BRAVO SYNERGIC MIG

<u>POWER SOURCES arts. 613 - 615 - 617 - 619 +</u> <u>WIRE FEEDERS arts. 1652 - 1654</u>

SERVICE MANUAL



CONTENTS

1	- GENERAL INFORMATION	3
1.1	- Introduction	3
1.2	- General service policy.	3
1.3	- Safety information	3
1.4	- Electromagnetic compatibility.	3
2	- SYSTEM DESCRIPTION.	4
2.1	- Introduction.	4
2.2	- Technical specifications.	4
2.3	- Welding system description.	4
2.4	- Description of power sources.	4
2.5	- Description of wire feeders.	5
3	- MAINTENANCE	6
3.1	- Periodic inspection, cleaning.	6
3.2	- Operating sequence.	6
3.2	2.1 - Power source commands and connections	6
3.2	2.2 - Wire feeder commands and connections.	7
3.2	2.3 - Welding system operation.	7
3.3	- Troubleshooting.	10
3.3	3.1 - The power source does not start, control panel off	10
3.3	3.2 - Power source powered, control panel on, fan (43) does not work	12
3.3	3.3 - Control panel on, display and signals do not show correct values	13
3.3	3.4 - The start button produces no effect.	14
3.3	3.5 - System powered, no gas flows from the torch	15
3.3	3.6 - Power source powered, the wire feeder motor does not work	16
3.3	3.7 - In open circuit operation, the output voltage is not regular	17
3.3	3.8 - In resistive load operation, the output voltage is not regular	20
3.3	3.9 - In synergic mode, the welding quality is not satisfactory, the wire speed is not suited to the	
	output current	21
3.3	3.10- Arc difficult to strike, the arc goes out immediately after lighting	21
3.3	3.11- When start button is released, the wire sticks to the workpiece (ineffective motor braking)	22
3.4	- Alarm signals	23
3.4	4.1 - Led (F) lit = transformer (48) temperature too high, or wire coil cover open, or cooling liquid	ł
	flow low, or fuse on 16 Vac power supply tripped.	23
4	- COMPONENTS LIST	24
4.1	- Power sources arts. 613-615-617-619: see file ESP61*.pdf enclosed at the end of the manual.	24
4.2	- Wire feeders arts. 1652-1654: see file ESP165*.pdf enclosed at the end of the manual	24
4.3	- Power sources components table: see file ESP61*.pdf enclosed at the end of the manual	24
4.4	- Wire feeder components table: see file ESP165*.pdf enclosed at the end of the manual	24
4.5	- Power sources spare parts list.	24
4.6	- Wire feeders spare parts list.	24
4.7	- Fuse table.	24
5	- ELECTRICAL DIAGRAMS	25
5.1	- Power sources arts. 613-615-617-619: see file SCHE61*.pdf enclosed at the end of manual	25
5.2	- Wire feeders arts.1652-1654: see file SCHE165*.pdf enclosed at the end of the manual	25
5.3	- Waveforms.	25
5.3	3.1 - Wire feeder motor (402/403) voltage during correct braking (par. 3.3.11)	25
5.3	3.2 - Wire feeder motor (402/403) voltage during incorrect braking (par. 3.3.11)	25
5.4	- Timing board (50) code 5.602.211.	26
5.5	- Motor control board (36) code 5.602.205.	27

1 <u>- GENERAL INFORMATION</u>

1.1 <u>- Introduction.</u>

The purpose of the present manual is to train personnel assigned to maintenance of the power sources and wire feeders that make up the BRAVO SYNERGY MIG welding system.

1.2 <u>- General service policy.</u>

It is the responsibility of the customer and/or operator to use the equipment appropriately, in accordance with the instructions in the Manual, as well as to maintain the equipment and related accessories in good working condition, in compliance with the instructions provided in the Service Manual.

Any internal inspection or repairs must be carried out by qualified personnel who are responsible for any intervention on the equipment.

It is forbidden to attempt to repair damaged electronic boards or modules; replace them with original Cebora spare parts.

1.3 - Safety information.

The safety notes provided in this manual are an integral part of those given in the Instruction Manual. Therefore, before working on the machine, please read the paragraph on safety instructions in the aforementioned manual.

Always disconnect the power cord from the mains before accessing the interior of the equipment.

Some internal parts, such as terminals and dissipaters, may be connected to mains or otherwise hazardous potentials. It is therefore forbidden to work with the safety guards removed from the machine unless strictly necessary. In this case, take special precautions such as wearing insulating gloves and footwear, and working in a perfectly dry environment with dry clothing.

1.4 <u>- Electromagnetic compatibility.</u>

Please read and observe the instructions provided in the paragraph "Electromagnetic compatibility" of the Instruction Manual.

2 - SYSTEM DESCRIPTION

2.1 - Introduction.

BRAVO SYNERGIC MIG is a system for welding mild and stainless steel and aluminium, using a synergic MIG process, consisting of electrical power sources with separate detachable wire feeders and a range of accessories to adapt to various types of use (see list in the Sales Catalogue).

2.2 <u>- Technical specifications.</u>

To verify the technical specifications, see the machine plate, Instruction Manual, and Sales Catalogue.

2.3 - Welding system description.

The welding system consists of a combination of a power source and a wire feeder, selected from among the following articles:

- power sources arts. 613, 615, 617 and 619. The difference between them lies in the maximum welding current and duty cycle.
- wire feeders arts. 1652 and 1654. The difference between them lies in the use of wire feed units with 2 (art. 1652) or 4 rollers (art. 1654).

NOTE

Power source and wire feeder are not autonomous, thus they cannot function separately. The present manual therefore refers to the power source + wire feeder combination connected together as in actual usage conditions.

Referring to the electrical diagrams in par. 5, the figs. in par. 4 and figs. 3.2.1 and 3.2.2, you can see the main blocks that make up the power sources and wire feeders.

2.4 - Description of power sources.

Articles 613, 615, 617 and 619 are direct current power sources, essentially electromechanical, consisting of a three-phase transformer and a rectifier bridge.

The switch (C)(32) powers the service transformer (35), that supplies power to the fan (43), timing board (50), socket (12) for the cooling unit, and the wire feeder via the connector (15).

The switches (34) and (33) act as selectors for the output voltage of the power source. Depending on their position, the supply voltage is applied to the various intermediate sockets of the primary winding of the transformer (48), for the purpose of altering the voltage on the secondary winding and thus at the power source output. This adapts the output current of the power source to specific welding needs.

The mains voltage is applied to the power transformer (48) only after the contactor (38) closes, which is controlled by the motor control board (36) present on the wire feeder, based on the welding conditions set by the operator.

The service transformer (35) receives the supply voltage through the voltage change terminal board (45), which serves to adapt power source operation to the mains voltage (230 or 400 Vac). As a result of this adaptation, and operation as an automatic transformer of the primary winding of the transformer (35), fan (43) and cooling unit if connected to socket (12), they are always powered at 230 Vac even with the mains at 400 Vac; the secondary voltages of the service transformer (35) also maintain the same value.

The 28 Vac secondary voltage powers the wire feeder through the connector (15).

CEBORA S.p.A.

The 16 Vac secondary voltage powers the timing board (50), which manages the pump and fan on the cooling unit through the socket (12), the fan (43) of the power source, and the circuit corresponding to the safety devices of the welding system (thermostat on the power transformer (48), flow meter on the cooling unit and microswitch on the guard of the wire feed unit). If the cooling unit is not present the peg (13), provided, must be connected to the connector (14).

When one of the these devices is tripped, it in turn trips the alarm of the motor control board (36) on the wire feeder that stops the power source by opening of the contact (38); the alarm is indicated on the control panel (led F lit).

When the torch button is pressed, the motor control board (36) on the wire feeder sends the closing command to the contactor (38), which coincides with the start signal for the timing board (50), which controls operation of the fan (43) and the cooling unit. After welding, thus when the start button on the torch is released, the contactor (38) is disabled immediately, while the pump and fans on the cooling unit and fan (43) on the power source remain running for approximately ten minutes longer, after which time they also stop and await a new start command.

The secondary transformer circuit (48) is connected to the rectifier bridge (42), which keeps the welding current constant. In arts. 615, 617 and 619 the choke (40), inserted downstream of the rectifier bridge (42), serves to level the welding current, and its intermediate sockets allow you to maximize welding quality as the material to be welded changes.

The negative output terminal (D) of the power source is located on the front panel. Arts. 615, 617 and 619 have the three terminals of the choke (40) to select the choke portion to use.

The following are present on the rear panel of the power source:

- the terminal (G)(32) corresponding to the positive output of the power source, to connect the power cable built into the connection extension to connect the wire feeder.
- the socket (E)(12) for the cooling unit gas supply;
- the connector (H)(14) to connect the flow meter on the cooling unit;
- the connector (F)(15) to connect the wire feeder.

The signals processed by the electronic board and present at its connectors are listed in the table in chapter five of this manual.

2.5 <u>- Description of wire feeders.</u>

The wire feeder is the control unit of the welding system.

The motor control board (36) is the system supervisor, receives the supply voltage (28 Vac) from the power source through the connector (14) and acts as a control panel.

It contains a microprocessor circuit that manages the welding system functions, operator interface and controls the wire feeder motor speed, in observance of the synergic and non-synergic programs saved in the board itself.

The torch trigger provides the start command through the central adapter (G)(32).

The signals corresponding to the position of switches (33) and (34) on the power source provide information regarding the output voltage of the power source to the motor control board (36), which activates the corresponding wire speed based on the parameters set on the control panel.

The microswitch (4) detects the opening of the safety cover of the wire feed unit, and provides the safety stop command to the motor control board (36). Its contact is located on the same circuit as the other safety devices in the power source.

The shunt (15) provides the output current signal, to display the welding current on display (H) and manage some functions, such as timing, in spot-welding and post-gas operations.

The signals processed by the electronic board and present on its connectors are listed in the table in the chapter five in this manual.

3 - MAINTENANCE

<u>WARNINGS</u> ANY INTERNAL INSPECTIONS OR REPAIRS MUST BE CARRIED OUT BY QUALIFIED <u>PERSONNEL.</u>

DISCONNECT THE POWER SOURCE FROM THE MAINS BEFORE PERFORMING MAINTENANCE.

3.1 - Periodic inspection, cleaning.

Periodically remove dirt and dust from the internal parts of the power source, using a jet of low-pressure dry compressed air or a brush.

Check the condition of the output terminals and power cables of the power source and torch; replace if aged or damaged.

Check the condition of the internal power connections and connectors on the electronic boards; if you find "loose" connections, tighten or replace the connectors.

3.2 <u>- Operating sequence.</u>

The following sequence shows the correct operation of the system. It may be used as a guiding procedure for troubleshooting.

It must be carried out after each repair without any errors.

NOTES

- Operations preceded by this symbol refer to operator actions.
- Operations preceded by this symbol refer to machine responses that must occur following an operator action.

3.2.1 - Power source commands and connections.





3.2.2 - Wire feeder commands and connections.

3.2.3 - Welding system operation.

- **□** System shut off and disconnected from the mains.
- \square Connect the gas supply to the fitting (Q) on the wire feeder.
- Connect the signal cable, built into the connection extension, to connectors (R) on the wire feeder and (F) on the power source.
- Connect the power cable, built into the connection extension, to connectors (S) of the wire feeder and (G) of the power source.
- \Box Insert the peg (13), provided, into connector (H) of the power source.
- \Box Connect the torch to the central adapter (G) of the wire feeder.
- □ Connect the negative pole (D) cable of the power source to the workpiece.
- Connect the power source to the mains.
- \Box Set the switch (C) on the power source to position 1.
 - System powered, on the control panel all indicators and displays are lit (lamptest).
 - After one second, display (H) shows the version of the work programs saved (ex:F01).
 - After one second, display (H) indicates the version of the synergic curves saved (ex.: C01).
 - ◆ After one second, display (H) flashes the article number corresponding to the power source (ex.: 613) previously set with the keys (N) and (O) (see wire feeder Instruction Manual).
 - After two seconds, display (H) shows the selected working program, and some indicator leds remain lit; all as they were set before the last time the unit was shut off.

• After two seconds, display (H) shows the wire speed programmed for the manual program, or, for synergic programs, the programmed current based on the position of switches (33) and (34) and knob (P).



- □ Press the key (E) several times to select the "Mode" repeatedly in sequence.
 - Each time the key (E) is pressed, the leds (B), (C), and (D) light in sequence, and display (H) shows the value of the function indicated by the corresponding lit led.

WARNING

DURING THE FOLLOWING TESTS DO NOT AIM THE TORCH AT PEOPLE OR PARTS OF THE BODY, BUT ONLY TOWARDS AN OPEN SPACE OR THE WORKPIECE.

- □ Switch the switches (33) and (34) for an output voltage suited to the welding to be done.
- □ Use the key (E) to select the "program" mode, led (B) lit.
- □ Use the button (O) or (N) to select the manual working program (P00 on display (H)).
- **u** Turn knob (P) for a wire speed suitable for the set welding current.
- $\hfill\square$ Hold down the torch start button for a few seconds.
 - Gas begins to flow from the torch as long as the button is held down plus the set post-gas time.
 - Wire begins flowing out of the torch, or in any case the wire feeder motor begins operating, and open-circuit output voltage is generated for as long as the button is held down.
 - Fan (43) running for as long as the button is held down plus the time set on timing board (50) (approximately 10 minutes).

- □ Move the torch near the workpiece and press the torch trigger.
 - Begin welding. Turn knob (P) to the current level and wire speed suitable for the kind of welding to be performed.
 - Display (H) shows the welding current.

- □ Release the start button, holding the torch in welding position until gas stops flowing out.
 - The arc shuts down immediately without the wire sticking to the workpiece, the wire stops exiting the torch, and gas flow is interrupted after the post-gas time set.

CEBORA S.p.A.

- □ Use the keys (E), (O) or (N) to select a saved synergic program (see Instruction Manual and table provided in the compartment of the wire feed unit).
 - Display (H) indicates the selected program number (ex.: P01).
 - After 1 second display (H) shows the programmed value of the measurement indicated by lighting one of the leds (M), (L) or (I). This value may be selected using the keys (O) and (N).
 - With current selected (led M lit) the value on display (H) may be changed using knob (P) and switches (33) and (34).
 - With voltage (led I lit) or thickness (led L lit) selected, the value on display (H) may be changed using the switches (33) and (34).

- □ Use the keys (E), (O) or (N) to select a synergic program suitable for the type of welding to be done (see Instruction Manual and table provided in the compartment of the wire feed unit).
- □ Turn the knob (P) to the central position (SYNERGIC).
- □ Move the torch near the workpiece and press the start button.
 - Begin welding. Turn the knob (P) for fine-tune the wire speed within the field permitted by the synergic curve being used. Changing the speed also affects the welding current shown on display (H) and thus the quality of the welding in progress.

- **□** Release the start button, holding the torch in welding position until gas stops flowing out.
 - The arc shuts down immediately without the wire sticking to the workpiece, the wire stops exiting the torch, and gas flow is interrupted after the post-gas time set.

▼ YES <u>REGULAR OPERATION.</u>

3.3 <u>- Troubleshooting.</u>

WARNINGS

ANY INTERNAL INSPECTIONS OR REPAIRS MUST BE CARRIED OUT BY QUALIFIED PERSONNEL.

DISCONNECT THE POWER SOURCE FROM THE MAINS BEFORE PERFORMING MAINTENANCE.

NOTES

Items in **boldface** describe problems that may occur on the machine (<u>symptoms</u>).

- □ Operations preceded by this symbol refer to situations the operator must determine (causes).
- Operations preceded by this symbol refer to actions the operator must perform in order to solve the problems (<u>solutions</u>).

3.3.1 - The power source does not start, control panel off.

MAINS SUITABILITY TEST.

□ Missing voltage at the power source input due to tripped mains protection.



- Eliminate any short-circuits or isolation leaks between the various conductors and towards earth in connections between the power cable, terminal board (37), contactor (38), switch (32), service transformer (35), fan (43) and socket (12).
- Mains not suitable to power the power source (ex.: insufficient installed power).

MAINS CONNECTION TEST.

□ Contactor (38), power terminals = approximately 3 x 400 Vac or 3 x 230 Vac, depending on mains voltage.



- Check power cable and plug and connections on terminal board (37), and replace if necessary.
- Check the mains voltage conditions.

MOTOR CONTROL BOARD (36) POWER SUPPLY TEST.

 \Box Motor control board (36), connector J7, terminals 1 - 2 = approximately 28 Vac.



• Check the wiring between contactor (38), switch (32), voltage change terminal board (45), service transformer (35), fan (43) and socket (12).

Correct values:

- Check the wiring between service transformer (35), connector (15) on the power source, connector (14) on the wire feeder, and motor control board (36).
- Make sure the setting of the voltage change terminal board (45) matches the mains voltage.
- Make sure the fuse on the primary circuit of the service transformer (35) is intact. If interrupted, replace and check the resistance of the primary winding.

terminals 0 - 230V = approximately 7 ohm;

terminals 0 - 440V = approximately 12 ohm.

If incorrect replace the service transformer (35).

- ♦ Make sure the fuse on the 28V secondary circuit of the service transformer (35) is intact. If interrupted, before replacing it check the resistance on terminals I and J of connector (15). Correct value = >Mohm in both measurement directions. If incorrect, disconnect the signal cable from the connectors (15) of the power source and (14) of the trolley, and repeat the test on terminals I and J of connector (14) on the wire feeder. If correct, check the status of the signal cable built into the connection extension, and replace service transformer (35) if necessary. If incorrect check the wiring between connector (14) and motor control board (36) and if necessary replace motor control board (36).
- Replace service transformer (35).
- Replace connection extension between power source and wire feeder.
- Replace the motor control board (36) on the wire feeder.

NOTE

The fan (43) may be activated using the start command of the torch button, and continues running after it is released for the time set on the timing board (50)(approximately 10 minutes).

FAN (43) TEST.

□ Terminals of fan (43) = approximately 230 Vac, with mains at either 230 Vac or 400 Vac with start button pressed.



- Make sure that there are no mechanical impediments blocking the fan.
- Check the integrity and connection of the starting capacitor of the fan (43). Replace if necessary.
- Replace the fan (43).
- Check the wiring between fan (43), terminal board on service transformer (35) and timing board (50)(contact of RL1).
- Make sure the fuse on the power supply for fan (43) is intact, located on the terminal board of the service transformer (35). If interrupted, before replacing it check the resistance between the terminals of the fan (43). Correct values = approximately 50 60 ohm. If incorrect, replace fan (43).
- Make sure the contactor (38) remains closed for as long as the start button is held down. If incorrect, carry out the START COMMAND TEST in par. 3.3.4. If correct check on terminals 7 and 8 of J1 timing board (50) that voltage = approximately 27 Vac when contactor (38) is closed. If incorrect check the wiring between timing board (50) and contactor (38).

TIMER BOARD (50) POWER SUPPLY TEST.

 \Box Timing board (50), connector J1, terminals 1 and 2 = approximately 16 Vac.



- Check the wiring between the 16 Vac winding of the service transformer (35), J1 on timing board (50), connector (15) on the power source, connector (14) on the wire feeder, and J2 on the motor control board (36).
- Make sure the fuse on the 16V secondary circuit of the service transformer (35) is intact. If interrupted, before replacing it check the resistance on terminals 1 and 2 of J1 on timing board (50), in the following conditions:
 - With plug (13) removed from connector (14) on the power source: Correct value = >Mohm in both measurement directions. If incorrect replace the timing board (50).
 - With plug (13) inserted in connector (14) on the power source: Correct values = from approximately 1000 ohm to 5500 ohm, based on the position of the switches (33) and (34) (this resistance is determined by the circuits leading to connectors J2 and J12 of motor control board (36), which become involved when the contacts of the safety devices, thermostat, wire feed unit guard switch, peg (13) in the socket (14) are closed). If incorrect check the wiring between J2 and J12 of motor control board (36), switches (33) and (34), timing

board (50) and service transformer (35), and replace motor control board (36) if necessary.

- Make sure the power supply to the service transformer (35) is correct performing if necessary the MOTOR CONTROL BOARD (36) POWER SUPPLY TEST in par. 3.3.1.
- Replace service transformer (35).
- Replace the timing board (50).
- Replace the fan (43).

3.3.3 - Control panel on, display and signals do not show correct values.

DISPLAY AND INDICATOR LED TEST.

- □ Upon start-up the display and leds are all lit for 1 second (lamp-test).
- □ After one second, display (H) shows the version of the work programs saved (ex.: F01).
- □ After one second, display (H) indicates the version of the synergic curves saved (ex.: C01).
- □ After one second display (H) flashes the article number corresponding to the power source (ex.: 613) previously set with the keys (N) and (O) (see wire feeder Instruction Manual).
- □ After two seconds, display (H) shows the selected working program, and some indicator leds remain lit; all as they were set before the last time the unit was shut off.
- After two seconds, display (H) shows the wire speed programmed for the manual program, or, for synergic programs, the programmed current based on the position of switches (33) and (34) and knob (P).
- All passages relating to "Mode" and "Program" selections are also possible using the buttons (E) (N) and (O) described in par. 3.2.3.



- Check the wiring between service transformer (35), connector (15) on the power source, connector (14) on the wire feeder, and motor control board (36).
- Perform the MOTOR CONTROL BOARD (36) POWER SUPPLY TEST, par. 3.3.1.
- If led (F) lit see "alarm signals", par. 3.4.
- Replace motor control board (36).
- Regular operation of the control panel.

3.3.4 - The start button produces no effect.

POWER SOURCE SAFETY TEST.

 \Box Motor control board (36), connector J2, terminals 7 and 8 = 16 Vac (no alarms present).



• See "Alarm signals", par. 3.4.

START COMMAND TEST.

□ Motor control board (36), connector J1, terminals 1 - 2 = 0 Vac with torch button pressed (16 Vac with button released).



- Check the wiring between connector J1 on motor control board (36), central adapter (32) and the torch trigger.
- Check the conditions of the central adapter (32). Replace if defective.
- Check the torch button and torch fitting. Replace them if defective, or replace entire torch.
- ♦ See MOTOR CONTROL BOARD (36) POWER SUPPLY TEST, par.3.3.1.
- Replace motor control board (36).
- Replace the entire torch.
- Replace motor control board (36).

3.3.5 - System powered, no gas flows from the torch.

SOLENOID VALVE (6) TEST.

□ Solenoid valve (6) terminals = 27 Vac with torch button pressed and for as long as the button is held down, plus the post-gas time.



- Check the presence of gas at the fitting (Q) provided on the rear panel, and make sure that the pressure and flow in the intake line comply with the values specified for the BRAVO SYNERGIC MIG system.
- Make sure there are no occlusions in the gas hoses of the power source.
- Check that the resistance on the solenoid valve terminals (6) = approximately 25 ohm. If >Mohm (winding broken), replace the solenoid valve (6).
- Replace the solenoid valve (6).
- Check the wiring between terminals 4 and 6 of J7 on motor control board (36) and solenoid valve (6).
- Check that the resistance on the solenoid valve terminals (6) = approximately 25 ohm. If 0 ohm (short-circuit), replace solenoid valve (6) and motor control board (36).
- See MOTOR CONTROL BOARD (36) POWER SUPPLY TEST, par. 3.3.1.
- Replace motor control board (36).

3.3.6 - Power source powered, the wire feeder motor does not work.

WIRE FEEDER MOTOR TEST.

- □ Use the buttons (E), (N) or (O) to select the manual working program (P00 on display (H)).
- □ Motor (36) control board, connector J8, terminals 1 (+) and 2 (-) = approximately +2.5 / +12 Vdc, adjustable using the knob (P), with start button pressed.



- Check the wiring between J8 motor control board (36) and wire feeder motor (402/403).
- Make sure there are no mechanical impediments blocking the motor.
- Check the motor rotation direction; if incorrect, reverse the wires on the terminals of J8 on motor control board (36).
- With the power source off, temporarily disconnect the terminals of the wire feeder motor (402/403) from the connector J8 motor control board (36), and check the resistance between the motor terminals left free. Correct value = approximately 0.6 ohm (motor winding resistance). If >Mohm (winding broken), replace wire feeder motor (402/403).
- Replace the wire feeder motor (402/403) or complete wire feed unit.
- Check the presence of the start command by carrying out the START COMMAND TEST in par. 3.3.4.
- With the power source off, temporarily disconnect the terminals of the wire feeder motor (402/403) from the connector J8 motor control board (36), and check the resistance between the motor terminals left free. Correct value = approximately 0.6 ohm (motor winding resistance). If 0 ohm (short-circuit), replace wire feeder motor (402/403) and motor control board (36).
- See MOTOR CONTROL BOARD (36) POWER SUPPLY TEST, par. 3.3.1.
- Replace motor control board (36).

<u>NOTE</u>

When the switches (33) and (34) are set to certain positions, the secondary voltage values between phases are different due to the particular connections between switches (33) and (34) and the primary circuit of the transformer (48). This situation is deliberate in order to offer more voltage levels, with minor differences among them, using a lower number of intermediate sockets on the windings of transformer (48).

OPEN-CIRCUIT OUTPUT VOLTAGE TEST.

□ Output terminal (D) power source (-) and output terminal (G) wire feeder (+) = direct current values (Vdc) according to the table, with start button pressed and rated mains voltage.

NOTE

The table give the THEORETICAL mean value of the rectified secondary circuit voltages.

When the power source has no load at all, the values that may actually be measured may in some cases be much higher than those given, due to incorrect operation by the rectifier bridge (42) without any load at its output.

With a small load (ex. 100 ohm 10W) applied at the power source output, the operation of the rectifier (42) may improve, and the measurable values may become closer to those given (+/-10%). Therefore, for measuring we recommend using the latter method, and consider not so important the precision of the absolute value measured, but rather the difference in value as the position of switches (33) and (34) changes.

			Swit	ch 33]	positio	on = 1					Swite	ch 33 j	positio	n = 2		
Art			Swi	itch 34	l posit	ions					Swi	tch 34	posit	ions		
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
613	18.1	19	20	21.1	21.8	23.2	24.1	25.9	27.3	29.5	32	34.4	36.2	39.9	42.5	47.8

			Swite	ch 34 j	positio	n = 1					Swite	ch 34 j	positio	n = 2		
Art			Swi	itch 33	b positi	ions					Sw	itch 3.	3 posit	ion		
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
615	17,1	17,4	17,6	17.9	18,1	18,7	19	19,6	20,7	21	21,4	21,7	22,1	22.9	23,4	24,3
617	16.7	16.9	17.2	17.5	17.8	18.5	18.9	19.6	19.8	20.2	20.5	20.9	21.4	22.2	22.8	23.8
619	17	17.3	17.6	17.9	18.2	18.9	19.3	20.1	20.5	20.9	21.4	21.9	22.5	23.5	24.1	25.3
			Swite	ch pos	ition 3	34 = 3					Swite	ch pos	ition 3	6 4 = 4		
Art			Swi	itch 33	b positi	ions					Swi	tch 33	b positi	ions		
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
615	25.8	26,3	26.8	27.4	28	29.3	30	31,5	34	34.9	35.7	36.6	37.7	40	41.4	44.2
617	25	25.6	26.2	26.7	27.5	29	29.9	31.7	32.6	33.5	34.6	35.6	36.9	39.6	41.2	44.6
619	26.6	27.3	28.1	28.8	29.6	31.5	32.5	34.8	35.4	36.7	38.1	39.5	41.1	44.5	46.6	51



INPUT CONTACTOR (38) TEST.

 \Box Contactor (38) coil terminals = 27 Vac, contactor closed, with start button pressed.



- Check the wiring between the contactor (38) coil, service transformer (35), power source connector (15), wire feeder connector (14) and terminal 5 of J7 on motor control board (36).
- Check the supply voltage for the motor control board (36), performing if necessary the MOTOR CONTROL BOARD (36) POWER SUPPLY TEST in par. 3.3.1.
- Check the wiring between switches (33) and (34), connector (15) of the power source, connector (14) of the wire feeder and connectors J2 and J12 on motor control board (36).
- With the power source off and unplugged, check the resistance between the terminals of the contactor (38) coil. Correct value = approximately 3.5 ohm. If 0 ohm (short-circuit), replace contactor (38) and motor control board (36).
- Check the efficiency of the start command, performing if necessary the tests in par. 3.3.4.
- With the power source off and unplugged, check the resistance between the terminals of the contact (38) coil. Correct value = approximately 3.5 ohm. If incorrect, replace contactor (38).

VOLTAGE TO SECONDARY CIRCUIT OF THE TRANSFORMER (48) TEST.

- Disconnect terminals of the secondary transformer (48) circuit from the rectifier bridge (42).
- \Box Terminals of the secondary transformer (48) circuit = alternating voltage (Vac) values as shown in the table, with start button pressed, open-circuit power source and rated mains voltage.

<u>NOTE</u>

The table shows the value of the three alternating voltages measured at the secondary circuit; if these are different (marked by an asterisk (*)) the table gives their average.

This average is thus slightly different from the value of each individual phase measured.

	Switch 33 position = 1									Swite	h 33]	positio	n = 2			
Art	Switch 34 positions						Switch 34 positions									
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
613	14.1	14.8*	15.5*	16.3	16.9*	17.8	18.4*	19.8	20.8	22.4*	24.2*	26	27.3*	30	31.9*	35.8

			Swite	ch 34 j	positio	n = 1					Swite	h 34 j	positio	n = 2		
Art			Swi	tch 33	positi	ions					Swi	tch 33	positi	ons		
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
615	13.6	13.8*	13.9*	14.2	14.3*	14.7	14.9*	15.4	16.2	16.5*	16.7*	17	17.2*	17.9	18.2*	18.8
617	13.3	13.5*	13.7*	13.9	14.1*	14.6	15*	15.5	15.6	15.9*	16.1*	16.4	16.8*	17.5	17.9*	18.6
619	13.3	13.5*	13.8*	14	14.2*	14.7	15.1*	15.6	16	16.2*	16.5*	16.9	17.3*	18	18.5*	19.4
			Swite	ch pos	ition 3	3 = 3					Swite	h pos	ition 3	3 = 4		
Art			Swi	tch 34	positi	ions					Swi	tch 34	positi	ons		
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
615	20	20.4*	20.8*	21	21.6*	22.6	23.1*	24.2	26	26.7*	27.4*	28.1	28.9*	30.6	31.5*	33.6
617	19.5	19.9*	20.4*	20.8	21.4*	22.5	23*	24.4	25	25.7*	26.5*	27.3	28.3*	30.3	31.5*	33.9



- Check the wiring between the secondary transformer (48) circuit and rectifier (42).
- Check the efficiency of the rectifier bridge (42).
- Check the wiring between the negative terminal of rectifier bridge (42), choke (40) (where present), output terminal (-)(D) of the power source, and between the positive terminal of rectifier bridge (42), output terminal (+)(G) of the power source, terminal (+)(S) of the wire feeder, shunt (15) and central torch adapter (32)(G). If you find loose connections, tighten them and replace any components with damaged terminals.
- Check the wiring between power cord, contactor (38), switches (33) and (34), voltage change terminal board (45), and primary winding of the transformer (48).
- Make sure the primary circuit of the transformer (48) is properly connected on the voltage change terminal board (45), and that the position of the voltage change (45) matches the mains voltage.
- Check the delta connection of the windings that make up the secondary transformer (48) circuit.
- Check the efficiency of switches (33) and (34); especially make sure there are no signs of burned or misshapen contacts. For the test use the tables in the electrical diagrams in par. 5. If necessary replace the defective switch.
- With the power source off and unplugged, check the efficiency of the contacts on contactor (38), tripping it manually and checking whether the resistance on each contact is approximately 0 ohm. If you find burnt contacts or have difficulty moving the mobile equipment, replace the contact (38).
- Replace the transformer (48).

3.3.8 - In resistive load operation, the output voltage is not regular.

NOTE

Only the test loaded at the maximum output voltage is described below, and thus at the maximum current of the power source, since it is assumed that the OPEN CIRCUIT OPERATION TEST in par. 3.3.7. has been successfully completed, and thus the connections, pin ratio and operation of the transformer (48) are all assumed correct.

OUTPUT VOLTAGE TEST ON RESISTIVE LOAD.

- □ Set the manual program (P00 on display (H)), switches (33) and (34) in the positions shown in the table, and use a resistive load capable of withstanding the maximum current of the power source. The appropriate values are shown in the table.
- □ Power source output terminal (D)(-) and wire feeder output terminal (G)(+) = direct current values as shown in the table, with start button pressed.

pwr. src. art.	switch 33 position	switch 34 position	resistive load resistance	power source output current (Adc)	power source output voltage (Vdc)
613	2	8	0.092 ohm	330	+30.5
615	8	4	0.085 ohm	400	+34
617	8	4	0.083 ohm	420	+35
619	8	4	0.078 ohm	500	+39
619	8	4	0.078 ohm	500	+39



- Regular operation.
- Make sure the connections between the primary circuit of transformer (48), switches (33) and (34) and the voltage change terminal board (45) are intact. If you find loose connections, tighten them and replace any components with damaged terminals.
- Check the efficiency of switches (33) and (34), especially make sure there are no signs of burned or misshapen contacts. For the test use the tables in the electrical diagrams in par. 5. If necessary replace the defective switch.
- With the power source off and unplugged, check the efficiency of the contacts of contactor (38), tripping it manually and checking whether the resistance on each contact is approximately 0 ohm. If you find burnt contacts or have difficulty moving the mobile equipment, replace the contactor (38).
- Check the wiring between the secondary winding of transformer (48) and rectifier bridge (42). If you find loose connections, tighten them and replace any components with damaged terminals.
- Check the efficiency of the rectifier bridge (42).
- ♦ Make sure connections are intact between the negative terminal of rectifier bridge (42), coke (40) (where present) and output terminal (-)(D) of the power source, and between the positive terminal of rectifier bridge (42), power source output terminal (+)(G), terminal (+)(S) of the trolley, shunt (15) and torch central adapter (+)(G). If you find loose connections, tighten them and replace any components with damaged terminals.
- Replace the transformer (48).

3.3.9 - In synergic mode, the welding quality is not satisfactory, the wire speed is not suited to the output current.

NOTE

The parameters entered into the synergic programs are drawn from experience, and thus some operators may find themselves working in ideal conditions, while others may need to make slight changes.

For this reason the possibility remains to alter, to a small degree, the ratio between wire speed and welding current within synergic programs. This value may be changed using the knob (P).

SYNERGIC PROGRAM PARAMETERS TEST.

□ In synergic mode, the parameters saved in the selected program reflect the actual welding conditions.



- Select the program that best meets your needs and set the correct parameters (see Instruction Manual and the table provided with the wire feeder, in the compartment of the wire feed unit).
- Make sure the wire feeder motor is working properly, performing if necessary the test in par. 3.3.6.
- Make sure the control panel is working properly (see par. 3.3.3).
- Replace motor control board (36).

3.3.10 - Arc difficult to strike, the arc goes out immediately after lighting.

<u>NOTE</u>

In the power sources covered by this manual, the "Soft Start" function is included in the work programs and is adjustable via the control panel (see Instruction Manual).

In power sources art. 615, 617 and 619, the choke (40) has two intermediate sockets to maximize welding as the material being used changes. These outputs may also be used for easier welding starts.

Therefore, when dealing with start-up problems and difficulty in maintaining the arc, we recommend:

- Make sure the "Soft Start" function adjustment is working properly, performing welding tests with various setting values.
- Carry out welding tests, changing the working program (with one similar to the one being used, if available), and adjusting the knob (P) to improve the welding conditions.
- Check the compatibility of the torch with the type of welding being carried out, and especially matching the torch nozzle with the wire being used.
- Check the wear status of the torch and its components, replacing them if necessary.
- Replace motor control board (36).

3.3.11 - When start button is released, the wire sticks to the workpiece (ineffective motor braking).

NOTE

The "Burn-Back" function is included in the work programs and is adjustable via the control panel (see Instruction Manual).

With this function the power source delays stopping current generation during the slowdown of the wire output from the torch, since even though it brakes after welding, the wire feeder motor still requires a certain amount of time to come to a complete stop.

This time depends on various circumstances such as the type of torch, size of the wire coil, type of wire, wire speed during welding, etc.

Thus if the wire sticks to the workpiece at the end of the welding process, consider the aforementioned conditions and perform the following test.

WIRE FEEDER MOTOR (402/403) BRAKING TEST.

□ Motor control board (36), connector J8 terminals 1 and 2 (gnd) = fig. 5.3.1, when the start button is released, with the power source open-circuit (no wire in the torch). The wire feeder motor stops immediately (braking time <200 msec.).



- ◆ If you encounter fig. 5.3.2 (the motor slows from its own inertia), the braking circuit on the motor control board (36) does not work properly, replace control board (36).
- Make sure that there are no mechanical impediments preventing the wire coil from stopping despite the braking action of the motor (ex.: sliding by wire feeder rollers, improperly adjusted roller spring).
- Replace the motor control board (36) and/or motor (402/403).

3.4 - Alarm signals.

- 3.4.1 Led (F) lit = transformer (48) temperature too high, or wire coil cover open, or cooling liquid flow low, or fuse on 16 Vac power supply tripped.
 - This signal is activated by four different situations:
- temperature of the transformer(48) above allowed limits, as detected by the thermostat inserted on the windings of transformer (48)
- safety cover of the wire feed unit open, detected by the safety switch (4) on the wire feeder guard;
- low flow of cooling liquid, detected by the cooling unit flow meter connected to connector (14) of the power source (if no cooling unit is present, connector (14) must be connected to the plug (13) provided);
- fuse on the 16 Vac secondary circuit of the service transformer (35) interrupted, thus no 16 Vac service voltage.

The alarm is automatically reset when the cause of the alarm is eliminated, but the power source will only begin operating after pressing the start command again.

- If the alarm occurs repeatedly, we recommend that you:
- Make sure the fan (43) is working properly.
- Make sure that air is flowing properly and that there is no dust or other obstacles to cooling.
- Make sure that the working conditions comply with the specified values, especially observing the "duty cycle".
- Make sure that the thermostat mounted on the transformer (48) is properly assembled and working properly; its contact must be closed at ambient temperature.
- Make sure the safety switch (4) and the wire feed unit guard are in good condition and properly mounted. With the guard closed the contact of switch (4) must be closed. If incorrectly positioned, correct the position; replace if defective.
- Check on terminals 7 and 8 of J2, motor control board (36), voltage = approximately 16 Vac (no alarm present). If incorrect, replace the motor control board (36). If incorrect, check the wiring between terminals 7 and 8 of J2 motor control board (36), switch (4) on the guard of the wire feed unit, thermostat on the transformer (48), flow meter on the cooling unit connected to connector (14) of the power source, connector J1 of timing board (50) and 16 Vac secondary circuit of the service transformer (35).
- Make sure the fuse on the 16Vac secondary circuit of the service transformer (35) is intact. If interrupted, before replacing it check the resistance on terminals 1 and 2 of J1 on timing board (50), in the following conditions:
- With plug (13) removed from connector (14) on the power source: correct value = >Mohm in both measurement directions. If incorrect replace the timing board (50).
- With plug (13) inserted in connector (14) on the power source: correct values = from approximately 1000 ohm to 5500 ohm, based on the position of the switches (33) and (34). This resistance is determined by the circuits leading to connectors J2 and J12 of motor control board (36), which become involved when the contacts of the safety devices thermostat, wire feed unit guard switch, and peg (13) in the socket (14) are closed. If incorrect check the wiring between J2 and J12 of motor control board (36), switches (33) and (34), timing board (50) and service transformer (35), and replace motor control board (36) if necessary.
- Replace motor control board (36).

4 - COMPONENTS LIST

- 4.1 <u>- Power sources arts. 613-615-617-619: see file ESP61*.pdf enclosed at the end of the manual.</u>
- 4.2 Wire feeders arts. 1652-1654: see file ESP165*.pdf enclosed at the end of the manual.
- 4.3 <u>- Power sources components table: see file ESP61*.pdf enclosed at the end of the manual.</u>
- 4.4 Wire feeder components table: see file ESP165*.pdf enclosed at the end of the manual.

4.5 - Power sources spare parts list.

Essen	tial spare parts.					
Ref.	Description	Qty.	Art. 613	Art. 615	Art. 617	Art. 619
32	switch	1	3190006	3190006	3190006	3190006
33	selector switch	1	3190514	3190511	3190511	3190511
34	selector switch	1	3190515	3190515	3190515	3190515
38	contactor	1	3190276	3190278	3190278	3190278
42	rectifier	1	3200329	3200334	3200304	3200319
Recon	nmended spare parts	<u>.</u>				
Ref.	Description	Qty.	Art. 613	Art. 615	Art. 617	Art. 619
35	service transformer	1	5610034	5610034	5610034	5610034
43	motor	1	3165203	3165051	3165011	3165011
47	fan	1	3065103	3065118	3065109	3065109
50	timing circuit	1	5602211	5602211	5602211	5602211

4.6 - Wire feeders spare parts list.

Essen	<u>tial spare parts.</u>			
Ref.	Description	Qty.	Art. 1652	Art. 1654
36	motor control circuit	1	5605832	5605832
402	2-roller gearmotor	1	5750720	-
403	4-roller gearmotor	1	-	5750730
Essen	<u>tial spare parts.</u>			
Ref.	Description	Qty.	Art. 1652	Art. 1654
6	solenoid valve	1	3160181	3160181
8	coil support	1	3060278	3060278

4.7 <u>- Fuse table.</u>

Ref.	Description	Value
F1	power supply for primary transformer circuit services (35)	5 A. 500 V.
F2	power supply for fan (43) + cooling unit	5 A. 250 V.
F3	power supply for 16 Vac services	1 A. 250 V.
F4	wire feeder power supply (28 Vac)	12 A. 250 V.

5 <u>- ELECTRICAL DIAGRAMS</u>

- 5.1 Power sources arts. 613-615-617-619: see file SCHE61*.pdf enclosed at the end of manual.
- 5.2 Wire feeders arts.1652-1654: see file SCHE165*.pdf enclosed at the end of the manual.

5.3 - Waveforms.



5.3.1 - Wire feeder motor (402/403) voltage during correct braking (par. 3.3.11).



5.3.2 - Wire feeder motor (402/403) voltage during <u>incorrect</u> braking (par. 3.3.11).

5.4 <u>- Timing board (50) code 5.602.211.</u>

5.4.1 - Topographical drawing.



5.4.2 <u>- Connector table.</u>

Conn. Terminals Function.

<i>_</i> 01111.	I CI mmans	i unction:
J1	1 - 2	16 Vac input timing board (50), safety circuits and start button on the torch power
		supply.
J1	3 - 4	signal input from flow meter on cooling unit.
J1	5	cooling liquid flow signal output.
J1	6	NU.
J1	7 - 8	start signal input for fan (43) and cooling unit.
J2	-	NU.
-	RL1	fan (43) operating control.
-	RL2	cooling unit operating control.

5.5 - Motor control board (36) code 5.602.205.

5.5.1 <u>- Topographical drawing.</u>



5.5.2 <u>- Connector table.</u>

Conn.	Terminals	Function.
J1	1 - 2	start signal input from torch button.
J2	1 - 2	NU.
J2	3 / 4-5-6	pre-selection inputs from switch (34) on art. 613 or switch (33) on arts. 615, 617, 619.
J2	7 - 8	input for safety devices signal.
J3	-	NU.
J4	1(-)	power source output current signal input.
J4	2(+)	shared input for voltage detection circuits and power source output current.
J5	-	NU. (board programming).
J6	-	NU.
J7	1 - 2	28 Vac input for motor control board (36) power supply.
J7	5	contactor (38) command output.
J7	4 - 6	solenoid valve (6) command output.
J8	1(+) - 2(-)	wire feeder motor (402/403) command output.
J9	-	NU.
J10	-	NU.
J11	-	voltage input for rectifier (42) output (negative potential).
J12	1	NU.
J12	2 - 3	pre-selection inputs from switch (33) on art. 613 or switch (34) on arts. 615, 617, 619.
J12	4	NU.

Art. 613





pos	DESCRIZIONE	DESCRIPTION
01	LATERALE SINISTRO	LEFT SIDE PANEL
02	MANICO	HANDLE
03	SUPPORTO MANICO	HANDLE SUPPORT
04	LATERALE FISSO	FIXED SIDE PANEL
05	COPERCHIO	COVER
06	SUPPORTO GIREVOLE	SWIVELLING SUPPORT
07	PANNELLO POSTERIORE	BACK PANEL
08	CINGHIA	BELT
09	APPOGGIO BOMBOLA	GAS CYLINDER SUPPORT
10	PRESSACAVO	STRAIN RELIEF
11	CAVO RETE	POWER CORD
12	PRESA	SOCKET
13	CONNETTORE	CONNECTOR
14	CONNETTORE	CONNECTOR
15	CONNETTORE	CONNECTOR
16	PRESA GIFAS	GIFAS SOCKET
17	LATERALE FISSO	FIXED SIDE PANEL
18	LATERALE DESTRO	RIGHT SIDE PANEL
19	FONDO	BOTTOM
20	ТАРРО	CAP
21	RUOTA FISSA	FIXED WHEEL
22	ASSALE	AXLE
23	SUPPORTO	SUPPORT
24	FONDO	BOTTOM
25	RUOTA PIROETTANTE	SWIVELING WHEEL
26	SUPPORTO	SUPPORT
27	PRESAGIFAS	GIFAS SOCKET

pos	DESCRIZIONE	DESCRIPT
28	CAVO MASSA	EARTH CABLE
29	PANNELLO ANTERIORE	FRONT PANEL
30	CORNICE	FRAME
31	PANNELLO COMANDI	CONTROL PANEL
32	INTERRUTTORE	SWITCH
33	COMMUTATORE	SWITCH
34	COMMUTATORE	SWITCH
35	TRASFORMATORE DI SERVIZIO	AUXLIARY TRAN- SFORMER
36	PIANO INTERMEDIO	INSIDE BAFFLE
37	MORSETTIERA	TERMINAL BOARD
38	TELERUTTORE	CONTACTOR
39	SUPPORTO TELERUTTORE	CONTACTOR SUPPORT
40	IMPEDENZA	CHOKE
41	SUPPORTO IMPEDENZA	CHOKE SUPPORT
42	RADDRIZZATORE	RECTIFIER
43	MOTORE	MOTOR
44	SUPPORTO MOTORE	MOTOR SUPPORT
45	MORSETTIERA	TERMINAL BOARD
46	SUPPORTO MORSETTIERA	TERMINAL BOARD SUPP.
47	VENTOLA	FAN
48	TRASFORMATORE	TRANSFORMER
49	SUPPORTO	SUPPORT
50	CIRCUITO DI COMANDO	CIRCUIT BOARD
51	SUPPORTO	SUPPORT

La richiesta di pezzi di ricambio deve indicare sempre: numero di articolo, matricola e data di acquisto della macchina, posizione e quantità del ricambio. When ordering spare parts please always state the machine item and serial number and its purchase data, the spare part position and the quantity.





pos	DESCRIZIONE	DESCRIPTION
01	CHIUSURA	CLOSING
02	LATERALE SINISTRO	LEFT SIDE PANEL
03	PIANO INTERMEDIO	INSIDE BAFFLE
04	PULSANTE	SWITCH
05	PANNELLO POSTERIORE	BACK PANEL
06	ELETTROVALVOLA	SOLENOID VALVE
07	MANICO	HANDLE
08	SUPPORTO BOBINA	COIL SUPPORT
09	COPERTURA	COVER
10	SUPPORTO BOBINA	COIL SUPPORT
11	SUPPORTO	SUPPORT
12	RACCORDO	FITTING
13	RACCORDO	FITTING
14	CONNETTORE + CAVO	CONNECTOR + CABLE
15	SHUNT COMPLETO	COMPLETE SHUNT
16	SPINA	PLUG
17	PROTEZIONE	PROTECTION
18	BLOCCAGGIO	LOCKING DEVICE
19	CERNIERA	HINGE
20	LATERALE DESTRO	RIGHT SIDE PANEL
21	ISOLAMENTO	INSULATION
22	FONDO	BOTTOM
23	SUPPORTO	SUPPORT
24	RUOTA FISSA	FIXED WHEEL
25	SUPPORTO GIREVOLE	SWIVELLING SUPPORT
26	SUPPORTO TORCIA	TORCH SUPPORT
27	RUOTA PIROETTANTE	SWIVELING WHEEL
28	RACCORDO	FITTING
29	RACCORDO	FITTING
30	PANNELLO ANTERIORE	FRONT PANEL
31	FLANGIA ADATTATORE	ADAPTOR FLANGE

pos	DESCRIZIONE	DESCRIPTION
32	CORPO ADATTATORE	ADAPTOR BODY
33	MANOPOLA	KNOB
34	CORNICE	FRAME
35	PROTEZIONE	PROTECTION
36	CIRCUITO DI CONTROLLO	CONTROL CIRCUIT
37	SUPPORTO	SUPPORT
402 403	GRUPPO TRAINAFILO COMPLETO	COMPLETE WIRE FEED UNIT
414	MOTORIDUTTORE	WIRE FEED MOTOR
420	SUPPORTO PREMIRULLO	ROLLER PRESSER SUPP.
421	BLOCCAGGIO GRADUATO	ADJUSTMENT KNOB
422	GUIDAFILO	WIRE DRIVE PIPE ASSY
423	CORPO TRAINAFILO	WIRE FEED BODY
424	ISOLANTE COMPLETO	INSULATION ASSY
425	PROTEZIONE	PROTECTION
426	TRAINAFILO COMPLETO	COMPLETE WIRE FEED
427	INGRANAGGIO	GEAR
428	RULLO TRAINAFILO	WIRE FEED ROLLER
429	POMELLO	KNOB
430	SUPPORTO PREMIRULLO DESTRO	RIGHT ROLLER PRESSER SUPPORT
431	SUPPORTO PREMIRULLO SINISTRO	LEFT ROLLER PRESSER SUPPORT
432	CORPO TRAINAFILO	WIRE FEED BODY
433	CANNETTA GUIDAFILO	WIRE INLET GUIDE
434	PROTEZIONE	PROTECTION
435	TRAINAFILO COMPLETO	COMPLETE WIRE FEED
436	INGRANAGGIO	GEAR
437	INGRANAGGIO COMPLETO	COMPLETE GEAR
442 443	GRUPPO TRAINAFILO COMPLETO	COMPLETE WIRE FEED

La richiesta di pezzi di ricambio deve indicare sempre: numero di articolo, matricola e data di acquisto della macchina, posizione e quantità del ricambio. When ordering spare parts please always state the machine item and serial number and its purchase data, the spare part position and the quantity.











Carrella trainafila Art 1652 (2R) e Art. 1654 (4R)