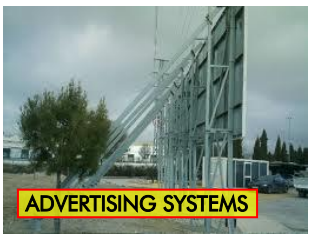
8.4.13. WELDING WITH CuSi3 FILLER METAL.

Welding with filler wires with copper-silicon, increases the resistance to corrosion of the joints and is easy to apply. It offers high resistance to frictional wear and its 3% silicon content provides it with excellent fluidity.

It has a melting point of 950°C, reducing the input heat and reducing the deformation of the pieces to be welded. It provides high resistance to corrosion as it prevents the zinc from evaporating.

The copper and silicon alloy at 3% (CuSi3) melts at around 950°C and evaporates at 2300°C. This means that to melt and weld, we only need to reach a temperature of 950°C, with which we evaporate much more zinc, still maintaining part of the material protection.
If we look at the temperatures at which the different materials melt, we will see that steel melts at 1550°C and CuSi3 at 950°C. The fusion of both occurs because the filler material (CuSi3) when melted, penetrates the sheet by capillarity. Thus, low temperature resistant welding is achieved, avoiding the total loss of the galvanised layer.
Tensile strength MIG-Brazing with CuSi3% - 309,5 N/mm / MAG with carbon steel 320,9 N/mm.

Applications:

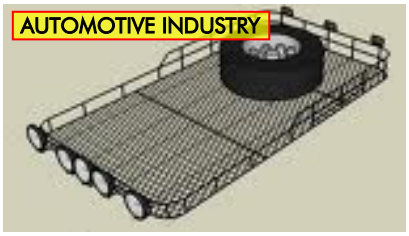


8.4.14. WELDING WITH CuAL8 FILLER METAL.

It improves applications welded with CuSi and its joints are characterised by being mechanically resistant and suitable for cold deformation, also having good corrosion resistance.

The resistance to atmospheric corrosion of these alloys is good; they resist corrosion in saline atmospheres well, too. Copper aluminium joints are less sensitive than brass to corrosion under stress in ammonia atmosphere; however , they are more sensitive to inter-granular corrosion in the presence of overheated vapour.

Applications:



8.4.15. ALUMINIUM WELDING.

Before starting to weld, we must bear in mind the basic aspects of the material, its high heat conductivity and its low melting point may easily produce perforations in the material due to an excess of input heat.

> The amount of filler metal will permit controlling the increase in temperature and thus reduce the risk of the material cracking.
> The greater the diameter of the filler metal, the easier it is to control the melting pool.

Before starting to weld aluminium, the operators must meticulously clean the base material and eliminate aluminium oxide and contamination by hydrocarbons coming from lubricants or cutting solvents.

It is good to remember that temperature developed by the electric arc of the MIG process is higher than the 660°C necessary to melt the aluminium; therefore, it is important to maintain an even arc length, thermally controlling the bead trajectory.

The technical requirement necessary to carry out this type of joint is greater than for other materials, as we must master the process considering the fast heating speed and slow cooling speed of the material.

We must also assess the influence of the oxide film (alumina) which is formed and covers the aluminium surface in contact with the oxygen of the air. The aluminium oxide melting temperature is 2038°C while aluminium, the base material underneath, melts at 649°C. Therefore, any oxide that remains on the surface of the base metal will inhibit the penetration of the metal into the piece.

> To reduce the resistance of the oxides and facilitate the execution of aluminium welded joints, it is recommended to apply previous descaling work. We can use mechanical treatments, using bristle brushes, or specific polishing discs, or attacks with chemical products, such as solvents or descaling agents, to destroy the high melting point oxide layer and to prevent the formation of new oxide during the welding process.

Welding aluminium requires specific travel speeds. Unlike steel, the high heat conductivity of aluminium determines the use of higher travel speed and intensity adjustments. If the travel speed is too low, the welder runs the risk of perforating the plate, especially if the plate is thin.

During its hardening process and as a result of its high coefficient of thermal expansion, the increase in temperature causes changes in the shape of the aluminium parts that may give rise to the appearance of cracks, deformation or residual stress.

8.4.16. WELDING WITH AlMg5 FILLER METAL.

The use of aluminium wires with a 5.5% of magnesium presents great resistance to corrosion.

Used to weld alloys type 5050, 5052, 5083, 5356, 5654 and 5456, it is recommended to weld AlMg 3, AlMg 5, AlMgMn, AlZnMg 1, AlMg 3Si, AlMg 5Si, AlMg 10, AlMg 1SiCu, AlMgSi 0.7.

It is common to find this in industrial sector applications, such as automobile, naval, railway, manufacture of tanks, repair of extruded, etc.

Applications:

8.4.17. WELDING WITH AlSi5 FILLER METAL.

Making joints with aluminium wire with 5% silicon is recommended for alloys type 3003, 5052, 6061, 6063, as well as for casting alloys 43, 355, 356 and 214.

It has a function range of 573°C - 623°C and develops excellent penetration and melting pool fluidity characteristics.

Excellent for repair and construction in valves, couplings, pipes and connections as well as to manufacture heat exchangers, capacitors and evaporators. Ideal result for maintenance of arms, paper industry rollers.

Recommended for AlSi5, AlMgSi 0.5, AlMgSi 0.8, AlMgSi 1, AlZnMg, AlCuMg welding.

Applications:

8.4.18. WELDING WITH AlSi12 FILLER METAL.

Aluminium wires with an approximate percentage of 12% silicon increase the fluidity and resistance to corrosion of the welded joint. The silicon content increases the bead elasticity, increasing its work capacity in parts submitted to temperature after the welding.

Recommended for aluminium alloys type 1060, 1060, 1350, 3003, 3004, 3005, 5005, 5050, 6053, 6061,6951 and7005. Used in welding and repair of nozzles, headpieces and engine covers, tanks, valves etc.

Applications:

9. MAINTENANCE OPERATIONS. RECOMMENDATIONS.

In order for the equipment to have a long life we must follow some essential rules for maintenance and use. Abide by these recommendations.

CORRECT MAINTENANCE OF THE EQUIPMENT WILL AVOID A GREAT PERCENTAGE OF FAULTS.

9.1. EQUIPMENT MAINTENANCE. GENERAL RECOMMENDATIONS.

Before carrying out any operation on the machine or welding cables, we must place the switch of the equipment in "O" position of machine disconnected.

Specialized personnel must handle the machine to carry out maintenance and repair operations.

BLOW THE INSIDE OF THE MACHINE WITH COMPRESSED AIR FROM TIME TO TIME.

The accumulation of metal dust on the inside is one of the main causes of breakdowns in this type of equipment as they are subject to a great amount of pollution.

As an essential measure, the equipment must be kept separate from the welding place.

Keeping the machine clean and dry is essential.

The inside should be blown with clean, dry compressed air as often as necessary.

After blowing, check that the electrical connections are still properly tightened.

THE MACHINE MUST ALWAYS BE OPERATED WITH THE HOUSING ON.

PLACE THE MACHINE IN A LOCATION WHERE THERE IS AIR RENEWAL.

The machine ventilations must be kept free.

KEEP THE WELDING ACCESSORIES IN GOOD CONDITIONS FOR USE.

ONCE THE WELDING OPERATION HAS FINISHED AVOID DIRECT CONTACT OF THE ELECTRODE-HOLDER CLAMP WITH THE WELDING EARTH CLAMP AND THE OTHER PARTS CONNECTED TO IT.

DO NOT UNPLUG THE MACHINE IF IT IS HOT, WAIT FOR THE INTERNAL REFRIGERATION SYSTEM TO COOL IT COMPLETELY.

9.2. RECOMMENDATIONS FOR REDUCING ELECTROMAGNETIC COMPATIBILITY (CEM) PROBLEMS.

The user is responsible for the installation and use of the cutting material according to the instructions in this manual and the following recommendations.

Before installing the cutting material, the presence of the following in the surrounding area must be kept in mind:

- Wiring for power, control, signalling, and telephones.
- Radio and television receivers and transmitters.
- Computers and other control equipment.
- Critical security equipment.
- People with pacemakers or hearing aids.
- Measurement and calibration equipment.

PLEASE NOTE THE TIME OF DAY THE WELDING WILL TAKE PLACE.

REMOVE POSSIBLE VICTIMS OF INTERFERENCE FROM THE WELDING INSTALLATION.

There may be electromagnetic difficulties in other environments caused by conducted and radiated disturbances. If protective devices or supplementary electrical system filters are needed, consult our Technical Service.

ALWAYS CONNECT THE MACHINE TO POWER GRID USING AN EFFICIENT GND.

IF THE PIECE TO BE CUT IS GROUNDED, KEEP IN MIND OPERATOR SAFETY AND NATIONAL REGULATIONS.

USE THE SHORTEST CONDUCTOR CABLES POSSIBLE AND KEEP THEM PLACED NEXT TO EACH OTHER NEAR THE FLOOR.

10. ANOMALIES. PROBABLE CAUSES. POSSIBLE SOLUTIONS.

SYMPTOM. ANOMALY.	PROBABLE CAUSE.	POSSIBLE SOLUTION.
GENERAL PROBLEM. NOTHING WORKS.	The machine has no voltage in one or all its vital elements.	1. Observe that there is voltage at the machine input. Otherwise, change the socket. It is advisable to see if any magnetothermal has "blown". 2. Check the power source fuses situated on the central panel. (See Spare parts Sheet) 3. The machine panels must be removed testing the logical points of the electrical diagram.
LIMITER TRIPS.	Low gauge circuit breaker for the case in hand. There may be a short circuit, which is what causes the limiter to trip.	Change the magnetothermal for another larger gauge one. It is important for the magnetothermal switch to have a characteristic slow type of curve. In the event that the electrical installation has limited power, the welding work must be tested at lower current levels.
IT CAUSES NOISE	Loose metal casing.	Review and screw casing.
	Defective electrical connections.	Correctly tighten the connections.
	The fan is damaged or poorly attached.	Examine the fan.
IF THE GREEN INDICATOR LD1 IS ON THE APPLIANCE DOES NOT WELD	Active protection system. Amber light "LD2" on.	Equipment overheated, wait until the equipment cools down.
		Supply voltage outside rated margin. Change supply tap.
THE ELECTRODE BURNS IN TIG WELDING	Excessive welding intensity for a certain electrode.	Decrease welding current or change electrode for one with larger diameter.
	Use of reverse polarity.	Place electrode to negative pole.
	Type of electrode	Change the electrode type.
	Lack of protection gas.	Adjust at an appropriate flow.
THE EQUIPMENT HEATS UP ABNORMALLY. THE THERMAL PROTECTION ACTIVATES QUICKLY.	The equipment is positioned in such a way that proper ventilation is prevented.	Place the equipment in an area where the air is constantly replaced.
	The fan does not work.	Replace the fan.
	The equipment is located in a very hot environment.	Avoid positioning where there is direct exposure to the sun.
	There is a loose connection inside the equipment.	Review the power electrical connections.
ALTHOUGH THE MACHINE IS CONNECTED AND WITH THE SWITCH LD1 ON, THERE IS NO REACTION WHEN PRESSED	Failure of the welding torch switch which does not make perfect contact.	Change the welding gun microswitch.
WHEN THE SHIELDING GAS IS RELEASED IT CONTINUES FLOWING.	There is impurity in the inside chamber of the solenoid valve which prevents the piston from closing completely.	Dismantle and clean the electrovalve.
	The configurated value of postflow is very high.	Change in the settings menu the postflow time value TPS.
THE WIRE REMAINS STUCK TO THE TORCH CONTACT TUBE.	The configurated value of burnback is very high.	Change in the settings menu the value of the burnback time correction TBB
WHEN FINISHING WELDING THE FINAL WIRE LENGTH IS VERY GREAT.	The configurated value of burnback is too low.	Change in the settings menu the value of the burnback time correction TBB.
	The torch is withdrawn immediately when torch push-button is no longer pressed.	The final wire length control system requires the welding torch not to be immediately withdrawn when the torch push-button is no longer pressed.
THE EQUIPMENT DOES NOT WELD CORRECTLY IN MIG/MAG MODE. "IT ADJUSTS BADLY"	Low effective welding voltage. Output wave does not correct.	Check that there is not a phase failure in the supply power. Check that the electrical contact elements of the welding circuit are correct: Welding earth and surfaces are rusty or very dirty. Contact nozzle with greater diameter than the wire, etc. Test the electrical diagram of the power source. Input and output voltages to the rectifier.
	The diameter of used wire does not match to selected programme.	Verify the use of the appropriate diameter and replace the erroneous one.
	The welding wire has a mechanical resistance at the outlet, which prevents it from having a regular speed.	Examine the welding gun. Blow the inside (cable) with compressed air.
	Selection of wrong synergic programme.	Verify the programme selection criteria : filler materials, gas mixture y and wire diameter.
	Consumable badly fit or in bad condition.	Review the consumable adjustment and replace if faulty.
	Unsuitable pressure of the clamping knob.	Adjust the pressure until the problem disappears.

SYMPTOM. ANOMALY.	PROBABLE CAUSE.	POSSIBLE SOLUTION.
EXCESS OF SPATTERS DURING WELDING.	Unsuitable shielding gas.	When welding normal steels we advise the use of a gas mixture Ar-CO2.
	Excessive pinch rollers pressure	Reduce the tightening knob pressure.
	Filler material is dirty or oxidized.	Remove remains of impurities, oils, oxides, etc.
	Insufficient arc length correction.	Increase the arc correction factor.
	Inappropriate dynamics adjustment (tendency to negative).	Adjust the dynamics control from "SETUP" mode.
	Stick out or insufficient distance between nozzle and base material.	Increase the distance between torch and material to be welded.
THE WELDING START IS VERY AGGRESSIVE. EXCESS OF SPATTERS.	Earth contact faulty.	Ensure the earth tap adjustment.
	Base material and filler material are too "cold".	To reduce the abruptness at first of weld, please use the IS striking mode.
	Aluminium is being welded with a wire feeding problem, which causes incorrect arc ignition as the wire is slowed down on knocking against the piece.	Examine the wire feeding process. Prevent the gun from making “knots”, keeping it in a straight line. The wire must not be slowed down when it knocks against the piece
	The wire length at onset of welding process is too long.	Change in the settings menu the value of the burn-back time correction TBB
	Oxide or other polluting agents are present in base material.	Ensure the cleaning of material to be welded.

ERROR		DESCRIPTION
E01	THE	Overheating in the power source. The thermal protection has disconnected the equipment.
E02	OVT	It is detected that there is no welding voltage.
E03	OVC	Over-current.
E04	CON	No communication between frontal electronic board and the control one.
E05	CON	Communication failure of CENTER (CEN) or peripheral of control (CON).
E06	GND	Earth failure.
E07	OVV	Over-voltage of input power supply (U1>470 V).
E08	UNV	Under-voltage of input power supply (U1>330 V).
E09	NPH	Phase failure in the power supply line.
E10	REF	Lack of coolant pressure.
E12	ROB	Shutdown triggered by Robot (Quick Stop).
E13	FPG	Wire remains stuck.
E14	FIL	A lack of welding wire has been detected.
E15	GAS	Gas flow rate out of range. Qg>50% and <85% or Qg>115%.
E16	NOG	Gas flow <50 %.
E17	CON	Communication failure between interface – machine.
E18	NOJ	Error when selecting JOB. Memory does not exist.
E19	NOP	Error when selecting programme. Programme isn't configured.
E20	CON	Communication failure in ModBus (Interface-PLC).
E21	ROB	The ROB mode operation is not enabled.
E22	NOC	Lack of centre with ROB machine without interface.

SPECIALIZED PERSONNEL MUST CARRY OUT ANY WORK ON THE EQUIPMENT.

BOTH AT THE BEGINNING AND END OF A REPAIR CHECK THE EQUIPMENT INSULATION LEVELS. DISCONNECT THE ELECTRONIC BOARDS WHEN MEASURING THE INSULATION.

The insulation-measuring device will have 500 V D.C. and will be applied to the following points of the circuit:
Power supply - Earth tap: Ra > 50 Mohms.
- Cutting operation - Earth tap: Ra > 50 Mohms.
- Power supply - Cutting operation: Ra > 50 Mohms.

BEFORE TURNING THE EQUIPMENT ON, ENSURE THAT IT IS OFF LOAD.

DO NOT OPERATE THE ON/OFF SWITCH WITH AN ELECTRICAL LOAD CONNECTED TO THE WELDING CONNECTORS.

11. SAFETY MEASURES.

The use of this equipment requires a maximum amount of responsibility with respect to their use and maintenance. Read this safety chapter carefully as well as the rest of the instructions manual. The correct use of the equipment will depend on this.

Any work on the equipment must be carried out by specialists.

During any maintenance operations or when dismantling any element from the inside of the machine, this must be disconnected from the electricity supply.

The equipment must be connected to the earth connection and this must always be effective.

The equipment must not be located in a damp place.

Never use this welding machine to defrost tubes.

In environments with a high risk of electrical shock, fire, proximity of inflammable products or height, observe relative national and international provisions.

Do not use the equipment if the welding or supply cables are damaged.

Do not touch the equipment switches when carrying out a welding operation.

Make sure that the part to be welded makes perfect electrical contact with the equipment earth.

Never lean directly on the work piece. We will always work with protection gloves.

Any work on the welding guns and earth clamps will be done with the equipment disconnected (OFF Position (O) on the on/off switch). Do not touch the electrically active parts (electrode-holder clamp, earth clamp, etc.) with your bare hand.

Use original spares.

The part to be worked on should be cleaned from possible grease or solvents as these may decompose during the welding process giving off fumes which could be very toxic. This can also occur with those materials which have some kind of surface coating (zinc-plated, galvanised, etc.).

Avoid inhaling the fumes given off in the process at all times. Protect yourself from the fumes and metal dust which can be given off.

Use quality approved anti-fume goggles.

Work with this equipment must be carried out in places or working posts where there is suitable air renewal. If welding processes are carried out in closed places the use of suitable fume extractors is recommended.

In welding processes, the electric arc formed gives off infra-red and ultraviolet type irradiations: these are harmful for the eyes and skin, so these areas , must be suitably protected with gloves and suitable clothing.

The eyes must be protected with goggles with an officially approved protection system with a protection index of at least 11. With electric arc welding machines use protection shield for the eyes and face.

Always use quality approved protection elements.

Never use contact lenses. They may adhere to the cornea due to the great heat given off during the process.

Bear in mind that the arc is considered to be dangerous within a 15-metre radius.

Cast material spatters are given MMA off during the welding process so due precautions must be taken.

Never direct the path of an electrode-holder clamp towards people.

There must be a fire-extinguisher near to the working area.

Do not keep inflammable material or explosives near to the working post.

Prevent fire caused by sparks or slag.

Use quality approved footwear for this type of operations.

Use approved auditive protectors in case of too high noise.

In environments with a high risk of electrical shock, fire, proximity of inflammable products or height, observe relative national and international provisions.

EN APPENDICES. ELECTRICAL DIAGRAMS AND PART LISTS.

- DECLARATION OF CONFORMITY FOR THE EC MARKING.
- ELECTRICAL WIRING DIAGRAMS.
- DETAIL DRAWINGS AND REFERENCE LISTS.

FORMULA FOR MAKING ORDERS FOR SPARE PARTS:
Please indicate:
1st. Machine, Reference and Serial no.
2nd. Supply Voltage / Frequency.
3rd. No. of parts, description and reference.

EXAMPLE:
GPS 4000 DR ADNVANCED - Series No. 1000000235V2 - Ref. 42381200 (400V-50/60Hz) - 1 FAN unit Ref. 53216023

GENERAL TERMS OF WARRANTY

GALA GAR, guarantees correct operation, against any manufacturing defects, during a period of 12 MONTHS, as from the purchase date (warranty period):

This guarantee will not be applied to components with a working life that is less than the guarantee period, such as spares and consumables in general.

In addition, the warranty does not include the installation, start-up, cleaning or replacement of filters, fuses and coolant or oil refills.

If the product should present any defect during the guarantee period, GALA GAR, undertakes to repair it without any additional charge, unless the damage caused to the product is the result of accidents, improper use, negligence, inappropriate accessories, unauthorized servicing or modifications to product not carried out by GALA GAR.

The decision to repair or replace parts or supply a new appliance will depend on the criterion of GALA GAR. All replaced parts and products will be the property of GALA GAR.

In order for the guarantee to become effective the product and the purchase invoice must be handed over, duly completed and stamped by an authorized Technical Service. Shipping and transport expenses will be on the user's account.

Damage or unforeseen or indirect expenses resulting from an incorrect use will of the equipment not be the responsibility of GALA GAR.

DECLARACION DE CONFORMIDAD PARA EL MARCADO "CE"

APPROVAL CERTIFICATE FOR THE EEC STANDARD
CERTIFIQUÉE DE CONFORMITÉE POUR LE MARQUEE CE

Jaime Ferrán 19 tlfn.-34/976473410 fax.-34/976472450
50014 ZARAGOZA (España)

GALA GAR S.L. DECLARA, QUE EL PRODUCTO SUMINISTRADO Y REFERENCIADO EN EL MANUAL DE INSTRUCCIONES, ES CONFORME A LAS DIRECTIVAS COMUNITARIAS APLICABLES PARA EL MARCADO CE:

GALA GAR S.L. DECLARES THAT THE PRODUCT SUPPLIED AND WITH THE REFERENCE NUMBER WRITTEN IN THE TECHNICAL INSTRUCTIONS HANDBOOK COMPLIES WITH THE EEC DIRECTIVES REQUIREMENTS OF THE EEC STANDARD:

GALA GAR S.L. DÉCLARA QUE LES PRODUITS PRÉSENTÉS ET RÉFERENCÉS DANS LE MANUEL D´INSTRUCTION SONT CONFORMES AUX DIRECTIVES COMMUNAUTAIRES APPLICABLES POUR LE MARQUEE CE :

PRODUCTO:	***GPS 4000 DR ADVANCED (400V)***
Referencia:	***42381200***
2004/108/CE (89/336/CEE)	Directiva relativa a la Compatibilidad Electromagnética
2006/95/CE (73/23/CEE)	Directiva sobre el material eléctrico destinado a utilizarse con determinados límites de tensión.
UNE-EN 60974-1:2013	Norma relativa a las Fuentes de Potencia para Soldadura de los Equipos de Soldadura Eléctrica por Arco.
UNE-EN 60974-10:2014/A1:2015	Norma relativa a la Compatibilidad Electromagnética de los Equipos de Soldadura Eléctrica por Arco.

Zaragoza, 3 de diciembre de 2019

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SOCIEDAD LIMITADA
Jaime Ferrán, 19
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Fax 976 47 24 50
50014 ZARAGOZA (España)
B-50045285

GALA GAR S.L.
Fdo. Julián Simón Campo
Responsable Departamento I+D

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PRODUCTO:	***GPS 4000 DR ADVANCED (440V)***
Referencia:	***42355200***
2004/108/CE (89/336/CEE)	Directiva relativa a la Compatibilidad Electromagnética
2006/95/CE (73/23/CEE)	Directiva sobre el material eléctrico destinado a utilizarse con determinados límites de tensión.
UNE-EN 60974-1:2013	Norma relativa a las Fuentes de Potencia para Soldadura de los Equipos de Soldadura Eléctrica por Arco.
UNE-EN 60974-10:2014/A1:2015	Norma relativa a la Compatibilidad Electromagnética de los Equipos de Soldadura Eléctrica por Arco.

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PRODUCTO:	***GPS 5000 DR ADVANCED (400V)***
Referencia:	***42600200***
2004/108/CE (89/336/CEE)	Directiva relativa a la Compatibilidad Electromagnética
2006/95/CE (73/23/CEE)	Directiva sobre el material eléctrico destinado a utilizarse con determinados límites de tensión.
UNE-EN 60974-1:2013	Norma relativa a las Fuentes de Potencia para Soldadura de los Equipos de Soldadura Eléctrica por Arco.
UNE-EN 60974-10:2014/A1:2015	Norma relativa a la Compatibilidad Electromagnética de los Equipos de Soldadura Eléctrica por Arco.

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PRODUCTO:	***GPS 5000 DR ADVANCED (440V)***
Referencia:	***42650200***
2004/108/CE (89/336/CEE)	Directiva relativa a la Compatibilidad Electromagnética
2006/95/CE (73/23/CEE)	Directiva sobre el material eléctrico destinado a utilizarse con determinados límites de tensión.
UNE-EN 60974-1:2013	Norma relativa a las Fuentes de Potencia para Soldadura de los Equipos de Soldadura Eléctrica por Arco.
UNE-EN 60974-10:2014/A1:2015	Norma relativa a la Compatibilidad Electromagnética de los Equipos de Soldadura Eléctrica por Arco.

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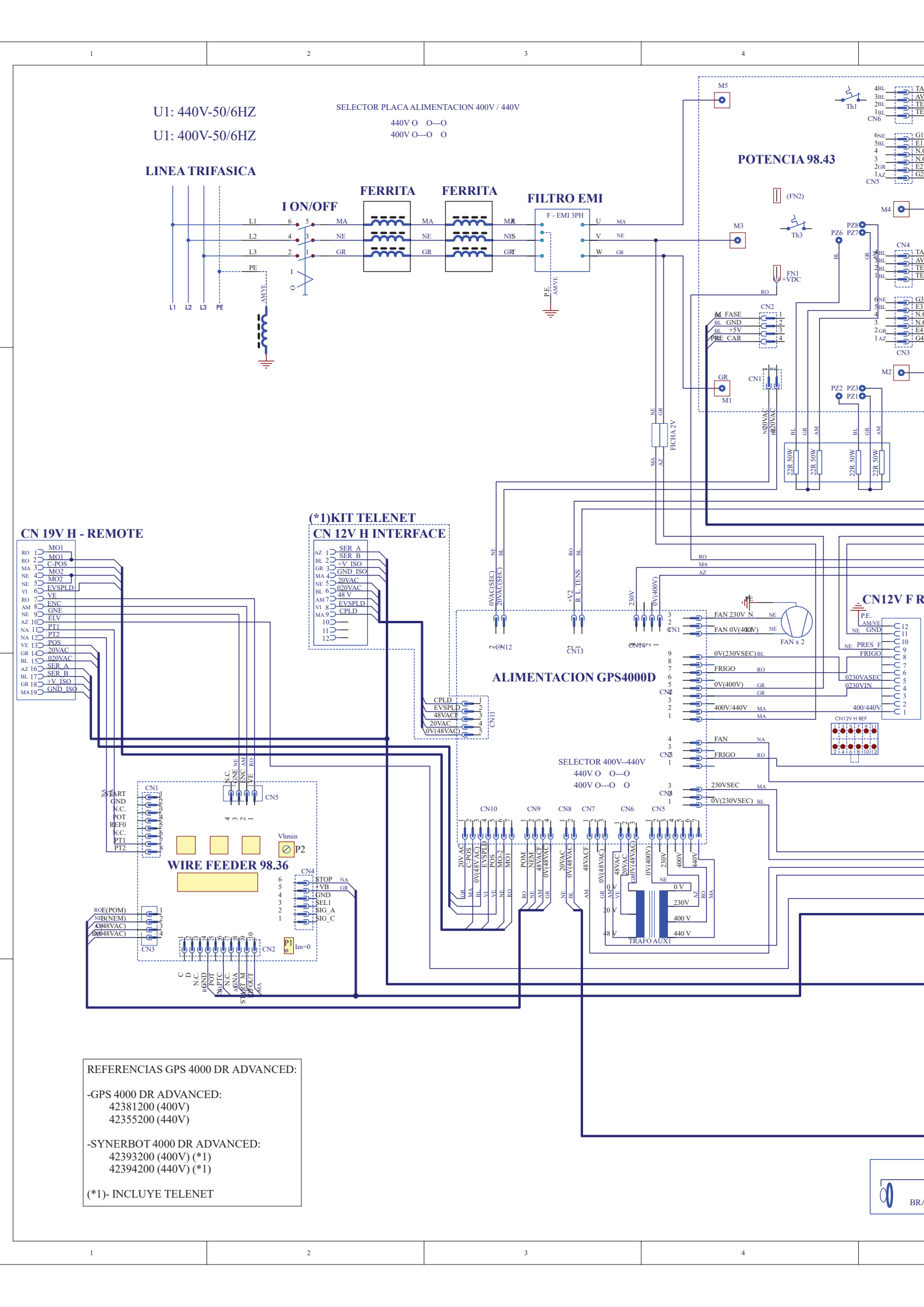
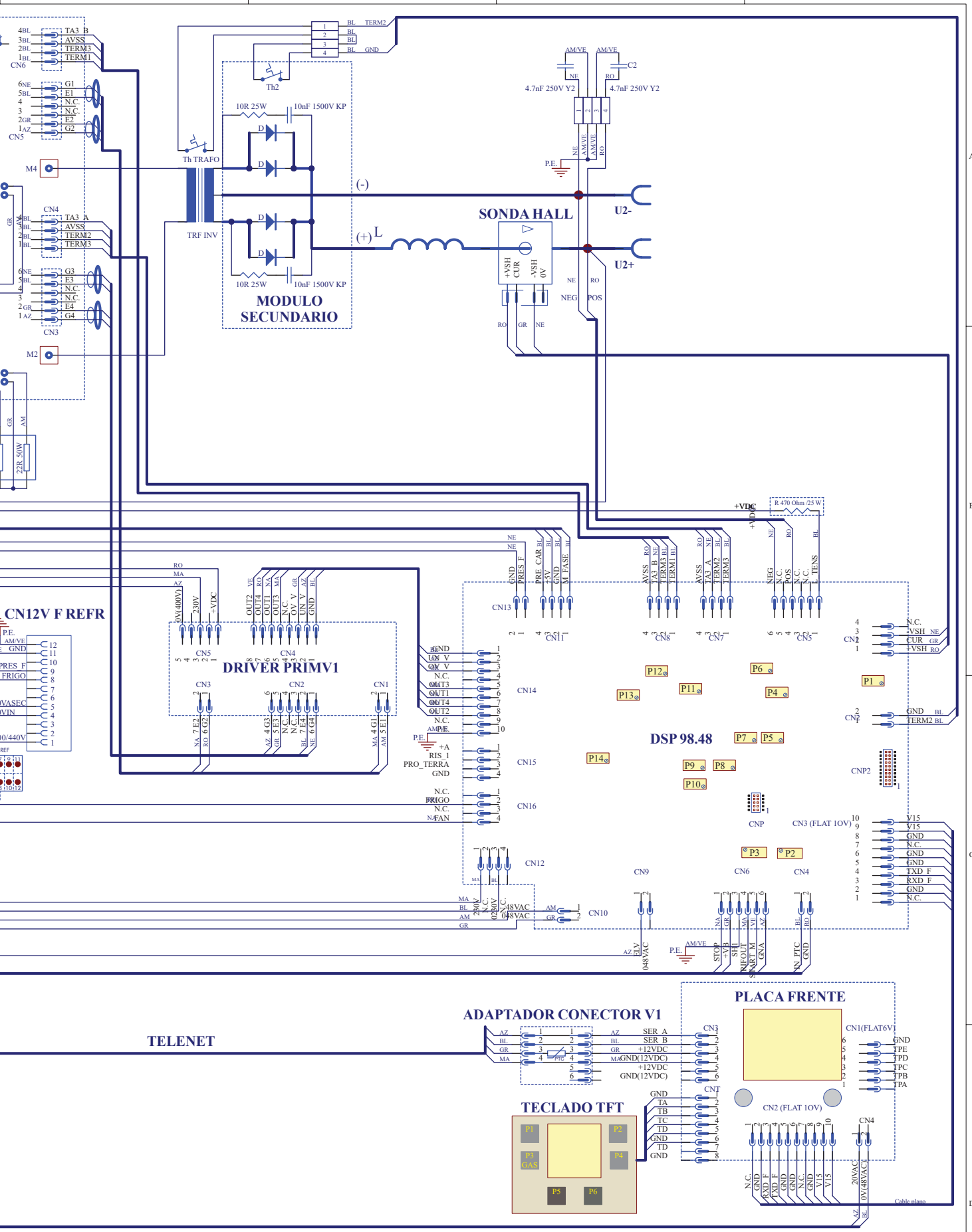

U1: 440V-50/6HZ
U1: 400V-50/6HZ
SELECTOR PLACA ALIMENTACION 400V / 440V
440V O O---O
400V O---O O
LINEA TRIFASICA
I ON/OFF
FERRITA
FERRITA
FILTRO EMI
F - EMI 3PH
POTENCIA 98.43
CN 19V H - REMOTE
(*1)KIT TELENET
CN 12V H INTERFACE
ALIMENTACION GPS4000D
CN12V F R
WIRE FEEDER 98.36
SELECTOR 400V--440V
440V O O---O
400V O---O O
FICHA 2V
FAN x 2
TRAFO AUX1
REFERENCIAS GPS 4000 DR ADVANCED:
-GPS 4000 DR ADVANCED:
42381200 (400V)
42355200 (440V)
-SYNERBOT 4000 DR ADVANCED:
42393200 (400V) (*1)
42394200 (440V) (*1)
(*1)- INCLUYE TELENET



BRAIDED CABLE WITH TOROIDAL - CABLE TRENZADO CON TOROIDE

IDEN./COLOR.
RO: ROJO, RED
NE: NEGRO, BLACK
GR: GRIS, GREY
MA: MARRON, BROWN
BL: BLANCO, WHITE
AZ: AZUL, BLUE
NA: NARANJA, ORANGE
VI : VIOLETA, VIOLET
AM: AMARILLO, YELLOW
VE: VERDE, GREEN
AM/VE: AMARILLO/VERDE, YELLOW/GREEN

	Fecha	Nombre
Realizado	27/11/2020	D. MARTIN
Revisado	27/11/2020	A. SERRANO
Aprobado	27/11/2020	J. SIMON

gala gar SOLDADURA

GALA GAR
ZARAGOZA

Pagina 1 de 1

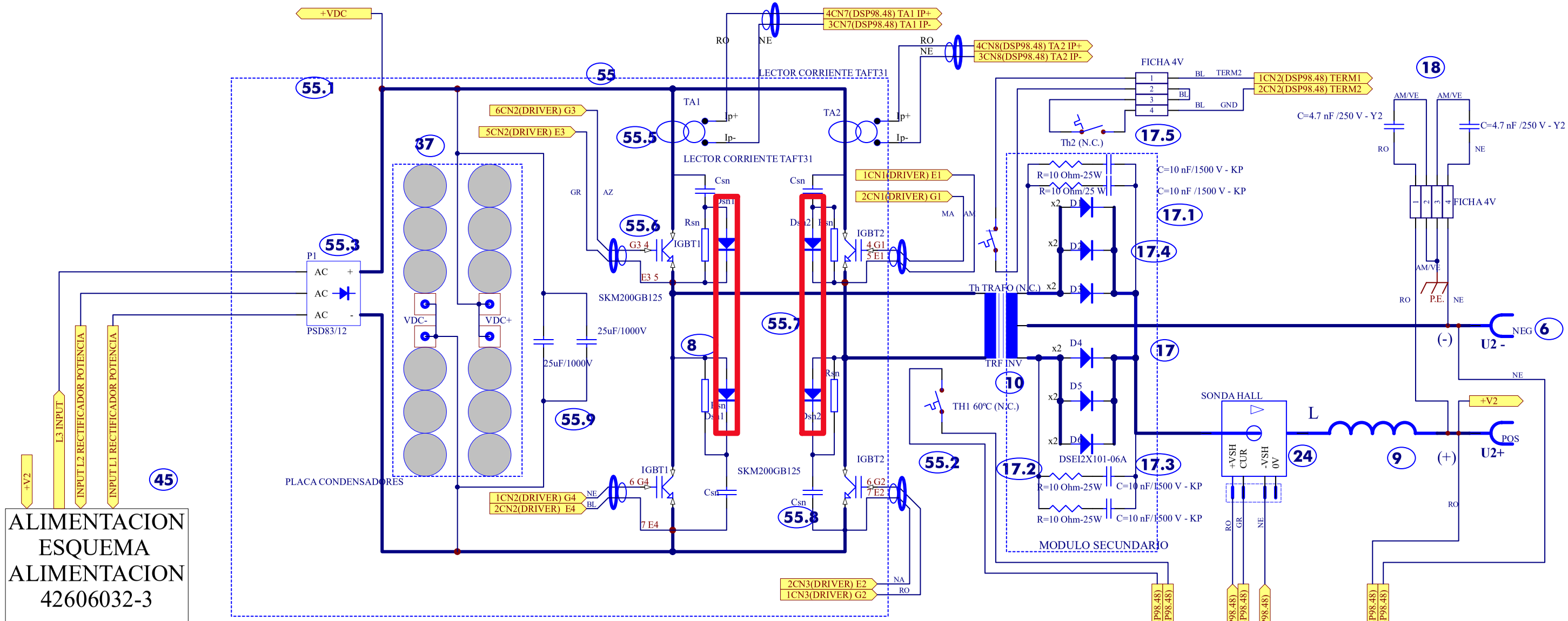
Fichero EE-42381200-V1_GPS_4000_DR_ADVANCED.SchDoc

Tamaño A2

Titulo
GPS 4000 DR ADVANCED

Codigo EE-42381200

Revision: V1



Dsn1, Dsn2= diodo DSEI 2X31-12B.
Csn=CONDENSADOR KP
4.7nF/1500V.
Rsn=22R/50W RB50/6

BRAIDED CABLE WITH TOROIDAL - CABLE TRENZADO CON TOROIDE

IDEN./COLOR.

RO: ROJO, RED
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GR: GRIS, GREY
MA: MARRON, BROWN
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AM/VE: AMARILLO/VERDE, YELLOW/GREEN

	Fecha	Nombre		
Realizado	04/06/2019	D. MARTIN	gala gar SOLDADURA	GALA GAR ZARAGOZA
Revisado	04/06/2019	A. SERRANO		Pagina 1 de 3
Aprobado	04/06/2019	J. SIMON	Fichero	42600200-1_GPS5000 DR TFT (POTENCIA).SchDoc
Tamaño A3	Titulo GPS 5000 DR TFT (POTENCIA)			Codigo 42600200 - 1
				Revision: V0

CN16(ALIMENTACION)

4CN8(DSP98.48) TA2 IP+
3CN8(DSP98.48) TA2 IP-
2CN2(DSP98.48) TERM2
1CN2(DSP98.48) TERM1
4CN7(DSP98.48) TA1 IP+
3CN7(DSP98.48) TA1 IP-

U2 -
6
U2+

SONDA HALL
24

R_L_TENS

+VDC
230V
0V(400V)
MA
AZ

54
DRIVER GPS5000
CN5 CN4 CN3 CN2 CN1

50
CN13 CN11 CN8 CN7 CN5 CN1

CN14
CN15
CN16
CN12
CN10

P.E.

2CN3(DRIVER) E2
1CN3(DRIVER) G2
6CN2(DRIVER) G3
5CN2(DRIVER) E3
2CN2(DRIVER) E4
1CN2(DRIVER) G4
2CN1(DRIVER) G1
1CN1(DRIVER) E1

4CN16(ALIMENTACION)
1CN16(ALIMENTACION)

P12 P6 P13 P11 P4 P1 P14 P7 P5 P9 P8 P10 P3 P2

CN2 FICHA 4V TERMICOS
CNP2 CNP CN3 (FLAT 1OV)
CN9 CN6 CN4

MODULO DE POTENCIA
ESQUEMA POTENCIA 42606032-1

DSP5000

45
ALIMENTACION
ESQUEMA ALIMENTACION
4260632-3

2CN3(ALIMENTACION)
4CN3(ALIMENTACION)
3CN4(ALIMENTACION)
1CN4(ALIMENTACION)
1CN7(ALIMENTACION)
2CN7(ALIMENTACION)
1CN9(ALIMENTACION)
2CN9(ALIMENTACION)
CN16(ALIMENTACION)

48VAC
048VAC
ELV
048VAC

20VAC
0V(48VAC)
1CN9(ALIMENTACION)
2CN9(ALIMENTACION)

13
CONTROL MOTOR GPS5000
ESQUEMA ALIMENTACION 42606032-3

4CN2(MOTOR 98.51) GND
6CN2(MOTOR 98.51) IN PTC
8CN2(MOTOR 98.51) GNA
9CN2(MOTOR 98.51) START M
10CN2(MOTOR 98.51) RIFOUT
5CN4(MOTOR 98.51) +VB
6CN4(MOTOR 98.51) STOP

9CN12V (REFR)
11CN12V (REFR)
10CN19H REMOTE

CN REFRIGERACION
CN INTERFACE
CN REMOTE
ESQUEMA ALIMENTACION
4260632-3

4
PLACA FRENTE
CN3 CN1(FLAT6V) CN2 (FLAT 1OV) CN4

SER_A
SER_B
+12VDC
GND(12VDC)
+12VDC
GND(12VDC)

GND TA TB TC TD GND TD GND

2
TECLADO TFT
P1 P2 P3 GAS P4 P5 P6

IDEN./COLOR.

RO: ROJO, RED
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GR: GRIS, GREY
MA: MARRON, BROWN
BL: BLANCO, WHITE
AZ: AZUL, BLUE
NA: NARANJA, ORANGE
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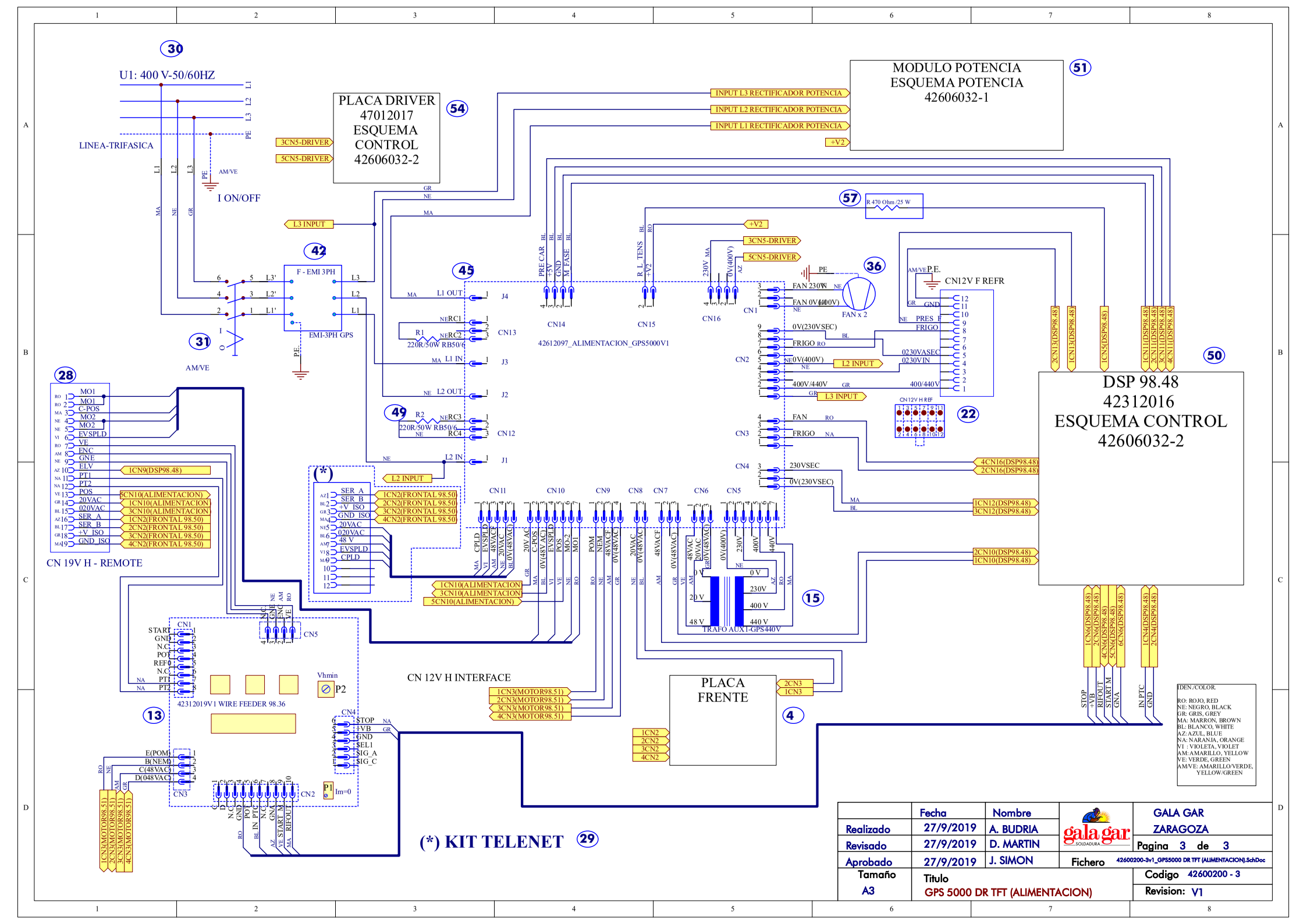
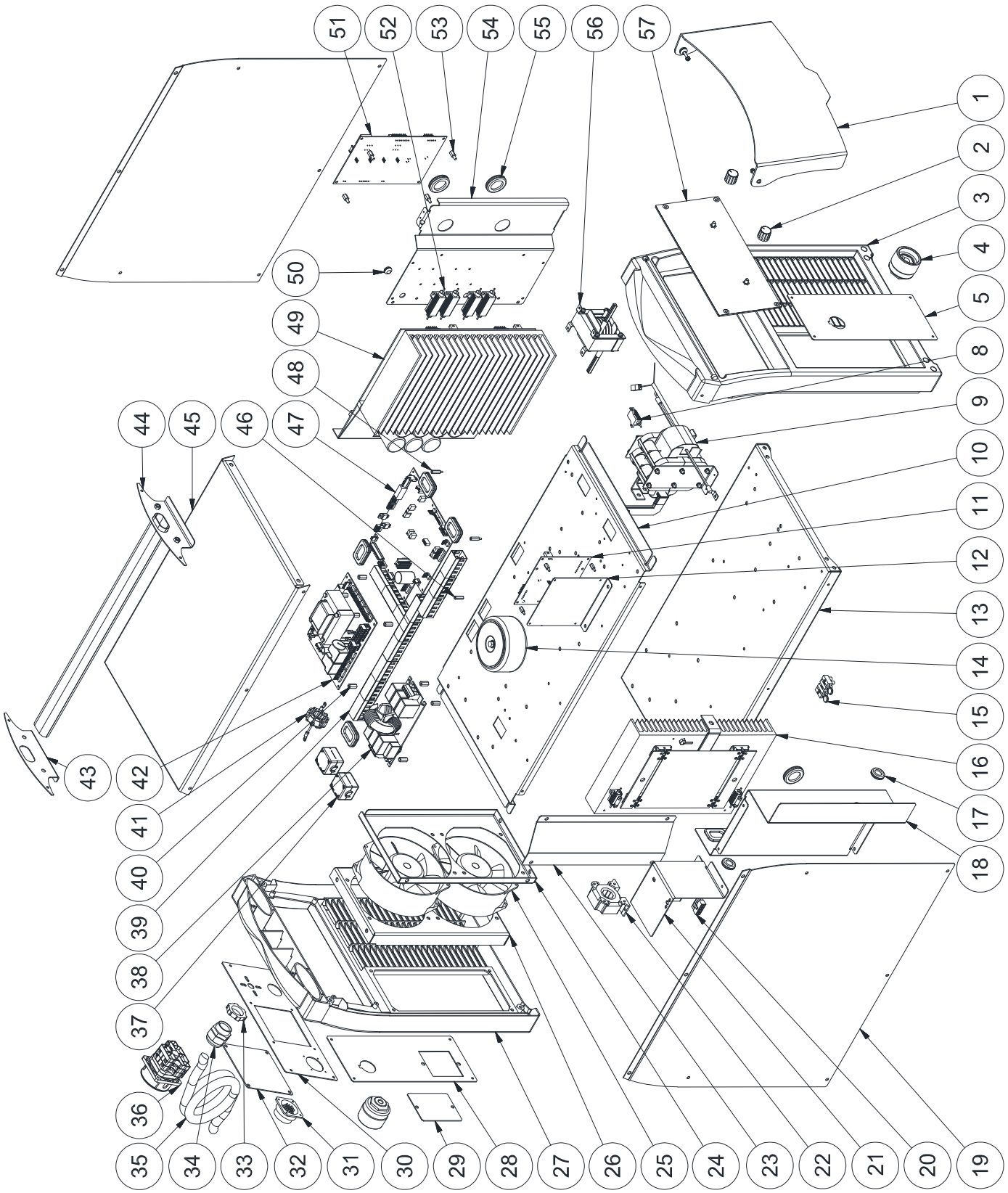
AM/VE: AMARILLO/VERDE, YELLOW/GREEN

	Fecha	Nombre		
Realizado	04/06/2019	D. MARTIN	gala gar SOLDADURA	GALA GAR ZARAGOZA
Revisado	04/06/2019	A. SERRANO		Pagina 1 de 1
Aprobado	04/06/2019	J. SIMON	Fichero	42600200-2_GPS5000 DR TFT (CONTROL).SchDoc
Tamaño A3	Titulo GPS 5000 DR(CONTROL)			Codigo 42600200 - 2
				Revision: V0


30
U1: 400 V-50/60HZ
LINEA-TRIFASICA
I ON/OFF
AM/VE
PLACA DRIVER
47012017
ESQUEMA
CONTROL
42606032-2
54
MODULO POTENCIA
ESQUEMA POTENCIA
42606032-1
51
INPUT L3 RECTIFICADOR POTENCIA
INPUT L2 RECTIFICADOR POTENCIA
INPUT L1 RECTIFICADOR POTENCIA
+V2
3CN5-DRIVER
5CN5-DRIVER
L3 INPUT
42
F - EMI 3PH
EMI-3PH GPS
31
45
L1 OUT
L1 IN
L2 OUT
L2 IN
J4
J3
J2
J1
CN13
CN12
49
R1
R2
220R/50W RB50/6
42612097_ALIMENTACION_GPS5000V1
CN14
CN15
CN16
CN1
CN2
CN3
CN4
57
R 470 Ohm /25 W
36
FAN x 2
FAN 230V
FAN 0V(400V)
CN12V F REFR
0V(230VSEC)
FRIGO
0230VASEC
0230VIN
400V/440V
400/440V
L2 INPUT
L3 INPUT
CN12V H REF
22
50
DSP 98.48
42312016
ESQUEMA CONTROL
42606032-2
28
CN 19V H - REMOTE
1CN9(DSP98.48)
5CN10(ALIMENTACION)
1CN10(ALIMENTACION)
3CN10(ALIMENTACION)
1CN2(FRONTAL 98.50)
2CN2(FRONTAL 98.50)
3CN2(FRONTAL 98.50)
4CN2(FRONTAL 98.50)
(*)
CN11
CN10
CN9
CN8
CN7
CN6
CN5
15
TRAFO AUX1-GPS440V
CN 12V H INTERFACE
PLACA
FRENTE
4
1CN3(MOTOR98.51)
2CN3(MOTOR98.51)
3CN3(MOTOR98.51)
4CN3(MOTOR98.51)
1CN2
2CN2
3CN2
4CN2
2CN3
1CN3
4CN16(DSP98.48)
2CN16(DSP98.48)
1CN12(DSP98.48)
3CN12(DSP98.48)
2CN10(DSP98.48)
1CN10(DSP98.48)
2CN13(DSP98.48)
1CN13(DSP98.48)
1CN5(DSP98.48)
1CN11(DSP98.48)
2CN11(DSP98.48)
3CN11(DSP98.48)
4CN11(DSP98.48)
1CN6(DSP98.48)
2CN6(DSP98.48)
4CN6(DSP98.48)
5CN6(DSP98.48)
6CN6(DSP98.48)
1CN4(DSP98.48)
2CN4(DSP98.48)
STOP
+VB
RIFOUT
START M
GNA
IN PTC
GND
IDEN./COLOR.
RO: ROJO, RED
NE: NEGRO, BLACK
GR: GRIS, GREY
MA: MARRON, BROWN
BL: BLANCO, WHITE
AZ: AZUL, BLUE
NA: NARANJA, ORANGE
VI : VIOLETA, VIOLET
AM: AMARILLO, YELLOW
VE: VERDE, GREEN
AM/VE: AMARILLO/VERDE, YELLOW/GREEN
CN5
CN1
CN4
CN2
CN3
Vhmin
P2
P1
Im=0
42312019V1 WIRE FEEDER 98.36
13
(*) KIT TELENET
29
Realizado 27/9/2019 A. BUDRIA
Revisado 27/9/2019 D. MARTIN
Aprobado 27/9/2019 J. SIMON
Tamaño A3
Titulo GPS 5000 DR TFT (ALIMENTACION)
GALA GAR
ZARAGOZA
Pagina 3 de 3
Fichero 42600200-3v1_GPS5000 DR TFT (ALIMENTACION).SchDoc
Codigo 42600200 - 3
Revision: V1

	REPUESTOS. **GPS 4000 DR ADVANCED** PARTS LIST. **GPS 4000 DR ADVANCED**	**REF: 423.81.200**	4-12--19	HR:42381200 V0 1/2

3Ph- 400V; 50/60 Hz



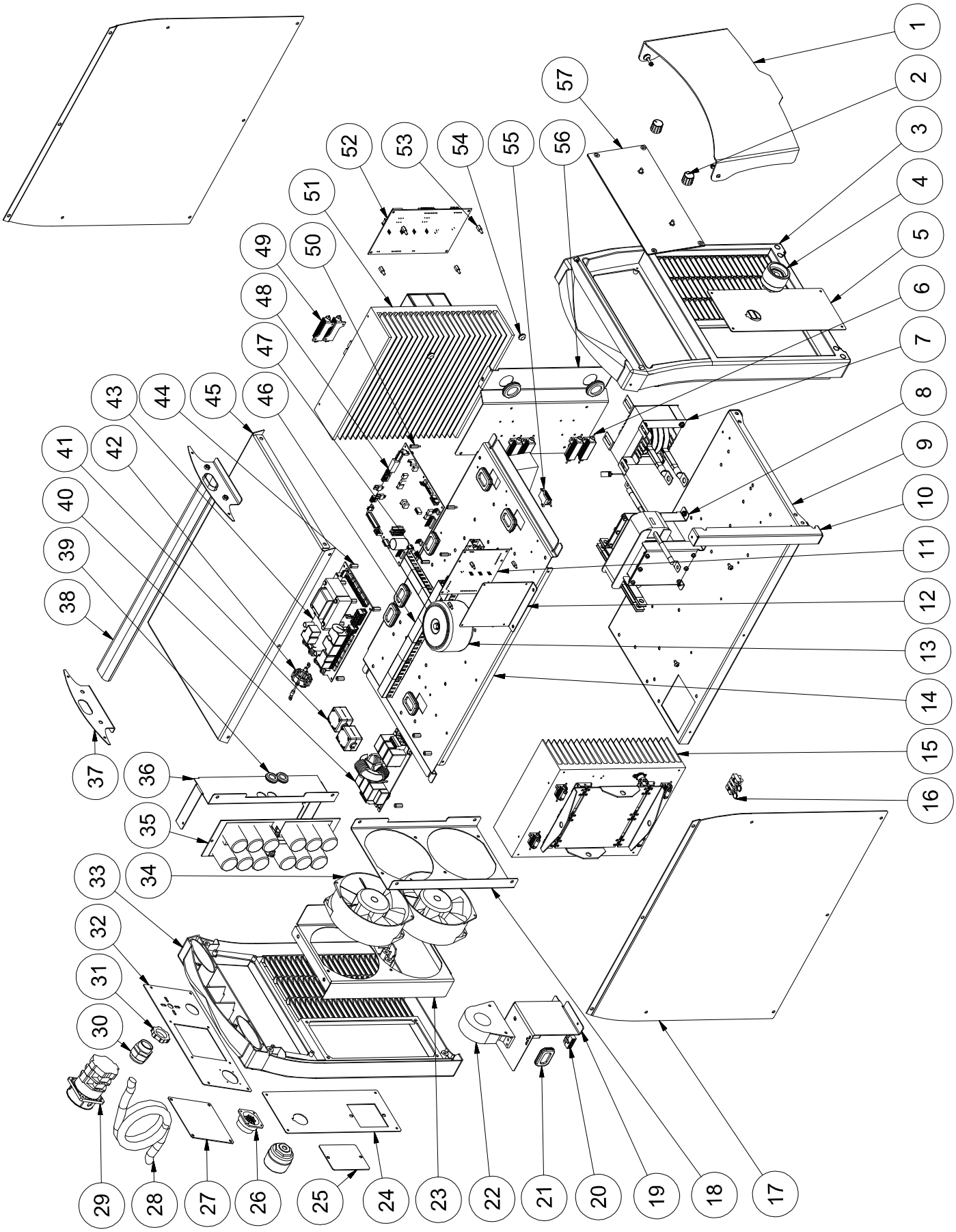
3Ph- 400V; 50/60 Hz

Nº	REF.	DESCRIPCION	
1	42312103	CONJUNTO TAPA	
2	63112005	MANDO POTENCIÓMETRO	
3	42313003	FRENTE PLÁSTICO	
4	47716035	CONECTOR HEMBRA	
5	42381562	PLACA FRENTE	
8	00550029	RESISTENCIA 470R/25W	
9	42312024	TRAFO POTENCIA	
10	42610028	PANEL CENTRAL HORIZONTAL	
11	42612219	PLACA ELECTRÓNICA CONTROL MOTOR	
12	42610075	SOPORTE PLACA CONTROL MOTOR	
13	42610001	CHASIS	
14	00557021	TRAFO AUXILIAR	
15	42612099	CONJUNTO FILTRO SOLDADURA	
16	42312023	MÓDULO SECUNDARIO	
17	00532067	PASAMUROS (DIAM.25,5MM)	
18	42381102	PANEL CENTRAL VERTICAL	
19	42300005	LATERAL FIJO	
20	42612045	MAZO CONEXIÓN WCS	
21	42610010	PROTECCIÓN CONEXIÓN	
22	00557601	SONDA HALL	
23	42310008	CANALIZADOR	
24	42310012	SOPORTE VENTILADORES	
25	53216023	VENTILADOR	
26	42310011	CÁMARA TURBO	
27	42313004	FRENTE POSTERIOR	
28	42610064	PLACA TAPA POSTERIOR	
29	42610564	TAPA CONEXIÓN WCS	
30	42610063	PLACA FRENTE POSTERIOR	

Nº	REF.	DESCRIPCION	V
31	00531221	CONECTOR HEMBRA 19V	
32	42610563	TAPA CONECTORES OPCIONALES	
33	49716220	TUERCA PRENSAESTOPAS	
34	49716120	PRENSAESTOPAS	
35	42312022	CABLE ENTRADA	
36	44016085	INTERRUPTOR	
37	42616098	FILTRO EMI ENCAPSULADO	
38	44016092	FILTRO EMI 3PH-35A	
39	00531079	REGLETA PROTECCIÓN CABLEADO	
40	00533019	SEPARADOR METAL H/H M4-15 mm	
41	47012098	FILTRO TIERRA	
42	42381597	PLACA ELECTR. CONTROL ALIMENTACIÓN	
43	42310029	SOPORTE CIERRE ASA	
44	42312013	ASA	
45	42610007	TAPA ENVOLVENTE	
46	00533023	SEPARADOR METAL H-H M3x17	
47	42381216	PLACA ELECTRÓNICA DSP	
48	00533008	SEPARADOR METAL M-H M3x17	
49	42312015	MÓDULO POTENCIA	
50	00532065	PASAMUROS Ø14	
51	47012017	PLACA ELECTRÓNICA DRIVER GTS	
52	00550028	RESISTENCIA 22R/50W	
53	00533004	SEPARADOR METAL M/H M4-10 mm	
54	42310032	SEPARADOR DRIVER-RESISTENCIAS SNUBBER	
55	43016040	PASAMUROS CIEGO (DIAM.39)	
56	42312025	REACTANCIA	
57	42381191	PLACA FRONTAL-DISPLAY	

	REPUESTOS. **GPS 5000 DR ADVANCED** PARTS LIST. **GPS 5000 DR ADVANCED** LISTE DES PIÈCES. **GPS 5000 DR ADVANCED**	**REF: 426.00.200**	04/12/19	HR:42600200 V0 1/4

3Ph- 400V ; 50/60 Hz

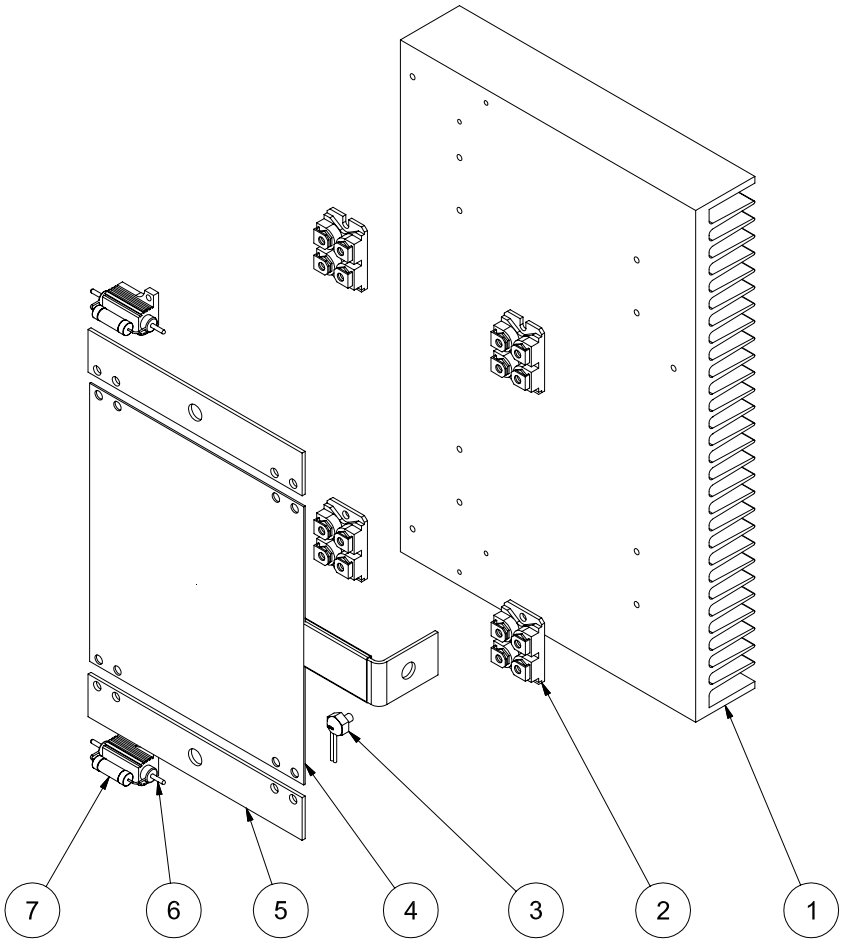


3Ph- 400V ; 50/60 Hz

Nº	REF.	DESCRIPCION
1	42312103	CONJ.TAPA GPS
2	63112005	MANDO POTENCIÓMETRO
3	42313003	FRENTE ANTERIOR PLÁSTICO
4	42616035	CONECTOR HEMBRA 70-95
5	42610062	PLACA FRENTE ANTERIOR
6	00550028	RESISTENCIA 22R/50W
7	42612025	CONJ.REACTANCIA
8	42612024	CONJ.TRAFO
9	42610001	CHASIS GPS
10	42610096	SOPORTE PANEL CENTRAL
11	42612219	PLACA ELECTRÓNICA CONTROL MOTOR
12	42610075	SOPORTE PLACA CONTROL MOTOR
13	00557021	TRAFO TOROIDAL
14	42610028	PANEL CENTRAL HORIZONTAL
15	42612023	MODULO SECUNDARIO
16	42612099	CONJUNTO FILTRO SOLDADURA
17	42300005	LATERAL FIJO
18	42610012	SOPORTE VENTILADOR
19	42610010	PROTECCION CONEXION
20	42612045	CONJ.CONEXION
21	43016040	PASAMUROS
22	00557605	SONDA HALL 500 A
23	42610011	CAMARA TURBO
24	42610064	PLACA TAPA POSTERIOR
25	42610564	TAPA CONEXIÓN REFRIGERACIÓN
26	00531221	CONECTOR BASE PANEL HEMBRA
27	42610563	TAPA CONECTORES OPCIONALES
28	44112029	CABLE ENTRADA
29	42616085	INTERRUPTOR

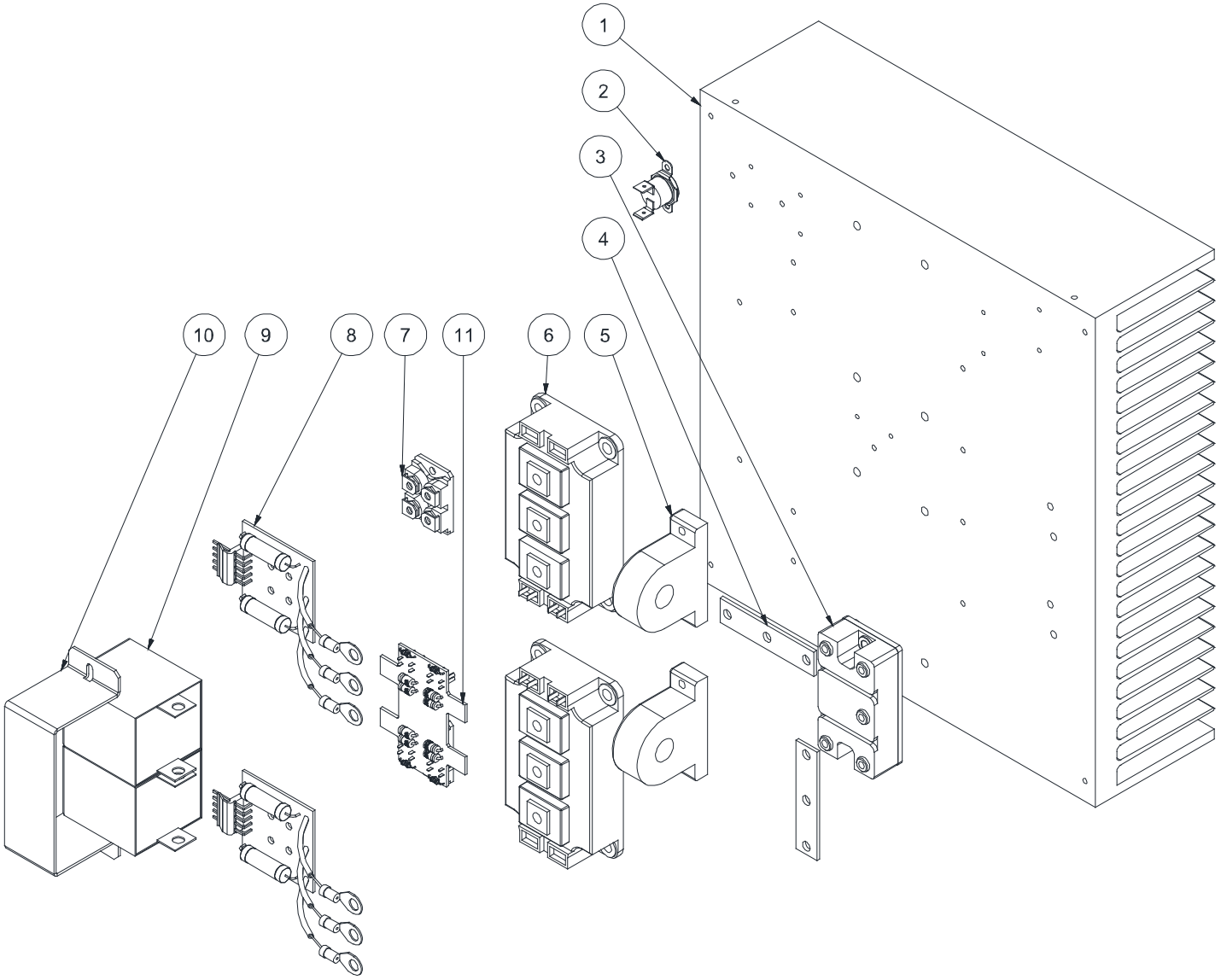
Nº	REF.	DESCRIPCION
30	49716120	PRENSAESTOPAS
31	49716220	TUERCA PRENSAESTOPAS
32	42610063	PLACA FRENTE POSTERIOR
33	42313004	FRENTE POSTERIOR PLÁSTICO
34	53216023	VENTILADOR
35	42612034	PLACA ELECTR.CONDENSADORES
36	42610081	SOPORTE CONDENSADORES
37	42310029	SOPORTE CIERRE ASA
38	42312013	CONJUNTO ASA
39	00532067	PASAMUROS
40	44016092	FILTRO EMI
41	42616098	FILTRO EMI ENCAPSULADO
42	47012098	FILTRO TIERRA
43	42612097	PLACA ELECTR.CONTROL ALIMENT.
44	00533019	SEPARADOR METAL H/H M4-15 mm
45	42610007	TAPA ENVOLVENTE GPS DR
46	00531079	REGLETA PROTECCION CABLEADO
47	00533023	SEPARADOR METAL
48	42612216	PLACA ELECTRONICA DSP
49	00550032	RESISTENCIA 220R/50W
50	00533008	SEPARADOR METAL M-H M3x17
51	42612015	MÓDULO PRIMARIO
52	47012017	PLACA ELECTRÓNICA DRIVER
53	00533004	SEPARADOR METAL M/H M4-10 mm
54	00532065	PASAMUROS
55	00550029	RESISTENCIA 470R/25W
56	42610032	SOPORTE DRIVER-RESIST.SNUBBER
57	42612091	CONJ. PLACA FRONTAL-DISPLAY

	REPUESTOS. **MODULO SECUNDARIO GPS** PARTS LIST. **SECONDARY MODULE GPS** LISTE DES PIÈCES. **MODULE SECONDAIRE GPS**	**REF: 423.12.023**	13-01-12	HR:42312023 V1 1/1

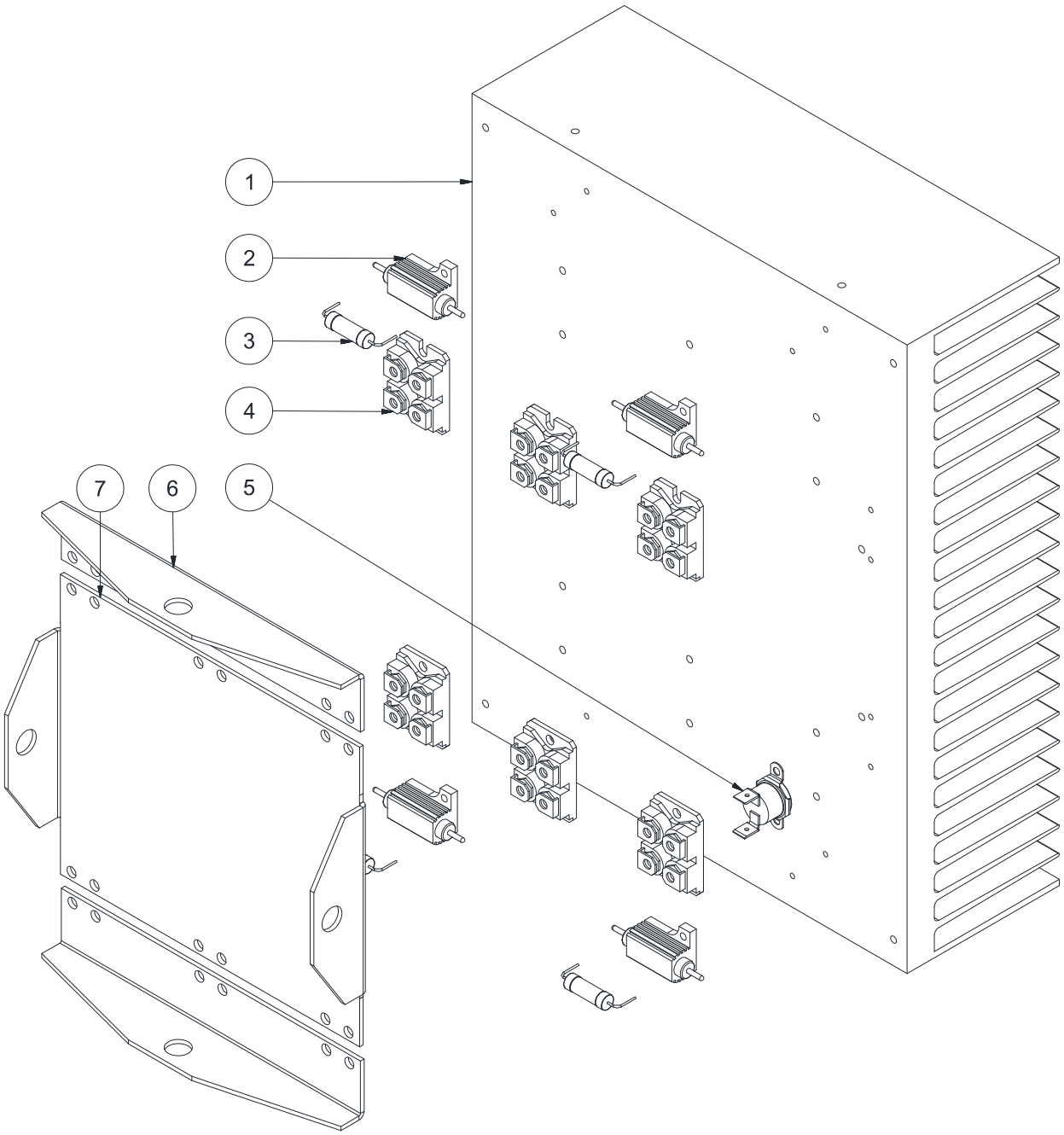


Nº	REF.	DESCRIPCION	DESCRIPTION	DESCRIPTION	V
1	42316123	DISIPADOR	DISSIPATER	DISSIPATEUR	
2	44016123	DIODO RECTIFICADOR	RECTIFYING DIODE	DIODE RECTIFICATIVE	
3	552057	TERMICO DE 70° (N.C.)	THERMAL DEVICE	TERMIQUE DISPOSITIF	
4	42312033	CJTO.CONEXION UNION 4 DIODOS	CONNECTION SET UNION 4 DIODES	ENSEMBLE CONNECTION UNION 4 DIODES	
5	42318032	CONEXIÓN UNION 2 DIODOS	CONNECTION UNION 2 DIODES	CONNECTION UNION 2 DIODES	
6	550027	RESISTENCIA 10R/25W	RESISTANCE 10R/25W	RESISENTENCE 10R/25W	
7	551047	CONDENSADOR KP 10nF/1500V	CONDENSER KP 10Nf/1500V	CONDENSATEUKP	

V	N °	~~REF~~	→	REF	IMD	observaciones



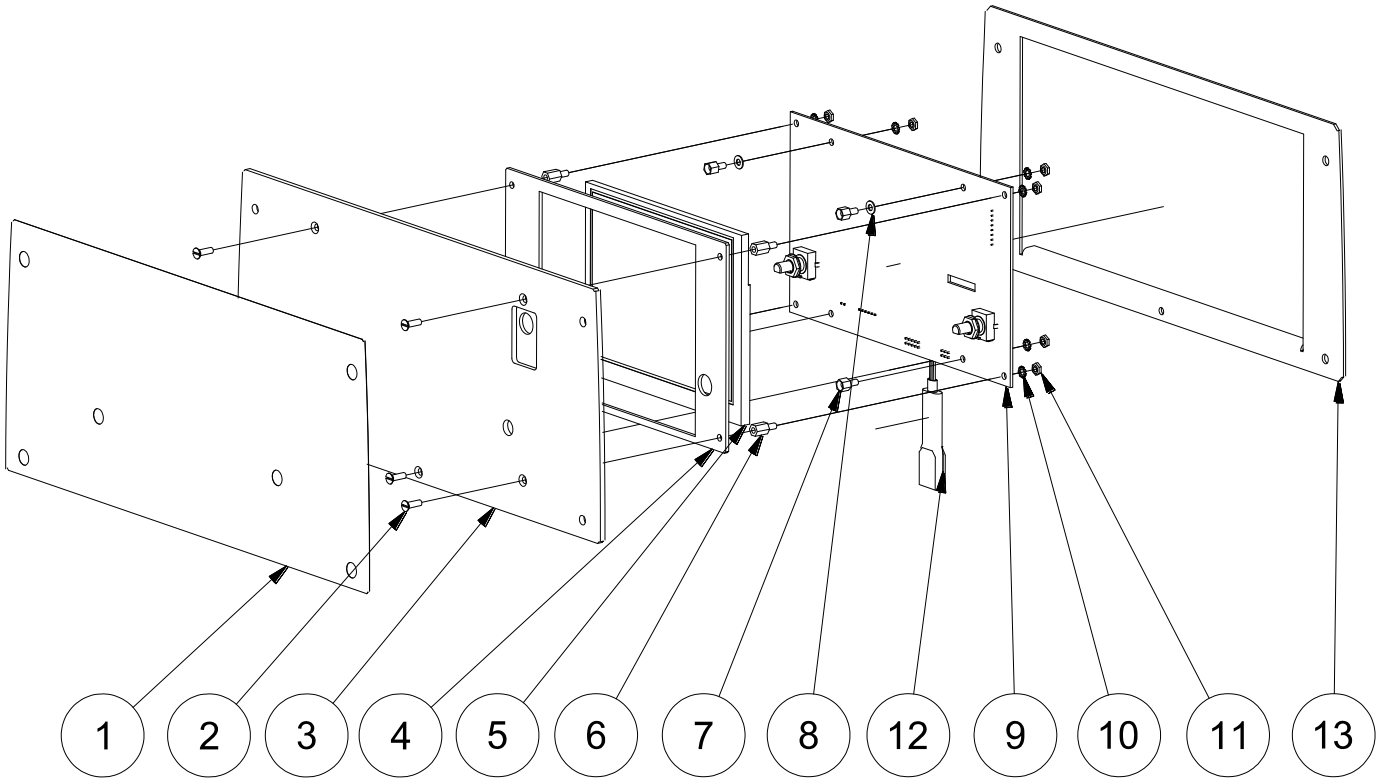
Nº	REF.	DESCRIPCION	
1	42616115	DISIPADOR MÓDULO PRIMARIO GPS 5000	
2	00552059	TERMICO DE 60º (N.C.) (RST45ºC)-FAST6,3	
3	00555006	RECTIFICADOR TRIFASICO 100A/1200V	
4	42618325	PLETINA UNION MODULO PRIMARIO	
5	00557025	LECTOR CORRIENTE MODULO PRIM.GPS5000	
6	00554402	MODULO IGBT 200A/1200V	
7	00555114	DIODO DOBLE 30A/1200V	
8	42612093	PLACA FILTRO DIODOS GPS 5000	
9	00551078	CONDENSADOR 25uF/1000V	
10	42610515	SOPORTE SUJECCION CONDENSADORES	
11	42612094	PLACA PUERTA IGBT 5000 DR	



Nº	REF.	DESCRIPCION	
1	42616123	DISIPADOR MÓDULO SECUNDARIO GPS 5000	
2	00550027	RESISTENCIA 10R/25W	
3	00551047	CONDENSADOR KP 10 nF/1500V	
4	00555113	DIODO SALIDA ISOTOP 600V	
5	00552060	TERMICO DE 70° (N.C.) (RST55°C)-FAST6,3	
6	42618035	CONEXION UNION 3 DIODOS GPS 5000	
7	42318036	CONEXION UNION 6 DIODOS GPS 5000	

REPUESTOS. **CONJ. PLACA FRONTAL-GPS-TFT 5000 DR** PARTS LIST. **CONJ. PLACA FRONTAL-GPS-TFT 5000 DR** LISTE DES PIÈCES. **CONJ. PLACA FRONTAL-GPS-TFT 5000 DR**	**REF: 426.12.091**	04/06/20	HR:42612091 V0 1/2

3Ph- 400V ; 50/60 Hz



3Ph- 400V ; 50/60 Hz

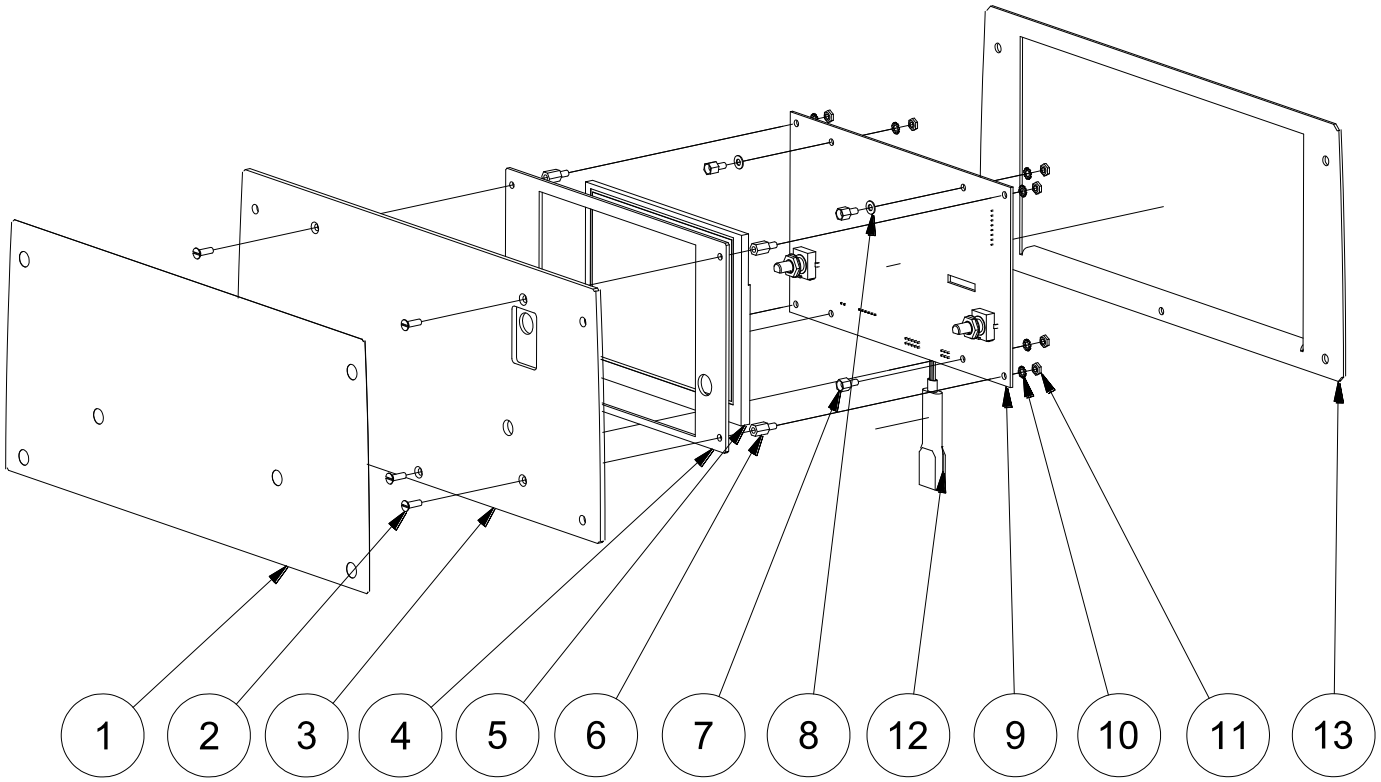
Nº	REF	DESCRIPCION
1	42616191	TECLADO ADHESIVO TFT GPS
2	00010159	TORNILLO DIN 963 M-3X8 ZINCADO
3	42613291	PLACA METACRILATO FRONTAL
4	47013391	PLACA METACRILATO MARCO GUIA
5	47016491	DISPLAY TFT 5.6"
6	00533014	SEPARADOR METAL M-H M3x8
7	00533017	SEPARADOR METAL M/H M3-5MM
8	00010002	ARANDELA PLANA DE 3 CINCADA
9	42612242	PLACA ELECTRONICA FRONTAL CONTOL GPS5000DR TFT
10	00010028	ARANDELA DIN 6798 A 3,2
11	00010160	TUERCA HIERRO EXAG. D-934 M-3 ZINC
12	42612092	PLACA ADAPTACION CONECTORES 4V-6V
13	42684226	MARCO REFUERZO CONJ. PLACA FRONTAL

Nº	REF	DESCRIPTION
1	42616191	TFT GPS ADHESIVE KEYBOARD
2	00010159	SCREW DIN 963 M-3X8 ZINC-PLATED
3	42613291	METHACRYLATE FACEPLATE
4	47013391	METHACRYLATE PLATE GUIDE FRAME
5	47016491	DISPLAY TFT 5.6"
6	00533014	METAL SEPARATOR M-H M3x8
7	00533017	METAL SEPARATOR M/H M3-5MM
8	00010002	FLAT WASHER, 3 ZINC-PLATED
9	42612242	ELECTRONIC FRONT PLATE CONTROL GPS5000DR TFT
10	00010028	WASHER DIN 6798 A 3,2
11	00010160	HEXAGONAL IRON NUT. D-934 M-3 ZINC
12	42612092	CONNECTOR ADAPTER PLATE 4V-6V
13	42684226	JOINT REINFORCEMENT FRAMEWORK. FRONT PLATE

Nº	REF	DESCRIPTION
1	42616191	CLAVIER GPS TFT
2	00010159	VIS DIN 963 M-3X8 ZINGUÉE
3	42613291	PLAQUE FRONTALE EN MÉTHACRYLATE
4	47013391	CADRE DE GUIDAGE DES PLAQUES DE MÉTHACRYLATE
5	47016491	DISPLAY TFT 5.6"
6	00533014	SÉPARATEUR DE MÉTAUX M-H M3x8
7	00533017	SÉPARATEUR DE MÉTAUX M/H M3-5MM
8	00010002	RONDELLE PLATE, 3 ZINGUÉE
9	42612242	PLAQUE FRONTALE ÉLECTRONIQUE CONTOL GPS5000DR TFT
10	00010028	WASHER DIN 6798 A 3,2
11	00010160	ÉCROU HEXAGONAL EN FER. D-934 M-3 ZINC
12	42612092	PLAQUE D'ADAPTATION DU CONNECTEUR 4V-6V
13	42684226	CADRE COMMUN DE RENFORCEMENT. PLAQUE AVANT

REPUESTOS. **CONJ. PLACA FRONTAL-GPS-TFT 4000 DR** PARTS LIST. **CONJ. PLACA FRONTAL-GPS-TFT 4000 DR** LISTE DES PIÈCES. **CONJ. PLACA FRONTAL-GPS-TFT 4000 DR**	**REF: 423.81.191**	04/06/20	HR:42381191 V0 1/2

3Ph- 400V ; 50/60 Hz



3Ph- 400V ; 50/60 Hz

Nº	REF	DESCRIPCION
1	42616191	TECLADO ADHESIVO TFT GPS
2	00010159	TORNILLO DIN 963 M-3X8 ZINCADO
3	42613291	PLACA METACRILATO FRONTAL
4	47013391	PLACA METACRILATO MARCO GUIA
5	47016491	DISPLAY TFT 5.6"
6	00533014	SEPARADOR METAL M-H M3x8
7	00533017	SEPARADOR METAL M/H M3-5MM
8	00010002	ARANDELA PLANA DE 3 CINCADA
9	42381242	PLACA ELECTRONICA FRONTAL CONTOL GPS4000DR TFT
10	00010028	ARANDELA DIN 6798 A 3,2
11	00010160	TUERCA HIERRO EXAG. D-934 M-3 ZINC
12	42612092	PLACA ADAPTACION CONECTORES 4V-6V
13	42684226	MARCO REFUERZO CONJ. PLACA FRONTAL

Nº	REF	DESCRIPTION
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3	42613291	METHACRYLATE FACEPLATE
4	47013391	METHACRYLATE PLATE GUIDE FRAME
5	47016491	DISPLAY TFT 5.6"
6	00533014	METAL SEPARATOR M-H M3x8
7	00533017	METAL SEPARATOR M/H M3-5MM
8	00010002	FLAT WASHER, 3 ZINC-PLATED
9	42381242	ELECTRONIC FRONT PLATE CONTROL GPS4000DR TFT
10	00010028	WASHER DIN 6798 A 3,2
11	00010160	HEXAGONAL IRON NUT. D-934 M-3 ZINC
12	42612092	CONNECTOR ADAPTER PLATE 4V-6V
13	42684226	JOINT REINFORCEMENT FRAMEWORK. FRONT PLATE

Nº	REF	DESCRIPTION
1	42616191	CLAVIER GPS TFT
2	00010159	VIS DIN 963 M-3X8 ZINGUÉE
3	42613291	PLAQUE FRONTALE EN MÉTHACRYLATE
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6	00533014	SÉPARATEUR DE MÉTAUX M-H M3x8
7	00533017	SÉPARATEUR DE MÉTAUX M/H M3-5MM
8	00010002	RONDELLE PLATE, 3 ZINGUÉE
9	42381242	PLAQUE FRONTALE ÉLECTRONIQUE CONTOL GPS4000DR TFT
10	00010028	WASHER DIN 6798 A 3,2
11	00010160	ÉCROU HEXAGONAL EN FER. D-934 M-3 ZINC
12	42612092	PLAQUE D'ADAPTATION DU CONNECTEUR 4V-6V
13	42684226	CADRE COMMUN DE RENFORCEMENT. PLAQUE AVANT

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