



WELD THE WORLD

Discovery 161MF Discovery 161MF TP

Instruction Manual







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1 INTRODUCTION

 	<h2 style="margin: 0;">IMPORTANT!</h2>
<p><i>This handbook must be handed over to the user prior to installation and commissioning of the unit. Read the “General prescriptions for use” handbook supplied separately from this manual before installing and commissioning the unit.</i></p> <p><i>The meaning of the symbols in this manual and the associated precautionary information are given in the “General prescriptions for use”.</i></p> <p><i>If the “General prescriptions for use” are not present, it is mandatory to request a replacement copy from the manufacturer or from your dealer.</i></p> <p style="text-align: center;"><i>Retain these documents for future consultation.</i></p>	




KEY

	<h2 style="margin: 0;">DANGER!</h2>
<p><i>This pictogram warns of danger of death or serious injury.</i></p>	

	<h2 style="margin: 0;">WARNING!</h2>
<p><i>This pictogram warns of a risk of injury or damage to property.</i></p>	

	<h2 style="margin: 0;">CAUTION!</h2>
<p><i>This pictogram warns of a potentially hazardous situation.</i></p>	

	<h2 style="margin: 0;">INFORMATION!</h2>
<p><i>This pictogram gives important information concerning the execution of the relevant operations.</i></p>	

	<p>This symbol identifies an action that occurs automatically as a result of a previous action.</p>
	<p>This symbol identifies additional information or a reference to a different section of the manual containing the associated information.</p>
	<p>This symbol identifies a reference to a chapter of the manual.</p>

NOTE

The figures in this manual are simply provided to depict the operations and may contain differences with respect to the actual equipment to which they refer.

1.1 INTRODUCTION

The Discovery 161MF is a compact and heavy duty generator for MIG/MAG welding. The reduced weight and compact size allow it to be carried wherever it is needed: it is designed to give you maximum power, reliability and efficiency. Wire reels of up to 200 mm in diameter can be mounted.

Sound alarm. A sound alarm has been provided to protect the power generator: it blocks the primary inverter in the event that the average welding current should exceed 160 A for more than 0.6 seconds.

Accessories that can be connected to the unit:

- Overcut device to protect the power source from power supply voltage spikes that could damage the electrical components.
- Power source trolley.
- Spool gun torch.

The DISCOVERY 161MF power generators can be supplied together with the 6 meters MIG SPOOL GUN torch with 1 kg D100 wire spools; in the MIG welding mode they are able to weld SG2 solid wires, 0.6-0.8 mm stainless steel wires, 0.6-0.8-1.0 mm aluminum wires and 0.9-1.0 mm cored wires with or without gas shielding.

The SPOOL GUN torch features:

- A wire drawing motor with two rollers, one above the other, on the torch.
- A spool support reel for 1 kg D100 wire spools.
- A 6 meters long torch.

Consult your dealer for an updated list of accessories and the latest available new products.

2 INSTALLATION



DANGER! **Lifting and positioning**

Read the warnings highlighted by the following symbols in the "General prescriptions for use".

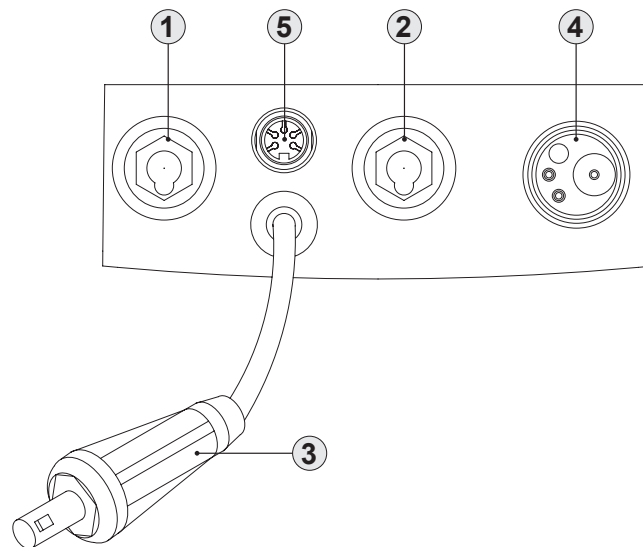


2.1 CONNECTIONS TO THE ELECTRICAL MAINS NETWORK

The characteristics of the mains power supply to which the equipment shall be connected are given in the section entitled "7 TECHNICAL DATA" on page 18.

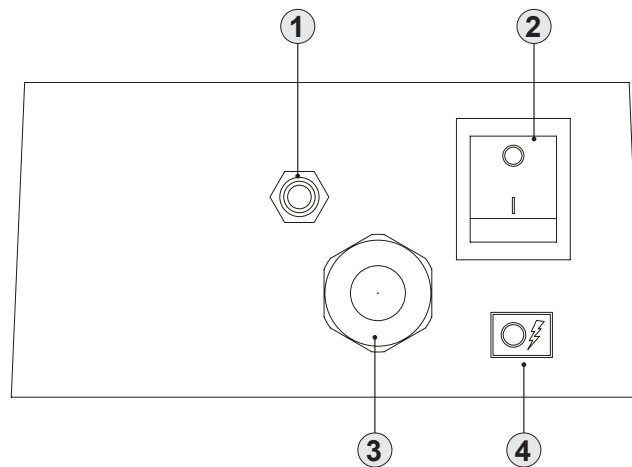
The machine can be connected to motorgenerators provided their voltage is stabilised.
Connect/disconnect the various devices with the machine switched off.

2.2 FRONT PANEL

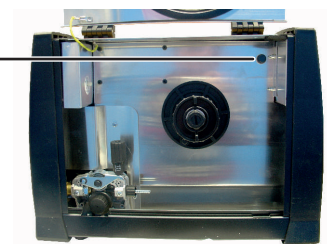
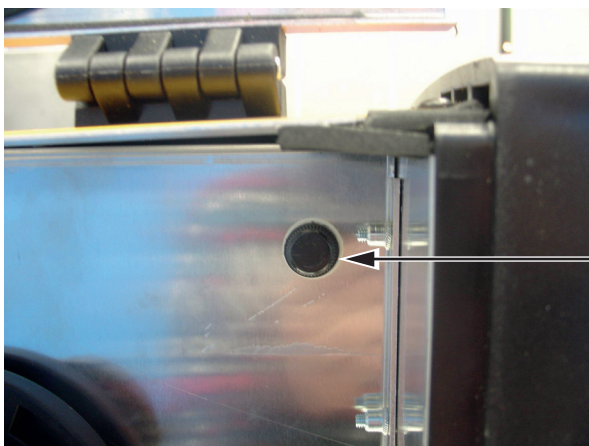


1. Negative pole welding socket.
2. Positive pole welding socket.
3. Polarity selector cable.
4. EURO TORCH welding socket.
5. Connector for logic signals of TIG torch.

2.3 REAR PANEL



- Connector for gas feed hose [Part. 1].
 - cylinder → power source
- Welding power source ON/OFF switch [Part. 2].
- Power cable [Part. 3].
 - Total length (including internal part): 2,5 m
 - Number and cross section of wires: 3 x 2,5 mm²
 - Power plug type: Schuko
- (Only DISCOVERY 161MF TP version) [Part. 4].
 - Led indicating excess voltage protection.
 - A built-in Total Protection Device saves the inverter components from overvoltage and makes the unit suitable for use with unstable power supply and motor-generators.



- Wire feed motor power transformer fuse.
 - Type: Delayed acting (T)
 - Amperage: 800 mA
 - Voltage: 250 V

3 PREPARING FOR MMA WELDING



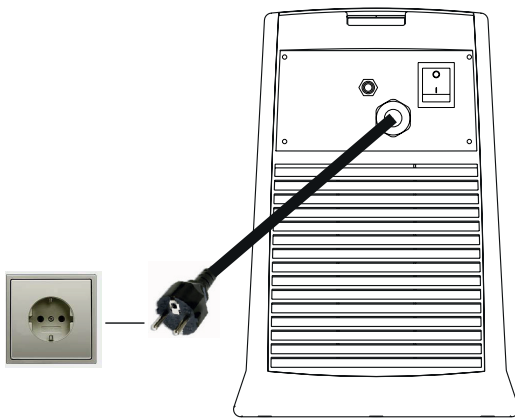
DANGER!
Electric shock hazard!

Leggere le avvertenze segnalate dai seguenti simboli nelle "Disposizioni d'uso generali".

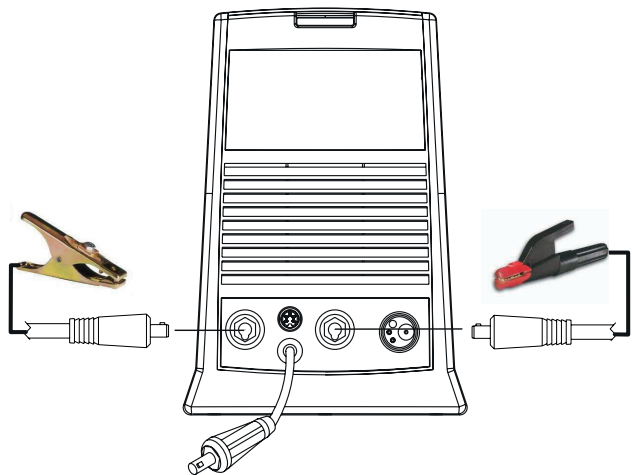


Preparazione MMA (polarità per elettrodo basico)

FRONT VIEW

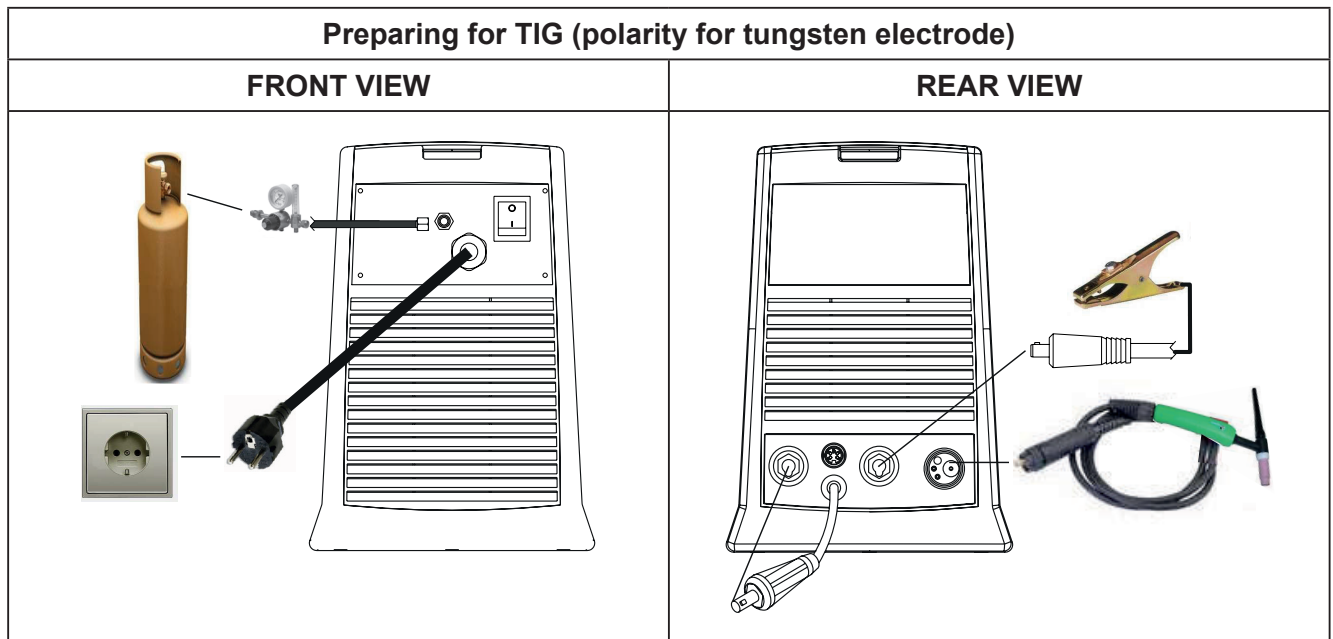


REAR VIEW



1. Set the welding power source ON/OFF switch to "O" (unit de-energized).
2. Plug the power cable plug into a mains socket outlet.
3. Choose the electrode based on the type of material and thickness of the workpiece to be welded.
4. Insert the electrode in the electrode holder.
5. Connect the electrode holder cable to the welding socket based on the polarity requested by the type of electrode used.
6. Connect the plug of the ground clamp to the welding socket on the basis of the polarity required.
7. Connect the earth clamp to the workpiece being processed.
8. Set the welding power source ON/OFF switch to "I" (unit powered).
9. Select the following welding mode on the user interface: MMA
10. Set the required welding parameter values on the user interface.
The system is ready to start welding.

3.1 PREPARING FOR TIG WELDING

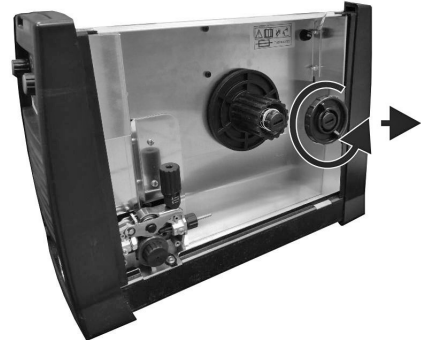


1. Set the welding power source ON/OFF switch to "O" (unit de-energized).
2. Plug the power cable plug into a mains socket outlet.
3. Connect the gas hose from the welding gas cylinder to the rear gas socket.
4. Open the cylinder gas valve.
5. Connect the TIG torch plug to the EURO TORCH welding socket.
6. Choose the electrode based on the type of material and thickness of the workpiece to be welded.
7. Insert the electrode in the TIG torch.
8. Connect the plug of the polarity selector cable to the welding socket on the basis of the polarity required.
9. Connect the plug of the ground clamp to the welding socket on the basis of the polarity required.
10. Connect the earth clamp to the workpiece being processed.
11. Set the welding power source ON/OFF switch to "I" (unit powered).
12. Select the following welding mode on the user interface: DC TIG
13. Set the required welding parameter values on the user interface.
The system is ready to start welding.

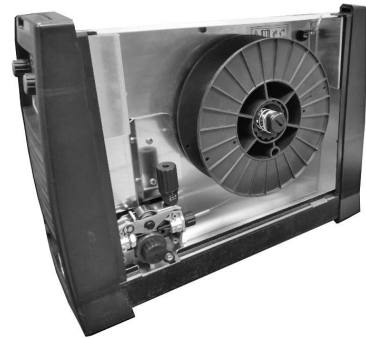
3.2 PREPARING FOR MIG/MAG WELDING

3.2.1 WIRE SPOOL POSITIONING

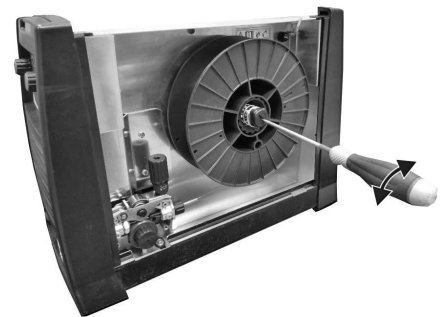
1. Open the unit side door to gain access to the spool compartment.
2. Unscrew the cap of the spool holder.



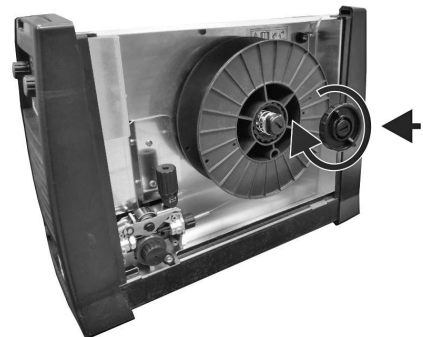
3. Choose the wire on the basis of the workpiece thickness and material type.
4. Fit the spool in the spool holder, ensuring it is located correctly.



5. Adjust the spool holder braking system by tightening/loosening the screw in such a way that the wire feed force is not excessive and when the spool stops rotating no excess wire is released.

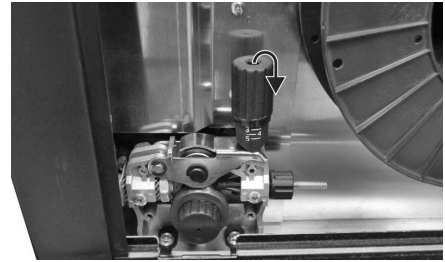


6. Refit the plug.

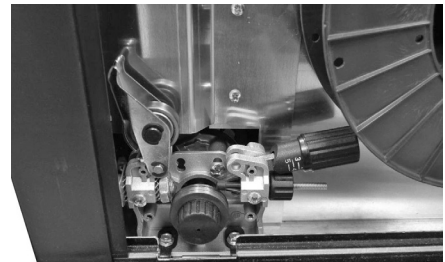


3.2.2 POSITIONING THE WIRE IN THE WIRE FEEDER

1. Lower the wire feeder pressure devices.



2. Raise the wire feeder pressure arms.



3. Check that the feed rolls are suitable for the wire gauge.

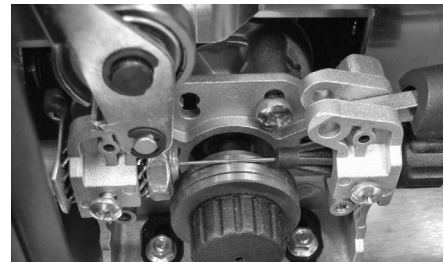
(See § “9.2 DISCOVERY 161MF TP”)

The diameter of the roll groove must be compatible with the diameter of the welding wire.

The roll must be of suitable shape in relation to the composition of the wire material.

The groove must feature a “U” profile for soft materials (Aluminium and its alloys, CuSi3).

The groove must be “V” shaped for harder materials (SG2-SG3, stainless steels).




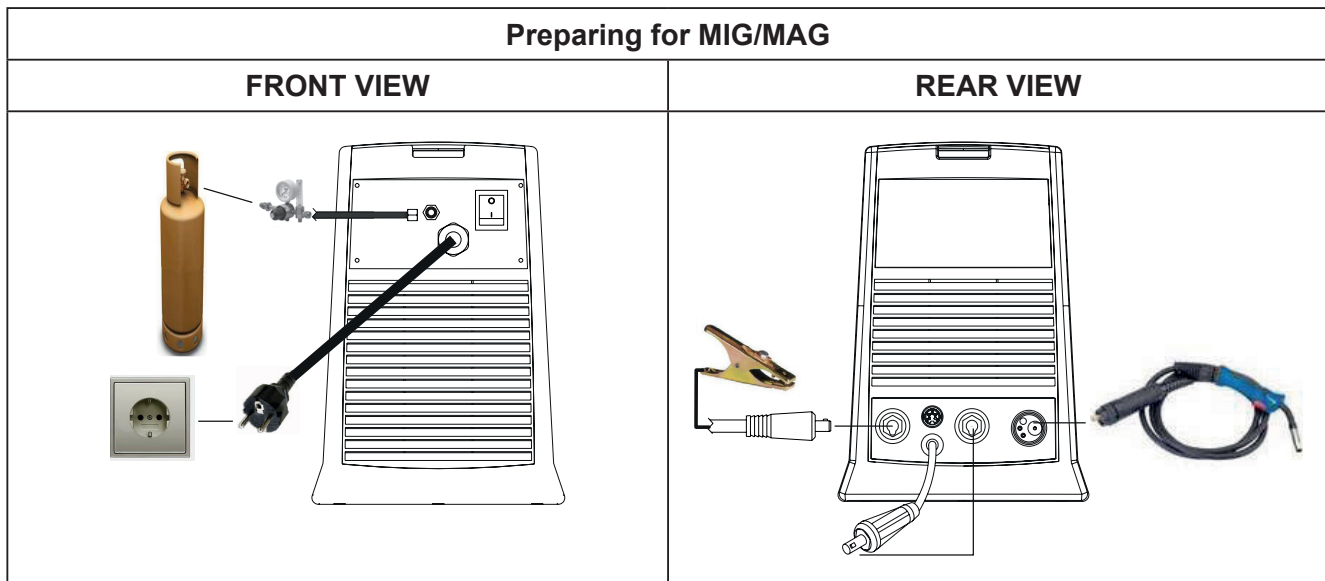
4. Feed the wire between the wire feeder rolls and insert it into the MIG/MAG TORCH connector plug.
5. Make sure the wire is located correctly in the roll grooves.

6. Close the wire feeder pressure arms.
7. Adjust the pressure system so that the arms press the wire with a force that does not deform it while also ensuring constant feed rate without slipping.
8. Close the spool compartment door in the side of the unit.



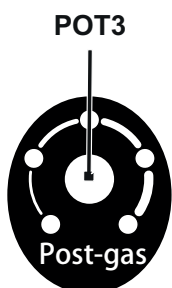
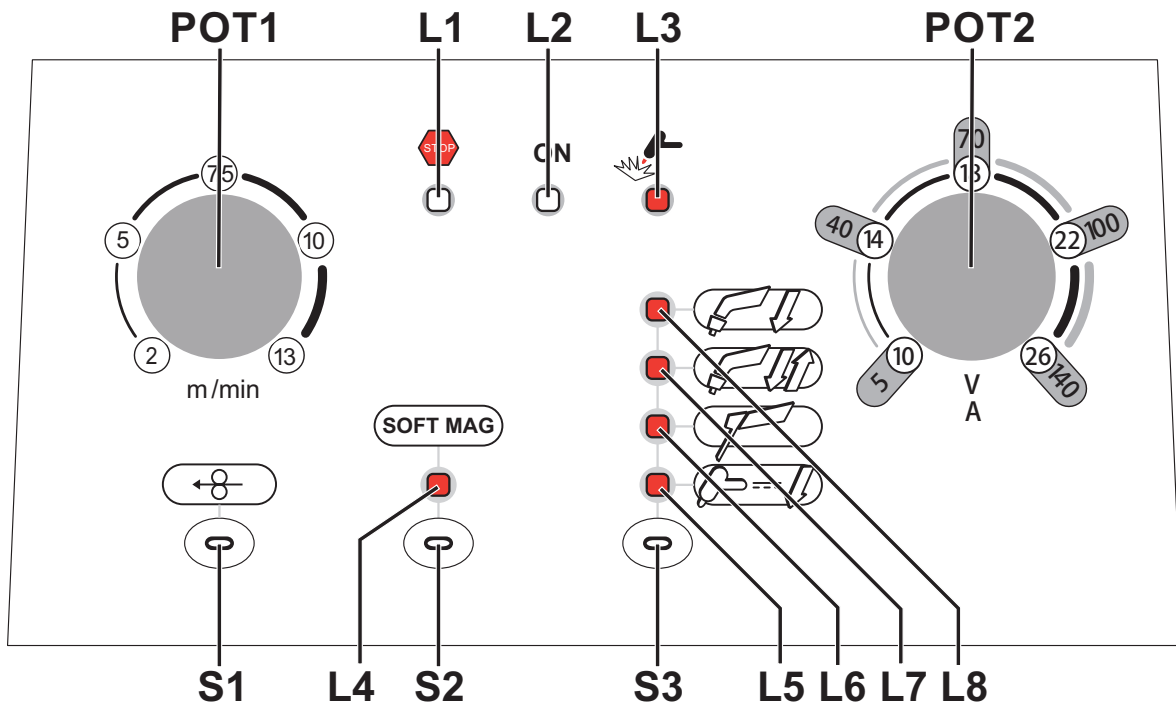
3.2.3 CONNECTIONS TO SOCKETS

1. Set the welding power source ON/OFF switch to "O" (unit de-energized).
 2. Plug the power cable plug into a mains socket outlet.
 3. Connect the gas hose from the welding gas cylinder to the rear gas socket.
 4. Open the cylinder gas valve.
 5. Connect the MIG/MAG torch plug to the EURO TORCH welding socket.
 6. Connect the plug of the ground clamp to the welding socket on the basis of the polarity required.
 7. Connect the plug of the polarity selector cable to the welding socket on the basis of the polarity required.
 8. Connect the earth clamp to the workpiece being processed.
 9. Set the welding power source ON/OFF switch to "I" (unit powered).
 10. Select the following welding mode on the user interface: MIG/MAG.
 11. Feed the wire through the torch until it protrudes from the tip, pressing button  on the unit's user interface.
- ① The advancement speed is adjustable by means of the POT1 potentiometer.
12. Select the torch trigger procedure on the user interface.
 13. Set the required welding parameter values on the user interface.
 14. The system is ready to start welding.














4 COMMISSIONING

4.1 USER INTERFACE



The picture shows the adjustment panel of MIG/MAG welding parameters, accessible by opening the wire feeding unit door.

CODE	SYMBOL	DESCRIPTION
L1		This LED illuminates to show an anomaly in the operating conditions. ① See § "5 ALARMS MANAGEMENT" at page 15
L2	ON	This LED comes ON when the machine is switched on.
L3		This LED illuminates to confirm the presence of power on the output sockets.
L5		This LED illuminates to show that the following welding mode is selected: 2 stroke procedure MIG/MAG
L6		This LED illuminates to show that the following welding mode is selected: 4 stroke procedure MIG/MAG
L7		This LED illuminates to show that the following welding mode is selected: MMA
L8		This LED illuminates to show that the following welding mode is selected: 2 stroke procedure TIG DC

CODE	SYMBOL	DESCRIPTION
S1		MIG/MAG mode: this button activates wire feed to insert it through the MIG/MAG torch.
S2	SOFT MAG	MIG/MAG mode: when the corresponding led is on it means the inductance is high and a soft welding arc is obtained; when the led is off it means the inductance is low and a dry welding arc is obtained.
L4		
S3		This button selects the welding mode.
P0T1		MIG/MAG mode: the potentiometer sets the value of the following parameter: WIRE FEED RATE.
P0T2		MIG/MAG mode: the potentiometer sets the value of the following parameter: WELDING VOLTAGE. MMA mode, TIG mode: the potentiometer sets the value of the following parameter: WELDING CURRENT.
P0T3		MIG/MAG mode: the potentiometer sets the value of the following parameter: POST-GAS.

4.2 UNIT POWER-UP

Set the welding power source ON/OFF switch to “I” to switch on the unit.

First power-up or power-ups following a RESET procedure

- ☛ The welding power source sets up for welding with the factory presets.

Subsequent power-ups

- ☛ The welding power source sets up for welding in the latest stable welding configuration that was active at the time of power-off.

5 ALARMS MANAGEMENT

 This LED illuminates if an incorrect operating condition occurs.

Tab. 1 Alarm messages

MESSAGE	MEANING	EVENT	CHECKS
AL. HEA.	<p>Overheating alarm Indicates tripping of the welding power source thermal protection.</p>	<p>All functions disabled. Exceptions: • cooling fan.</p> <p>Leave the unit running so that the overheated components cool as rapidly as possible. When the unit has cooled, the welding power source will reset automatically.</p>	<ul style="list-style-type: none"> • Make sure that the power required by the welding process is lower than the maximum rated power output. • Check that the operating conditions are in compliance with the welding power source data plate specifications. • Check for the presence of adequate air circulation around the welding power source.
AL. Cur.	<p>Overcurrent alarm Indicates tripping of the welding power source current surge protection.</p>	<p>All functions disabled. Exceptions: • cooling fan.</p> <p>An audible signal will sound (buzzer).</p> <p>Muting the audible signal: • in torch trigger procedure 2T, release the torch trigger. • in torch trigger procedure 4T the alarm mutes automatically after 5 seconds.</p> <p>Exit the alarm state by performing one of the following actions: • press any button. • switch the power source off.</p>	<ul style="list-style-type: none"> • Check that the programmed arc voltage value is not too high in relation to the thickness of the work to be welded.

6 WELDING SETTINGS

6.1 TORCH TRIGGER MODES

6.1.1 2 STROKE LIFT-ARC TIG WELDING (2T)

1. Touch the workpiece with the torch electrode.
2. Press (1T) and keep the torch trigger pressed.
3. Slowly lift the torch to strike the arc.
- ➡ The welding current reaches the preset value, by way of a up slope time, if programmed.
4. Release (2T) the trigger to start the weld completion procedure.
- ➡ The current reaches the end current value in the time set in the down slope time parameter.
- ➡ The arc is extinguished.
- ➡ Gas delivery continues for the time set in the post gas parameter.

6.1.2 2 STROKE MIG/MAG WELDING (2T)

1. Bring the torch up to the workpiece.
2. Press (1T) and keep the torch trigger pressed.
- ➡ The wire advances at the approach speed until making contact with the work. The arc strikes and the wire feeder accelerates to the set feed rate value.
3. Release (2T) the trigger to start the weld completion procedure.
- ➡ Gas flow continues for the time set in the post gas parameter (adjustable time).

6.1.3 4 STROKE MIG/MAG WELDING (4T)

1. Bring the torch up to the workpiece.
2. Press (1T) and release (2T) the torch trigger.
- ➡ The wire advances at the approach speed until making contact with the work. The arc strikes and the wire feeder accelerates to the set feed rate value.
3. Press (3T) the trigger to start the weld completion procedure.
- ➡ Gas flow continues until the torch trigger is released.
4. Release (4T) the torch trigger to start the post gas procedure (adjustable time).

6.2 WELDING PARAMETERS

PARAMETER	MIN	DEFAULT	MAX.
WELDING CURRENT	5 A	-	140 A
MIG/MAG WELDING VOLTAGE	14.2 V	-	22.0 V
WIRE FEED RATE	0.5 m/min	-	16.0 m/min
POST GAS	0.0 s	-	3.0 s

WELDING CURRENT

Output current value during welding.

POST GAS TIME

Time of post gas delivery when the welding arc is extinguished.

This is useful when welding at high current values or with materials that oxidise readily to cool the weld pool in an uncontaminated atmosphere.

In the absence of specific requirements the value should generally be kept low.

Consequences of a higher value:

- More effective pickling (improved appearance of workpiece at the end of the welding pass).
- Higher gas consumption.

Consequences of a lower value:

- Lower gas consumption.
- Oxidation of electrode tip (more difficult arc strike).








MIG/MAG WELDING VOLTAGE

The parameter sets the welding voltage in MIG/MAG mode.

WIRE FEED RATE

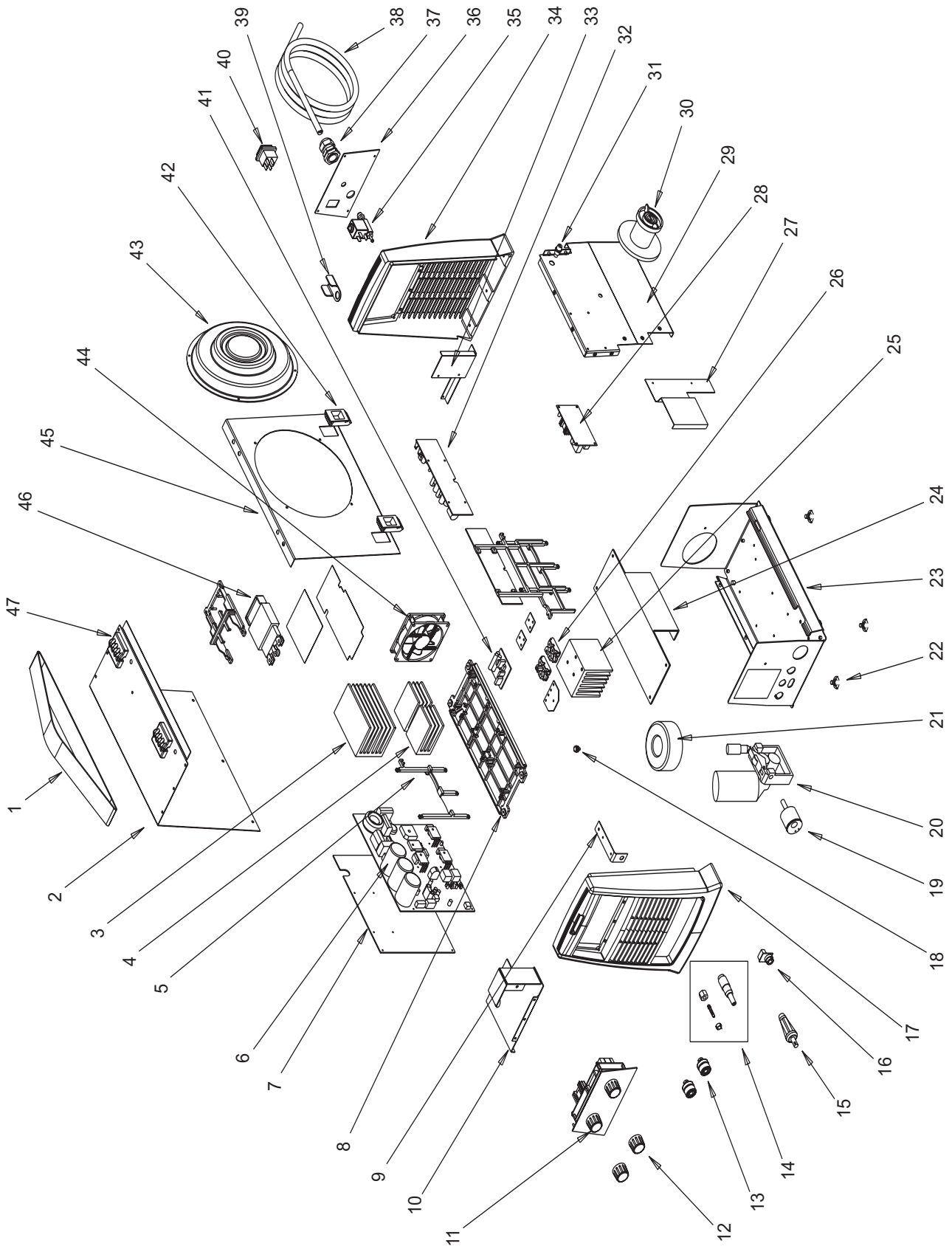
The parameter sets the output wire feed rate.

7 TECHNICAL DATA

Directives applied	Waste electrical and electronic equipment (WEEE)		
	Electromagnetic compatibility (EMC)		
	Low voltage (LVD)		
	Restriction of the use of certain hazardous substances (RoHS)		
Construction standards	EN 60974-1; EN 60974-5; EN 60974-10 Class A		
Conformity markings	 Equipment compliant with European directives in force		
	 Equipment suitable in an environment with increased hazard of electric shock		
	 Equipment compliant with directive WEEE		
	 Equipment compliant with directive RoHS		
Supply voltage	1 x 230 Va.c. ± 15 % / 50-60 Hz		
Mains protection	16 A Delayed		
Z_{max}	This equipment complies with IEC 61000-3-12 provided that the maximum permissible system impedance is less than or equal to 36 mΩ at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with maximum permissible system impedance less than or equal to 36 mΩ.		
Dimensions (L x D x H)	460 x 230 x 325 mm		
Weight	12.6 kg		
Insulation class	B		
Protection rating	IP23S		
Cooling	AF: Air-over cooling (fan assisted)		
Maximum gas pressure	0,5 MPa (5 bar)		
Motor speed	0.5 - 16.0 m/min		
Wire spool: (dimensions/weight)	200 mm / 5 kg		
Caratteristica statica	MMA	 Drooping characteristic	
	TIG	 Drooping characteristic	
	MIG/MAG	 Flat characteristic	
Current and voltage adjustment range	MMA	5 A / 20.2V - 140 A - 25.6 V	
	TIG	5 A / 10.2 V - 140 A - 15.6 V	
	MIG/MAG	5 A / 14.2 V - 160 A - 22.0 V	
Welding current / Working voltage	MMA	35 % (40° C)	140 A / 25.6 V
		60 % (40° C)	120 A / 24.8 V
		100 % (40° C)	100 A / 24.0 V
	TIG	40 % (40° C)	140 A / 15.6 V
		60 % (40° C)	130 A / 15.2 V
		100 % (40° C)	110 A / 14.4 V
	MIG/MAG	30 % (40° C)	160 A / 22.0 V
		60 % (40° C)	120 A / 20.0 V
		100 % (40° C)	100 A / 19.0 V

Maximum input power	MMA	35 % (40° C)	5.4 kVA
		60 % (40° C)	4.6 kVA
		100 % (40° C)	3.7 kVA
	TIG	40 % (40° C)	3.6 kVA
		60 % (40° C)	3.2 kVA
		100 % (40° C)	2.6 kVA
	MIG/MAG	30 % (40° C)	5.5 kVA
		60 % (40° C)	3.7 kVA
		100 % (40° C)	3.0 kVA
Maximum supply current	MMA	35 % (40° C)	23.5 A
		60 % (40° C)	20.0 A
		100 % (40° C)	16.0 A
	TIG	40 % (40° C)	15.7 A
		60 % (40° C)	13.9 A
		100 % (40° C)	11.3 A
	MIG/MAG	30 % (40° C)	24.0 A
		60 % (40° C)	16.1 A
		100 % (40° C)	13.0 A
Maximum effective supply current	MMA	35 % (40° C)	13.9 A
		60 % (40° C)	15.5 A
		100 % (40° C)	16.0 A
	TIG	40 % (40° C)	9.9 A
		60 % (40° C)	10.8 A
		100 % (40° C)	11.3 A
	MIG/MAG	30 % (40° C)	13.1 A
		60 % (40° C)	12.5 A
		100 % (40° C)	13.0 A
No-load voltage (U₀)	MMA	91 V	
	TIG	91 V	
	MIG/MAG	91 V	
Reduced no-load voltage (U_r)	MMA	10 V	
	TIG	10 V	
		10 V	
Power source efficiency	Efficiency (140A / 25,6V): 85,8%		
	No-Load condition power consumption (U ₁ = 230 Va.c.): 18 W		
Essential raw materials	According to the information provided by our suppliers, this product does not contain essential raw materials in quantities greater than 1g per component.		

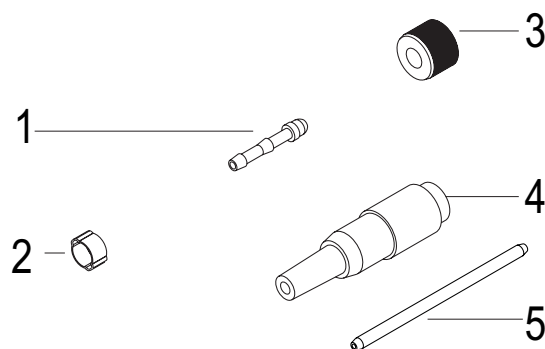
8 SPARE PARTS



N°	CODE	DESCRIPTION
1	005.0001.0008	BELT
2	011.0000.0181	COVER PLATE
3	015.0001.0001	HEAT SINK L= 107mm
4	015.0001.0002	HEAT SINK L= 50 mm
5	012.0001.0000	INTERNAL FRAMEWORKS
6	050.0006.0001	POWER BOARD
7	046.0002.0006	ELECTRICAL INSULATION
8	012.0001.0007	NYLON BASE
9	045.0005.0006	SHUNT
10	011.0010.0005	FRONT PROTECTION PLATE
11	050.5052.0000	LOGIC FRONT PANEL
12	014.0002.0008	KNOB WITH POINTER
13	021.0001.0229	FIXED SOCKET
14	021.0001.2021	CAPILLARY TUBE FOR EURO CONNECTOR
15	021.0001.0029	MOVABLE PLUG
16	050.0001.0042	AMPHENOL CONN. BOARD
17	010.0006.0033	FRONT PLASTIC PANEL
18	040.0003.1080	TERMAL SWITCH 80° C
19	021.0001.2001	COUPLING EURO
20	002.0000.0021	WIRE FEED MOTOR
21	041.0006.0001	AUXILIARY TRANSFORMER
22	016.0009.0001	RUBBER FOOT
23	011.0010.0007	LOWER COVER
24	011.0010.0008	INTERNAL SUPPORT PLATE
25	015.0001.0027	HEAT SINK L= 75 mm
26	032.0002.2003	ISOTOP DIODE
27	011.0010.0004	MOTOR PROTECTION PLATE
28	050.0001.0021	MOTOR BOARD
29	011.0010.0003	SPOOL SUPPORT PLATE
30	011.0006.0050	SPOOL SUPPORT
31	040.0006.1420	FUSE CARRIER
32	050.0001.0033	DOUBLER BOARD (161MF)
	050.0001.0043	DOUBLER-OVERCUT BOARD (161MF-TP)
33	011.0010.0006	REAR PROTECTION PLATE
34	010.0006.0034	COMPLETE REAR PLASTIC PANEL
35	017.0001.5542	SOLENOID VALVE
36	013.0007.0200	REAR PANEL
37	045.0000.0007	CABLE CLAMP
38	045.0002.0001	NEOPRENE CABLE
39	011.0002.0018	SOLENOID VALVE PLATE
40	040.0001.0001	BI-POLE SWITCH
41	050.0001.0003	SNUBBER BOARD
42	011.0006.0001	SLIDE CLOSURE
43	012.0000.0001	SPOOL COVER
44	003.0002.0002	FAN
45	011.0000.0201	DOOR PLATE
46	010.0007.0001	POWER TRANSFORMER

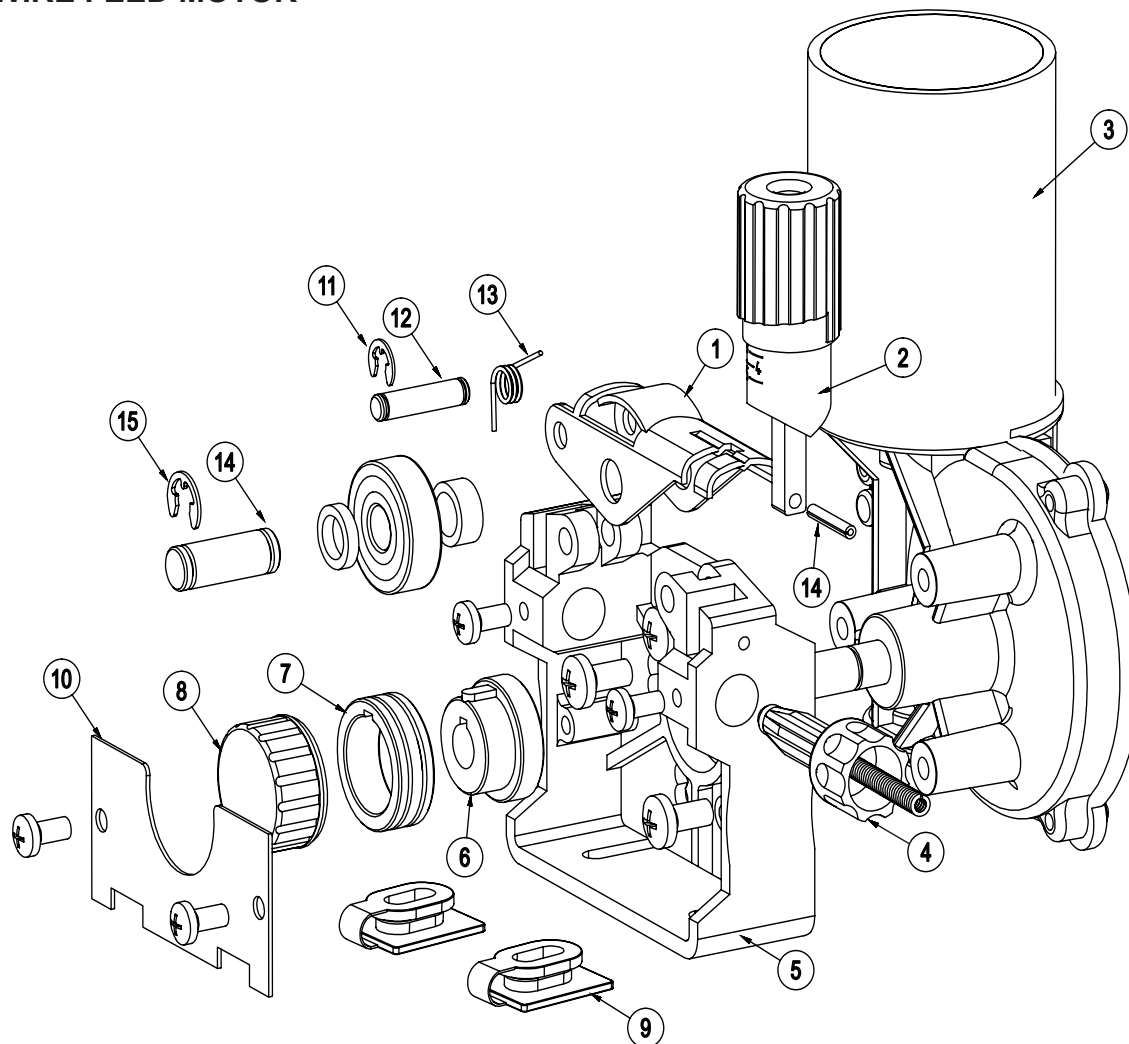
ENGLISH

N°	CODE	DESCRIPTION
47	011.0006.0006	PLASTIC HINGE
48	021.0001.2011	BRASS GUIDE FOR EURO CONNECTOR
49	002.0000.0284	SCREW CAP FOR SPOOL SUPPORT
50	045.0006.0062	DIODE-POWER CABLE BRACKET
51	045.0006.0063	DIODE-PLANAR TRANSFORMER BRACKET



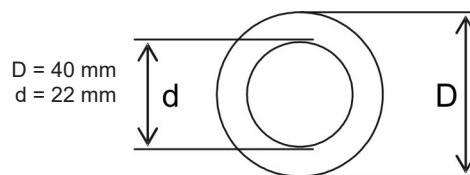
N°	CODE	DESCRIPTION
	021.0000.0003	COMPLETE KIT FOR GAS CONNECTORS
1	016.5001.0822	SLEEVE HOSE ADAPTER FOR RUBBER HOSE
2	016.0007.0001	HOSE CLAMP Ø= 11-13
3	016.5001.0823	NUT 1/4
4	021.0004.3360	AMPHT3360-001 M/5V. VOL. CONNECTOR
5	021.0001.2021	CAPILLARY TUBE FOR EURO CONNECTOR

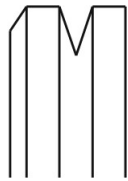
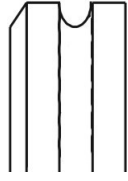
8.1 WIRE FEED MOTOR



N°	CODE	DESCRIPTION
1	002.0000.0364	PRESSURE ARM COMPLETE
2	002.0000.0257	FIXING ARM COMPLETE
3	002.0000.0231	MOTOR COIL
4	002.0000.0217	COMPLETE INLET GUIDE
5	002.0000.0363	FEED PLATE
6	002.0000.0232	DISTANCE RING
7	002.0000.0106	FEED ROLL
8	002.0000.0227	FIXING CAP
9	002.0000.0325	INSULATING WASHER
10	002.0000.0412	METAL COVER
11	002.0000.0413	RETAINING WASHER
12	002.0000.0414	SHAFT
13	002.0000.0415	SPRING FOR PRESSURE ARM
14	002.0000.0416	PIN
15	002.0000.0417	RETAINING WASHER

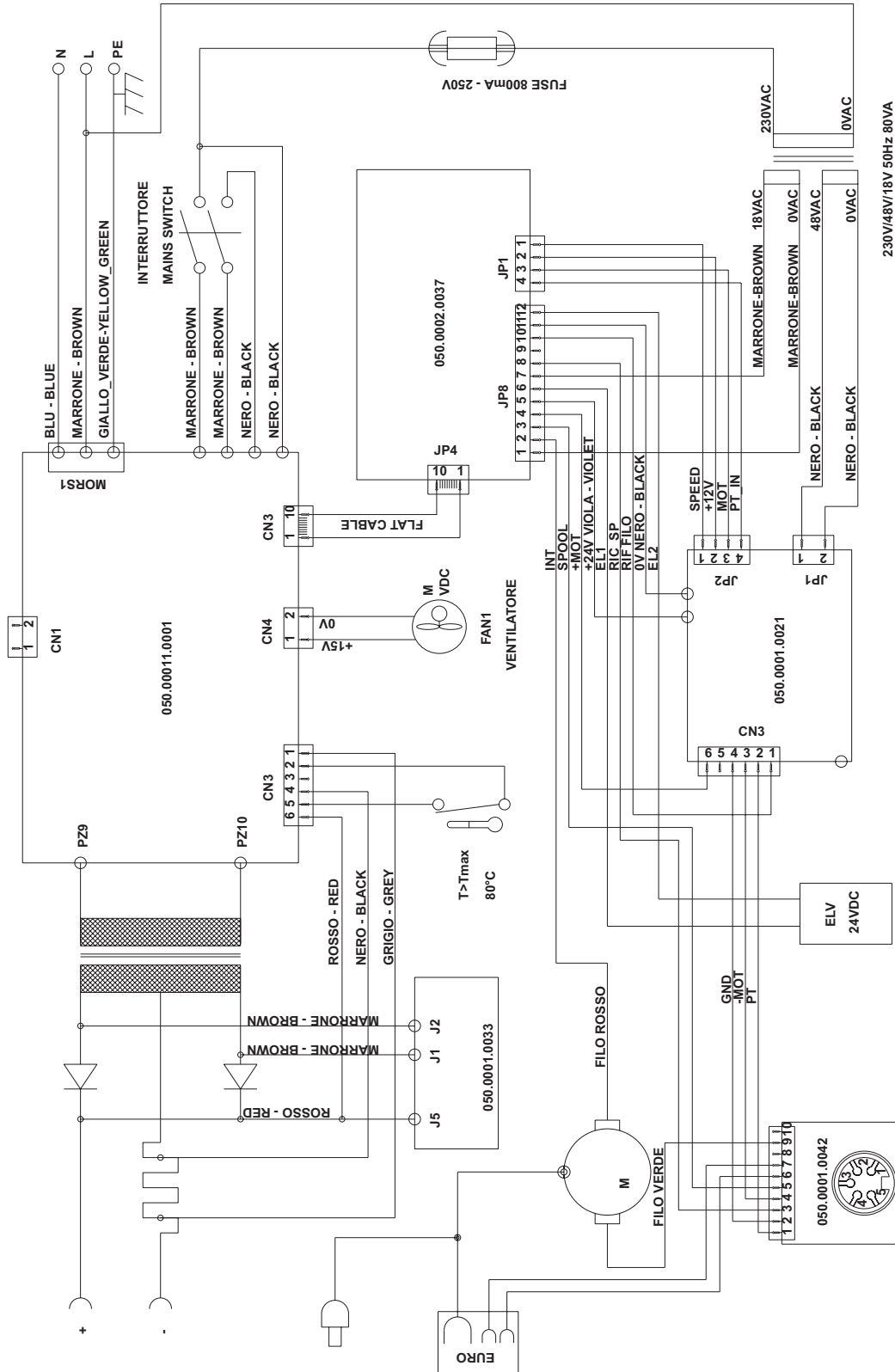
8.2 WIRE FEEDER ROLLS



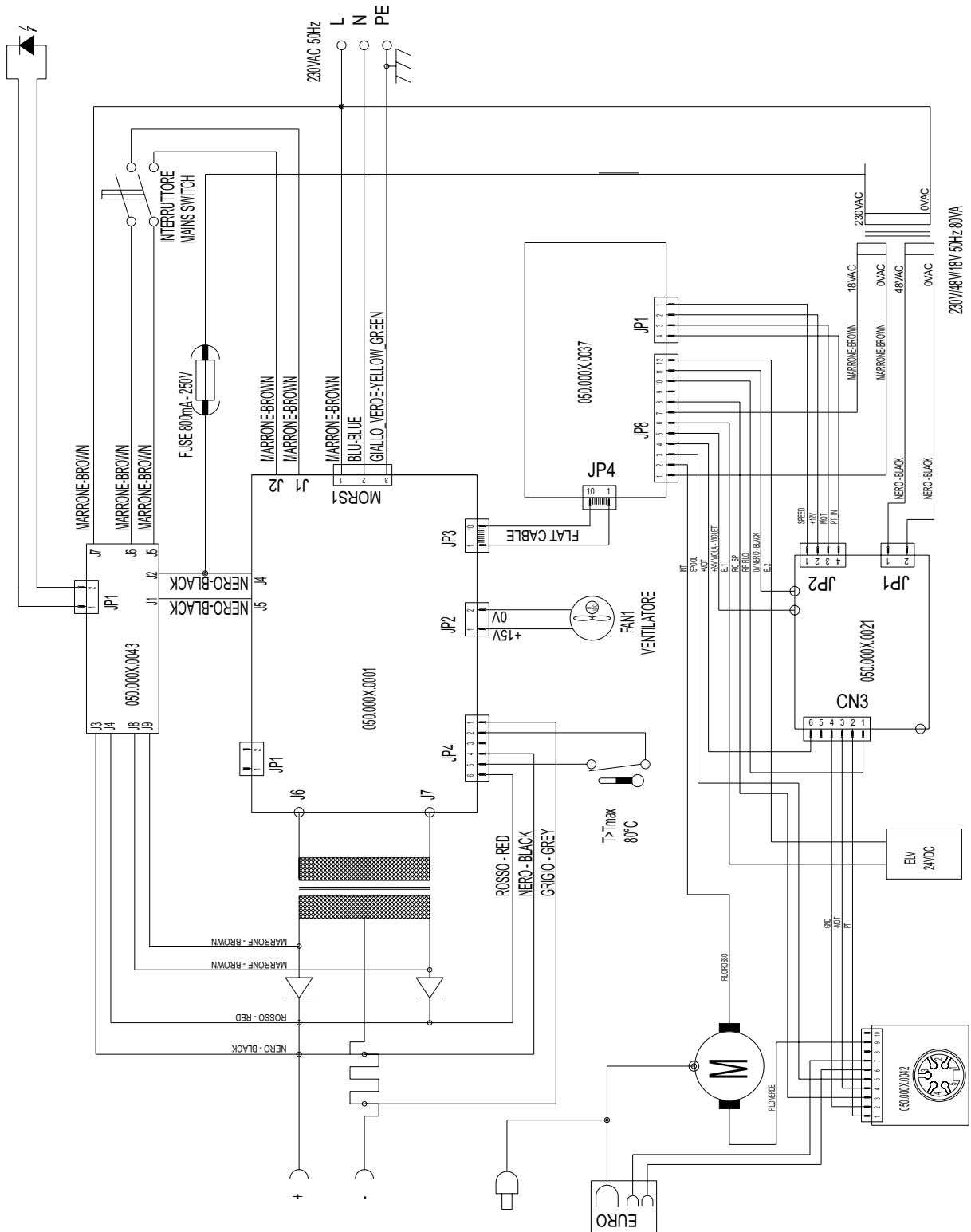
N°	CODE	WIRE DIAMETER	GROOVE TYPE
7	002.0000.0106	0.6 - 0.8	 V groove Solid wire
	002.0000.0109	0.8 - 1.0	
	002.0000.0111	0.8 - 1.0	 U shape Aluminium wire
	002.0000.0114	1.0 - 1.2	

9 ELECTRICAL DIAGRAM

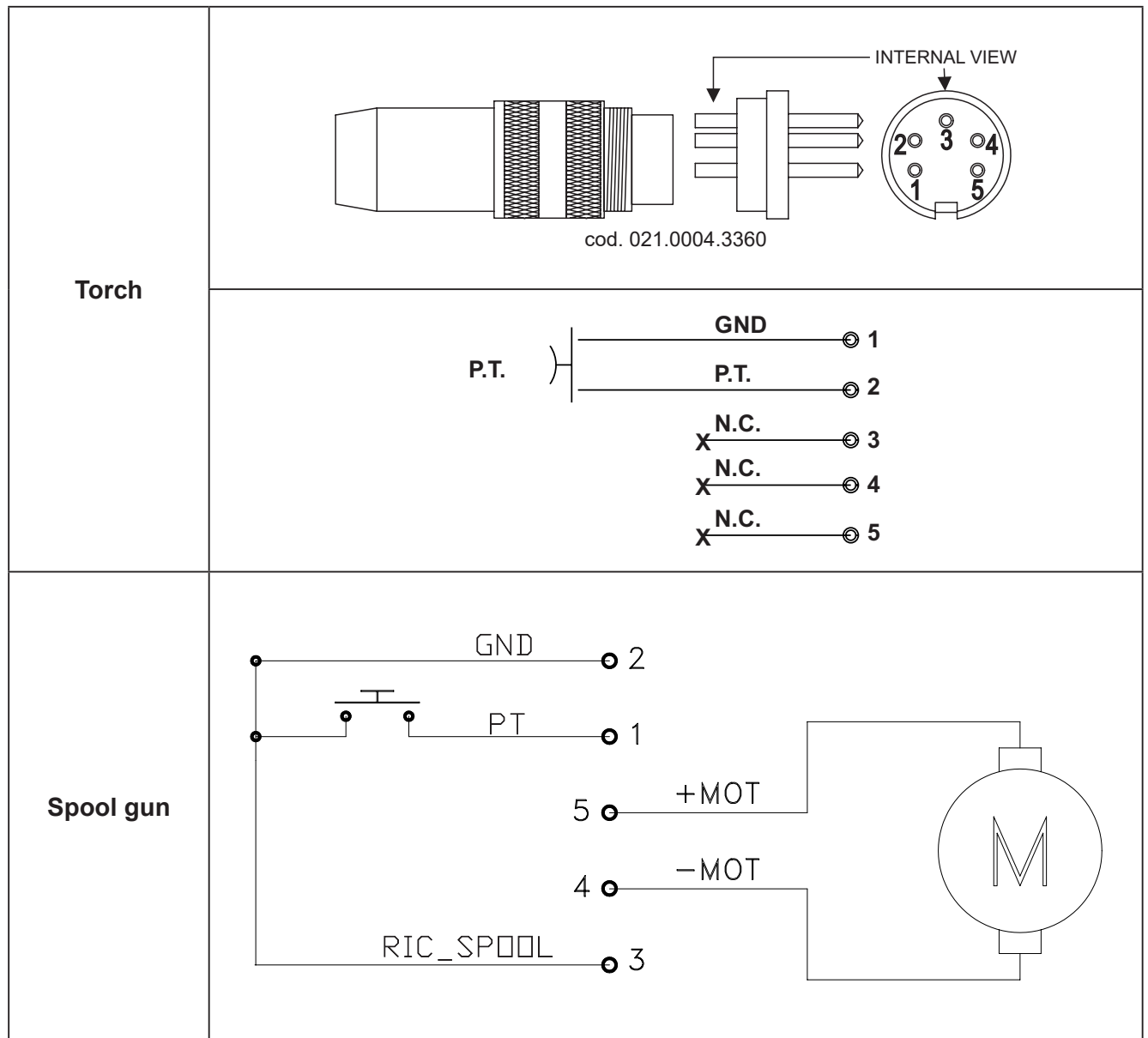
9.1 DISCOVERY 161MF



9.2 DISCOVERY 161MF TP



9.3 TORCH CONNECTOR





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