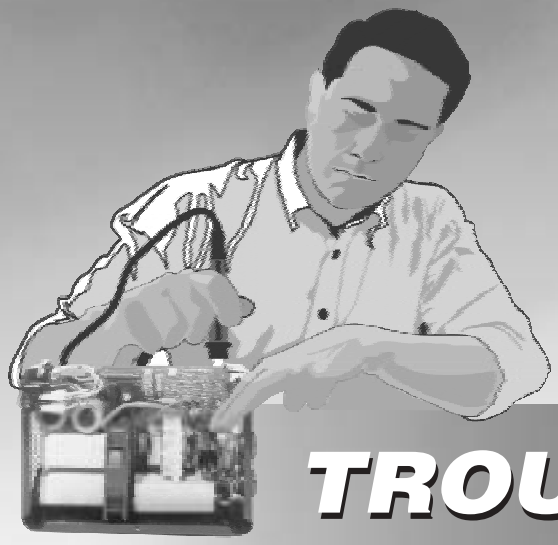
cod. 988345

TELWIN

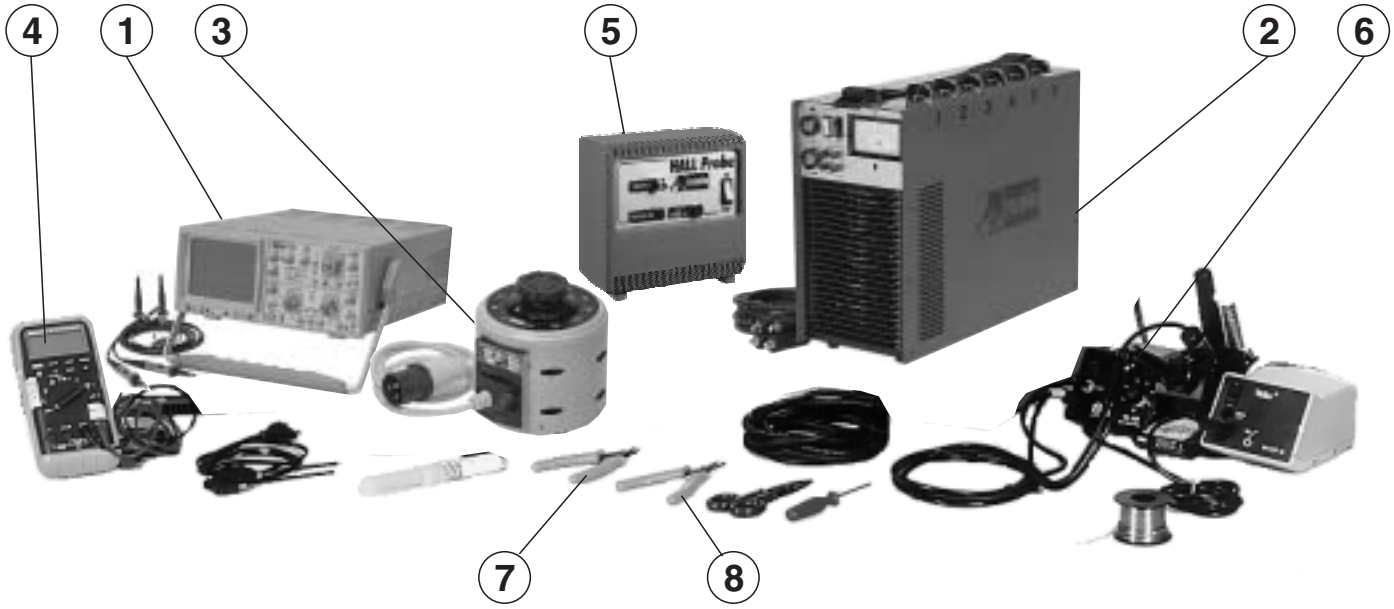
TECHNOLOGY TIG 160-180
AC/DC HF-LIFT
inverter



TROUBLESHOOTING AND REPAIR MANUAL

"reparation no problem!"

EQUIPMENT REQUIRED



ESSENTIAL INSTRUMENTS

1 Dual trace oscilloscope	***802401 (*)***
2 Static load generator	***802110 (*)***
3 Variac 0 - 300v 1500Kw	***802402 (*)***
4 Digital multimeter	
5 Hall probe	***802406 (*)***

USEFUL INSTRUMENTS

6 Unsoldering station

MISCELLANEOUS

7 Cutting nippers
8 Flat jaw pincers

(*) The instruments with codes can be supplied by Telwin. The sale price is available on request!

GENERAL REPAIR INSTRUCTIONS

The following is a list of practical rules which must be strictly adhered to if repairs are to be carried out correctly.

A) When handling the active electronic components, the MOSFET, IGBT and DIODES in particular, take elementary antistatic precautions (use antistatic footwear and wrist straps, antistatic working surfaces etc.).

B) To ensure the heat flow between the electronic components and the dissipator, place a thin layer of thermo-conductive grease (e.g. COMPOUND GREASIL MS12) between the contact zones.

C) The power resistors (should they require replacement) should always be soldered at least 3 mm above the board.

D) If silicone is removed from some points on the boards, it should be re-applied.
NB. Use only non-conducting neutral or oximic reticulating silicones (e.g. DOW CORNING 7093). Otherwise, silicone that is placed in contact with points at different potential (IGBT rheophores, MOSFET etc.) should be left to reticulate before the machine is tested.

E) When the semi-conductor devices are soldered manually the maximum temperature limits should be respected (normally 300°C for no more than 10 seconds).

F) It is essential to take the greatest care at each disassembly and assembly stage for the various machine parts. In particular we strongly recommend labelling the wiring before disconnecting the connectors.

G) Take care to keep the small parts and other pieces that are dismantled from the machine so as to be able to position them in the reverse order when re-assembling. (Damaged parts should never be left out but should be replaced, referring to the spare parts list given at the end of this manual 🕮).

H) The boards (repaired when necessary) and the wiring should never be modified without prior authorisation from Telwin.

I) To understand and use the control panel correctly and for further information on the specifications and operation of the machine, refer to the Instruction Manual.

J) WARNING! When the machine is in operation there are dangerously high voltages on its internal parts so do not touch the boards of the machine when it is live.

GUIDE TO REPAIRING THE MACHINE

1) Disassembling the machine

Every operation should be carried out in complete safety with the power supply cable disconnected from the mains outlet.

A) Undo the 2 screws on the knob near the black plastic clips on the top cover **(figure 1)**.

B) Undo the 12 screws fastening the two plastic covers (6 each) to the front and back **(figure 2)**.

C) To free the front cover turn the control panel gently and pass it behind the cover **(figure 2)**. This operation is easier if the panel wiring is temporarily disconnected and removed.

D) Slide out the 2 covers, moving them outwards **(figure 2)**.
NOTA: the two parts are slightly different.

E) Undo the 14 screws fastening the top cover to the body, 7 on one side and 7 on the other **(figure 3)**.

F) Remove the top cover **(figure 3)**.

G) Remove the base by unscrewing the four screws (**figure 4** – keep the toothed washers).

H) Undo the two screws fastening the two paper air conveyors to the sides of the machine and extract them without damaging them.
After completing the repairs, proceed in reverse order to re-assemble the base, to cover and front and back covers.

2) Cleaning the inside of the machine

Using compressed air, carefully clean the components of the welding power source since dirt is a danger to parts subject to high voltages and can damage the galvanic separation between the primary and secondary boards.
It is therefore important to take special care when cleaning the following parts:
Fan **(figure 7):** check whether the dirt has damaged the correct rotation of the blades, if there is still damage after cleaning replace the fan.
Control board **(figure 7)**:

A) Microcontroller U1 with extreme care,

B) Miscellaneous connectors.

Primary board **(figure 5)**:

A) Rheophores IGBT Q8, Q9, Q10 and Q11 **(figure 9)**. Remove any dust between the rheophores and the dissipator as well.

B) Rheophores of recirculating diodes D27 and D31 **(figure 9).**

C) Rheophores of snubber network diodes D24, D25, D29 and D30 **(figure 9).**

D) Photocouplers ISO1 and ISO2 **(figure 9)**.

Secondary board **(figure 6)**:

A) Secondary power diodes D8, D10, D11, D12, D13, D14, D15, D16, D18, D19 **(figure 10)**.

B) Terminals connecting IGBT module Q5 to the board **(figure 10)**.

C) Rheophores of snubber network diodes D9 and D17**(figure 10)**.

D) Photocouplers ISO4 and ISO5 **(figure 10)**.

Power transformer – HF transformer – filter inductance assembly **(figure 7)**.

3) Visual examination of the machine

Make sure there is no mechanical deformation, dent, or damaged and/or disconnected connector.
Make sure the power supply cable has not been damaged or disconnected internally and that the fan works correctly: when the machine is on stand-by it turns for a limited amount of time then switches off automatically (approx. 5 seconds after machine startup if welding is not started immediately or about 15 minutes after welding is completed). Check that the components listed below show no signs of burning or breakage:

A) Power supply switch **(figure 8)**.
Use a tester to check whether the contacts are stuck together or open
Probable cause:
mechanical or electrical shock (e.g. bridge rectifier or IGBT in short circuit, handling under load).

B) Varistor RV1 **(figure 9)**.
Probable cause: machine connected to a much higher line voltage than 230Vac (e.g.380 Vac).

C) Relays K1 and K2 **(figure 9)**.
Probable cause:
see power supply switch
NB. If the relay contacts are stuck together or dirty, do not attempt to detach them and clean them but replace the relay.

D) Fuse F1 **(figure 9)**.
Check whether it has blown.

E) Electrolytic capacitors C47, C48, C49 and C50 **(figure 9)**.
Probable cause:
- mechanical shock;
- machine connected to much higher line voltage than 230Vac;
- broken rheophore on one or more capacitor: the remainder are overstressed and become damaged by overheating.
- aging after a considerable number of working hours.

F) IGBT's Q8, Q9, Q10 and Q11 **(figure 9)**.
Probable cause:

- discontinuation in snubber network;
- poorly functioning thermal contact between IGBT and dissipator (e.g. loosened attachment screw);
- fault in command circuit (driver);
- loosened power transformer ferrites;
- excessive overheating related to faulty operation.

G) Primary board diodes D24, D25, D27, D29, D30 and D31 **(figure 9)**.
Probable cause:
excessive overheating related to faulty operation.

H) Secondary board diodes D8, D10, D11, D12, D13, D14, D15, D16, D18 and D19 **(figure 10)**.
Probable cause: ·

- discontinuation in snubber network;
- poorly functioning thermal contact between diodes and dissipator (e.g. loosened attachment screws: check)
- faulty connection at machine outlet.

I) Transformer – HF transformer – filter inductance assembly **(figure 7)**.

J) Solenoid valve assembly **(figure 7)**.

4) Checking power and signal wiring

It is important to check that all the connections are in good condition and the connectors are inserted and/or attached correctly (take care to check that the screws fastening the bushes are tightened correctly).
In particular, on the **primary board (figure 5)** it is necessary to check:

A) The connection of the power supply cable to the connectors J5, J6 and J7.
B) The connections of the power supply switch to the connectors J17, J18, J19 and J20.
C) The terminals of the power transformer primary attached to J8 and J4 **(figure 5).**
NB. The connection of the transformer winding nearest the outside to J8, that on the inside to J4 (**figure 9** – the wires are different colours).

On the **secondary board (figure 6)** it is necessary to check:

A) The connections from J8, J9 and J10 to the two power resistors attached to the machine body under the control panel.
B) The outlets of the power transformer secondary attached to J4 and J1 **(figure 6)**.
NB. Do not cross the connections (transformer outlet on the side of the board towards J4 connected to J4 and the outlet towards J1 to J1).
C) The terminal of the outlet filter inductance (transformer assembly) fastened to J5 **(figure 10)**.
D) The connection OUT+ to J2 **(figure 6)**.
E) Also the shunt to J2 **(figure 6)**.
F) The connection from the HF transformer to J6.
G) The thermostat wiring to J14 and J18.

Other checks:

A) The connection from the HF transformer to the power resistor under the control panel.
B) The outlet of the HF transformer secondary to the outlet OUT-.

5) Electrical measurements with the machine switched off

With the digital multimeter set for diode testing check the following components (junction voltages not less than 0.2V):

A) Rectifier bridges D26 and D28 **(figure 9)**.
B) IGBT's Q8, Q9, Q10, Q11 (absence of short circuits between collector-gate and between emitter-collector).
C) Direct and recirculating diodes of secondary board between anode and cathode.
D) The IGBT module Q5 (absence of short circuits between collector and gate, **figure 11**).
With the digital multimeter set on ohms check the following components:

A) Resistor R35: 47 ohm ±5% 7W (pre-load resistor in **figure 9**).
B) Resistors R33, R38: 20 ohm ±5% 25W (primary snubber in **figure 9**).
C) Resistors R13, R20: 27 ohm ±10% 9W (secondary snubber in **figure 10**).
D) Power resistors attached to the machine body under the control panel, the one of over 20 ohm ±10% 50W (before measuring disconnect the faston at one end) and the one of under 47 ohm ±10% 90W;
E) Continuity test of thermostatic capsules on secondary board dissipator diodes: disconnect the two wires from the capsules and measure the resistance over their ends, it should be approx. 0 ohm.
F) Continuity test of thermostatic capsule on power transformer disconnect the two wires from the capsule and measure the resistance over their ends, it should be approx. 0 ohm.
G) Continuity test of thermostatic capsule on filter reactance: disconnect the two wires from the capsule and measure the resistance over their ends, it should be approx. 0 ohm.

6) Electrical measurements with the machine in operation

The tests described below can be used to check the workings of the power and control parts of the machine in relation to the different welding modes available.

Preparation for testing

A) Extract the control panel as shown above, attach it to the front cover using the four screws and check that it is connected correctly.
NB. To prevent short circuits, for every operation on the panel and every time it is handled extreme care should be taken: keep it away from the metal body of the machine when it is switched on.
B) Disconnect the wiring from the fastons J2 and J4 on the HF power source board **(figure 6)**.
C) On the primary board open the jumpers JP8, JP9 and disconnect the wiring on the fastons J11 and J12 that connects it to the auxiliary transformer **(figure 9)**.
D) On the secondary board open the jumper JP5 **(figure 10)**.
E) Make 2 connections to the fastons of the primary board J11, J12 and on the ends that were previously disconnected from the auxiliary transformer so that the power supply (line voltage 230 Vac) can be applied separately.
F) Connect the power supply cable of the machine to a single phase variac with variable output 0-300 Vac.

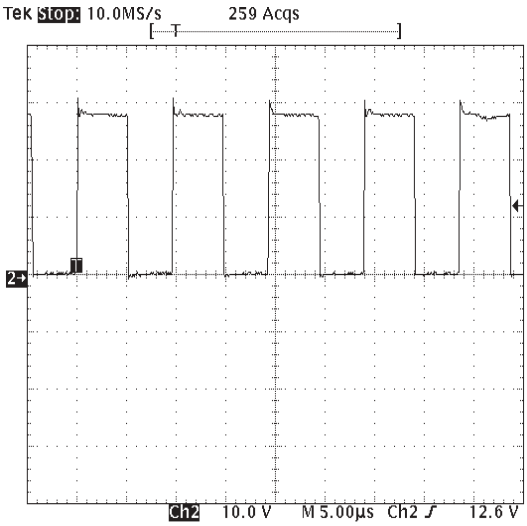
Functional test of display panel and primary board at low voltage:

A) Switch on the power supply (230 Vac) and check that after a short period of about 4 seconds (panel display shows "____") the relays K1 and K2 **(figure 9)** commute and the control panel is updated without signalling any alarm.
B) Placing the multimeter negative on theU2 case (LM7812) check the following power supply voltages on the primary board:
PIN 3 of U2 = +12V ±3%
PIN 3 of U3 = +5V ±3%
PIN 3 of U4 = -12V ±3%
PIN 3 of U5 = -15V ±3%
C) Turn the encoder on the control panel **(figure 2)** and check that the numerical signal on the display changes.
D) Using the keys, check if the LED's on the panel, related to the different functions, light up: **see TABLES 1 and 2 for a summary of modes and parameters.**

E) Make a load and programming cycle for the welding parameters (see the Instruction Manual: programming).
NB. For the following tests set in LOCAL mode (control from panel) and MMA welding (electrode).

F) Use the oscilloscope (voltage probe x 100) to verify that the wave forms between the collector and emitter of Q5 and Q7 on the primary board (figure 9) resemble that in **FIGURE A**.

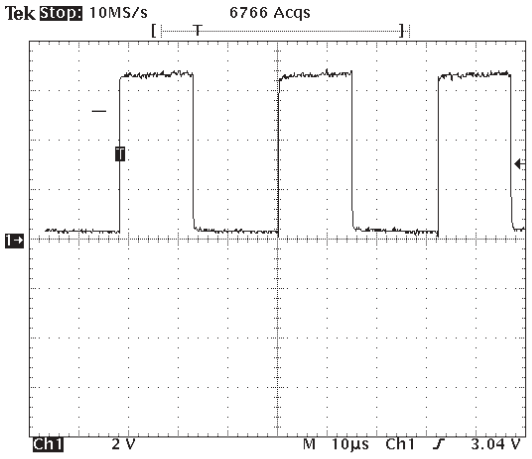
Figure A



Amplitude tolerance: ±10%
Time tolerance: ±5%

G) With the voltage probe x10 between pin 4 of JP8 and TP1 (earth connector on the latter) on the control panel (the corner behind the LOAD button), use the oscilloscope to verify that the wave form resembles that in **FIGURE B.**

Figure B

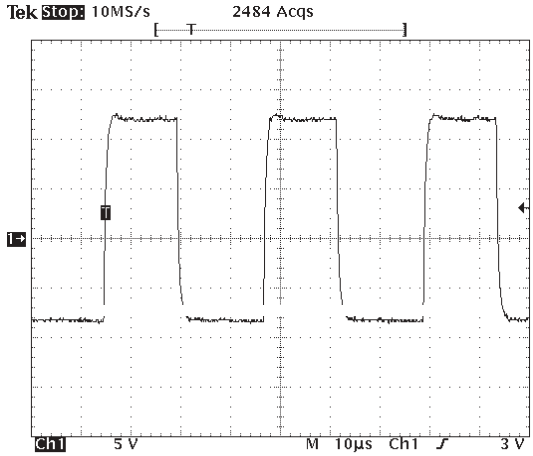


Amplitude tolerance: ±10%
Frequency: 32KHz ±2%

H) Check that there is a voltage of 26 Vdc ±15% between pins 7 and 8 of the opto-couplers ISO1 and ISO2 on the primary board **(figure 9)**.

I) Use the oscilloscope (voltage probe x10) to verify that the wave form of the voltage between the gate and emitter of the IGBT's Q8, Q9, Q10, Q11 on the primary board **(figure 9)** resembles that in **FIGURE C.**

Figure C

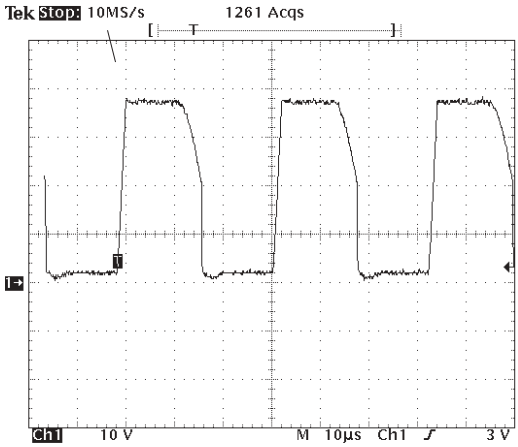


Amplitude tolerance: ±10%
Time tolerance: ±2%

J) Switch on the machine and the variac, setting a voltage of 26 Vac (starting from 0 Vac).

- Verify (voltage probe x100) that the wave form of the voltage between the collector and emitter of IGBT's Q8, Q9, Q10, Q11 on the primary board **(figure 9)** resembles that in **FIGURE D.**

Figure D



Amplitude tolerance: ±10%
Time tolerance: ±2%

Functional test on secondary board IGBT module, at rated voltage, gas solenoid valve, start with HF and LIFT:

A) On the secondary board check that the power supply of the drivers between pins 7 and 8 of the opto-couplers ISO4 and ISO5 is 24 Vdc ±5%.

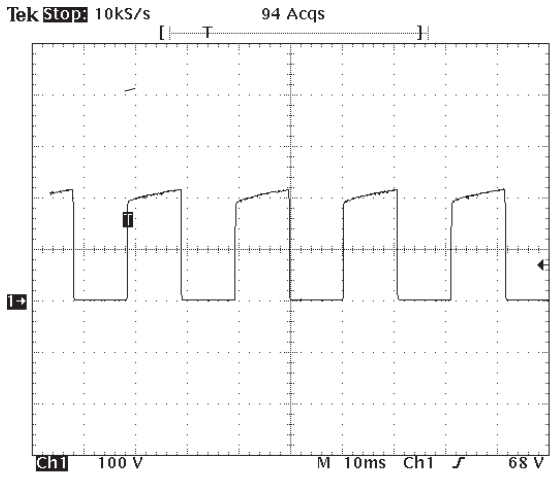
- Switch off the separate power supply and the variac.

B) For later tests:

- Connect the static load generator to the machine outlets (dinse sockets) with the switches set as in the table in FIGURE E.

- Switch back on the separate power supply and the variac, bringing it gradually to 230 Vac.
- Switch on the machine and set TIG HF AC mode (main current = 40A and Frequency = 50Hz).
- Having inserted the static load generator, use the oscilloscope (probe x10) to verify that the wave form of the voltage between the cathodes of D1 and D2 on the secondary board (gate command of an IBGT on the module) resembles that in **FIGURE E.**

Figure F

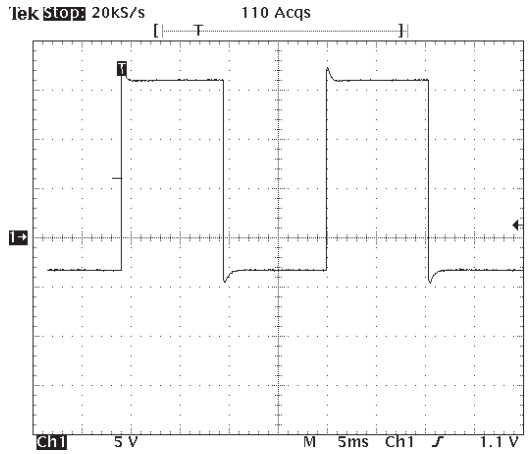


Amplitude tolerance: ±10%
Time tolerance: ±5%

NB. This command signal, generated in the control board, should be present between resistor R204 (micro U1 side) and quartz case Y1 on the board with an amplitude between 0 and 5V.
NOTE: The other IGBT on the secondary module in AC should also be commanded in the same way, but with the signal phase displaced by half a cycle.
In DC and MMA one of the 2 IGBT's is always commanded while the other is always switched off.

C) Under the same load conditions as above, use the oscilloscope (probe x100) to verify that the wave form of the voltage between the resistor R13 (D9 side) and the D2 cathode on the secondary board (IGBT collector-emitter signal on module) resembles that in **FIGURE F.**

Figure E



Amplitude tolerance: ±10%
Time tolerance: ±5%

1	2	3	4	5	6	Switch number
2	2	2	2	2	1	Switch position

D) Switch off the separate power supply and the variac, disconnect the static load and reset all the original connections (including HF)

E) Connect the machine plug to the variac and switch on. Check that if the voltage is set below 190 Vac or above 270 Vac **(Warning: Never exceed 280 Vac)** the machine stays in alarm status: yellow LED on control panel lit up **(figure 2)**.

F) Bring the power supply to 230 Vac and attach a TIG torch to the machine outlet.

- Check that the fan starts to rotate correctly and, in electrode mode, that the green LED on the control panel lights up **(figure 2)**.
- Set the machine in TIG HF DC and check that in this case the green LED lights up when the torch button is pressed (in 2T).

G) Check that the shielding gas circuit command solenoid valve is energised after the torch button is pressed.

H) Set the pregas time as desired and check that, after the torch button is pressed, the gas is enabled and the HF cuts in after the set time (arc strike for approx. 2 seconds).

I) Set the machine in TIG HF AC, press the keys ◀ ▶ simultaneously and turn the encoder to check that the display **(figure 2)** shows the 3 HF cut-in possibilities:
- HF-t (HF total – always active),
- HF-p (HF partial – linked with torch button),
- noHF (HF never active).

NB. Set HF at partial or total (function not present on all machines).

J) Verify correct management of the torch button in 2T and 4T, checking that the pregas and postgas times agree with the preset values (as desired): see table 3.

K) Having set the machine in TIG LIFT and prepared it for welding check for a correct start in LIFT (current 20A) both in 2T and 4T: the cycle should be similar to the start with HF. After completing the tests, switch off the machine.

7) Repairing the primary and secondary boards

If repairing one or both of the boards becomes particularly complicated or impossible, replace them completely.
Each board is identified by a 6-digit code (printed in white on the component side after the initials TW). This is the reference code for requesting a replacement. Telwin may supply boards that are compatible but with different codes. **Note:** before inserting a new board check it carefully for damage that may have occurred in transit. When we supply a board it has already been tested and so if the fault continues after it has been replaced correctly, check the other machine components. Unless otherwise required by the procedure, never alter the board trimmers.

A) Removing the primary board (figure 5)

- Disconnect all the wiring connected to the board.
- From the rear of the machine remove the solenoid valve assembly **(figure 7)** and the main power supply switch **(figure 8)**.
- Undo the four screws (two on each side) fastening the primary radiator to the body of the machine **(figure 7)**.
- Together with the primary board complete with radiator, extract the four spacers between the printed circuit and the body **(figure 7)**.
- For re-assembly proceed in the reverse order: attach the board, attach the solenoid valve set, the switch and restore the wiring.

Please read the procedure for replacing the IGBT's and/or rectifier bridges carefully:
Even if only one IGBT is damaged, all 4 must always be replaced.

- On the board, which has been removed from the machine,

unscrew the four nuts fastening the dissipators **(figure 9)**.
- Unsolder the components, clean the solder from the bump contacts on the printed circuit and separate the dissipator from the board.
- Before making the replacement check whether the components piloting the IGBT's are also damaged:
  - with the multimeter on ohms check the printed circuit for shorting between the 1st and 3rd bump contacts (between the gate and the emitter) corresponding to each component,
  - alternatively, the resistors R34, R36, R39 and R40 could have burst and/or the diodes D1, D2, D4 and D5 could be unable to function at a correct Zener voltage (this should have shown up in the preliminary tests).
- Remove the components (IGBT's, diode bridges or both) by undoing the screws fastening them to the dissipators
- Clean any irregularity or dirt from the dissipators. If the IGBT's have burst the dissipators may have been irreversibly damaged: in this case they should be replaced.
- Apply thermoconductive grease following the general instructions.
- Prepare the components to be replaced. For the IGBT's, bend the rheophores through 90° at a distance of 20 mm from the attachment hole axis (never put the parts of the rheoohores under tension and/or bend them near the case).
- Position the screws holding the components without tightening them completely.
- Join the dissipator/compononent assembly to the printed circuit, inserting all the rheophores in the bump contacts and the threaded spacers on the four attachment holes.
- Attach the dissipators with the nuts and lock the closures once and for all in the following order:
  - the nuts fastening the dissipators to the printed circuit with a torque wrench setting of 2 Nm ±20%;
  - the screws fastening the rectifiers to the dissipators with a torque wrench setting of 2 Nm ±20%;
  - the screws fastening the IGBT's to the dissipators with a torque wrench setting of 1 Nm ±20%.
- Solder the terminals taking care not to let the solder run along them.
- On the component side cut away the protruding part of the rheofores and check they are not shorted (especially the gate and emitter).

NB. The 4 IGBT's should belong to the same selection kit supplied by Telwin.

B) Removing the secondary board (figure 6)

To gain easy access to the board we advise turning the machine upside down.
- Disconnect all the wiring connected to the board.
- Undo the four screws (two on each side) fastening the secondary radiator to the machine body **(figure 8)**.
- Extract the secondary board with its dissipator **(figure 8)**.
- For -assembly proceed in the reverse order: attach the board and restore the wiring.

Please read the procedure for replacing the secondary board diodes carefully:

The direct and recirculating diodes are all attached to the secondary dissipator.
- Having removed the board from the machine, undo the screws fastening the diode requiring replacement to the dissipator.
- Unsolder the rheofores, clean the solder from the bump contacts and remove the component.
- Repeat the procedure for any other diodes requiring replacement, then remove any dirt or irregularities from the dissipator. If the diodes have burst the dissipator may have been irreversibly damaged: in this case replace it.
- If the replacement has been made on the side where thermo-conductive grease has been applied to the components, replace the grease following the general instructions. If the replacement has been made on the side where (SIL-PAD) insulating film has been applied to the components, if it is not satisfactory replace it.
- Position the components on the dissipator, inserting the rheophores on the bump contacts and insert the screws without tightening them completely.
- Solder the rheophores and cut away any excess on the components side.
- Tighten up the diodes once and for all with a torque wrench setting of 1 Nm ±20%.

The IGBT Module Q5: While the diodes can be replaced without removing the secondary dissipator from the board, this procedure is dangerous for the IGBT module since sliding it out would overstress the printed circuit.

Given the remote probability of the component breaking, if it is found to be broken we advise either replacing the complete board or having it repaired directly by Telwin.

8) Replacing the HF and control panel boards

If the boards of the control panel (consisting of control board, command board and metal support) and/or the HF board are damaged replace them completely by simply removing the screws fastening them to the machine structure.

TESTING THE MACHINE

The test should be carried out on the assembled machine before closing it with the top cover.

During the tests while the machine is in operation the selectors must not be commuted and neither must the noninductive load electromagnetic switch be activated.

Preparation for testing.

A) Disconnect the fastons J2 and J4 on the HF power source board **(figure 6)**.

B) Disconnect the J8 connection on the primary board, insert the current probe of the Hall effect transducer and immediately restore the connection **(figure 9)**.(Reference arrow in direction of current entering J8).

C) On the primary board open the jumpers JP8, JP9 and disconnect the wiring on the fastons J11 and J12 that connect it to the auxiliary transformer **(figure 9)**.

D) On the secondary board open the jumper JP5 **(figure 10)**.

E) Prepare 2 connections to the fastons on the primary board, J11, J12 and on the ends of the auxiliary transformer that have been disconnected so that a separate power supply (mains voltage 230Vac) can be applied.

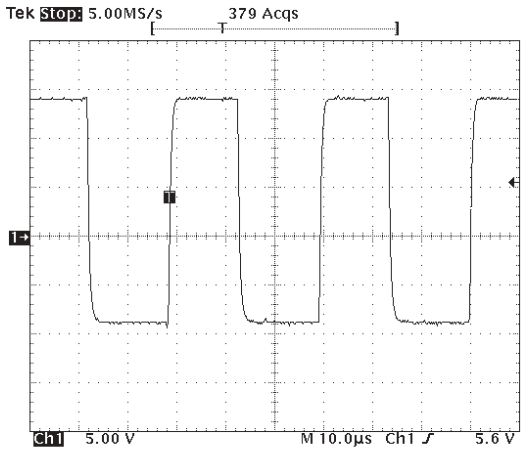
F) Connect the power supply cable of the machine to a single phase variac with variable output 0-300 Vac and the static load generator to the outlets (dinse sockets).

G) Attach the TIG torch to the machine (of the 3 cables connect only the torch button cable: see instruction manual).

Recommended tests

A) No-load test (low voltage):
- Switch on the 230 Vac power supply, check that the control panel lights up and operates correctly: see Electrical Measurements with the machine in operation.
- Press the LOAD key, use the encoder to select program "PF16" and press the LOAD key again for 2 seconds (loading program 16 TIG DC HF).
- Press the torch button and use the oscilloscope (voltage probe x 10) to check that the voltage wave forms between the gate and emitter of IGBT's Q8, Q9, Q10 e Q11 on the primary board

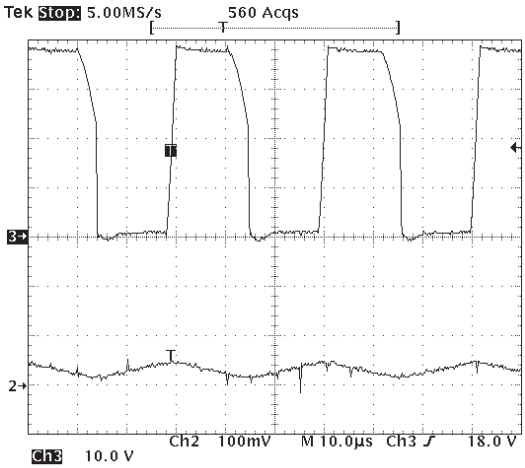
Figure G e that in **FIGURE G**.



Amplitude tolerance: ±10%
Time tolerance: ±2%

- Apply a voltage probe x100 between the collector (point) and emitter (earth) of Q10 (then similarly for the other IGBT's Q8, Q9 and Q11) and connect it with the Hall probe that has already been inserted in the oscilloscope.
- Switch on the variac and, starting from 0 Vac bring it to 26 Vac. Press the torch button.
- Verify that the voltage and current wave forms displayed on the oscilloscope resemble those in **FIGURE H**.

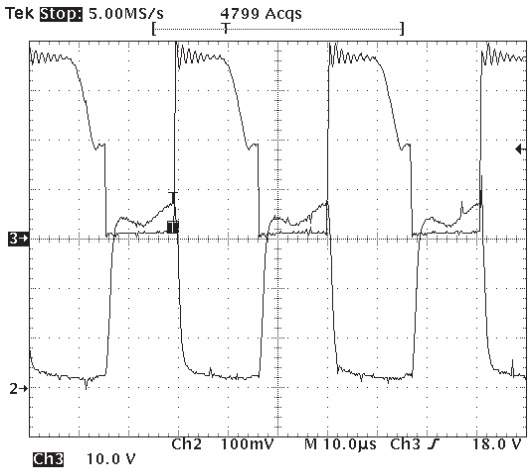
Figura H



Amplitude tolerance: ±10%
Frequency: 100mV = 1A

B) Load test (low voltage):
- Set the static load switches as shown in the table in **FIGURE I** and switch on.
- Use the encoder on the control panel to set a current of 8 A.
- With the variac kept at 26 Vac press the torch button and verify that the voltage and current waveforms resemble those in **FIGURE I** (the machine should be "in adjustment" i.e. the duty cycle should be reduced by decreasing the current setting).

Figura I

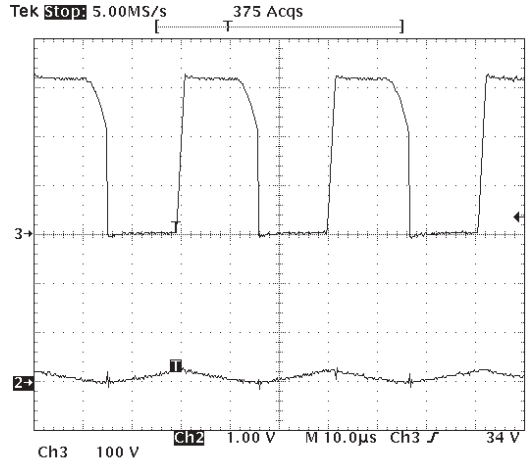


Amplitude tolerance: ±10%
Frequency: 100mV = 1A

1	2	3	4	5	6	Switch number
3	3	3	2	1	1	Switch position

C) No-load test (rated voltage):
- Disconnect the static load and use the variac to increase the voltage to 230 Vac.
- Press the torch button and verify that the voltage and current wave forms between the collectors and emitters of the IGBT's on the primary board resemble those in **FIGURE J**.

Figura J

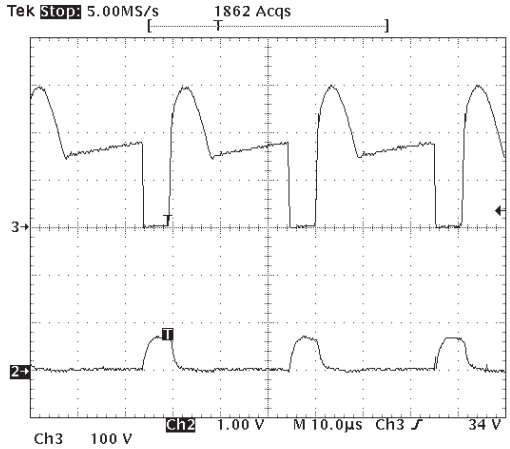


Amplitude tolerance: ±10%
Frequency: 1V = 10A

D) Minimum load test (rated voltage):
- First switch off the variac and then the auxiliary power supply.
- Connect the jumpers JP8, JP9 on the primary board and JP5 on the secondary board.
- Disconnect the machine from the auxiliary power supply (from the fastons J11 and J12 on the primary board and from the auxiliary transformer) and from the variac.
- Reset the original machine connections inside the machine

(N.B. Not the HF: J2 and J5 on the board).
- Use the power supply cable to connect the machine to the mains and switch it back on.
- Use the encoder to set the current at 15A.
- Having connected the static load set as in the table in **FIGURE K**, press the torch button and verify that the voltage and current wave forms resemble those in **FIGURE K.**

Figura K

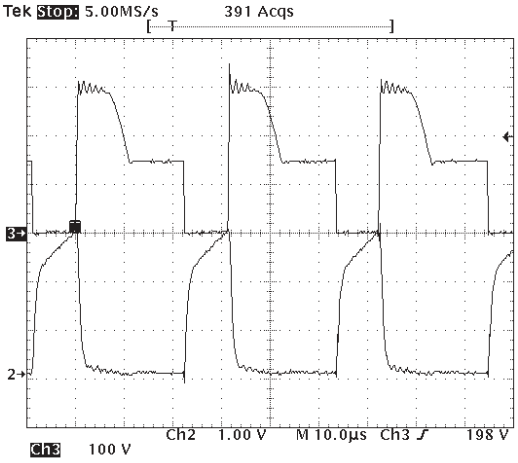


Amplitude tolerance: ±10%
Frequency: 1V = 10A

1	2	3	4	5	6	Switch number
1	1	1	0	0	0	Switch position

E) Average load test (rated voltage):
- Set the load as in the table in **FIGURE L** and set a current of 80A.
- Press the torch button and verify that the voltage and current wave forms resemble those in **FIGURE L**.

Figura L

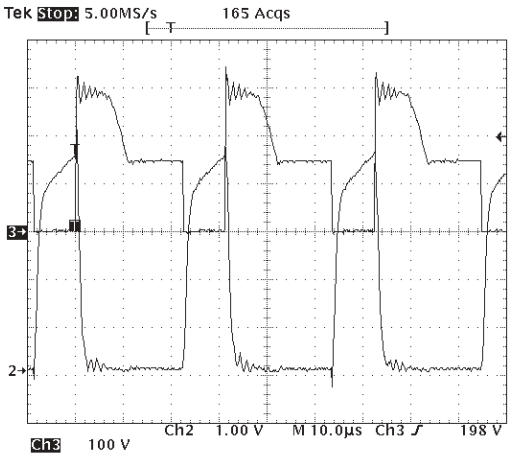


Amplitude tolerance: ±10%
Frequency: 1V = 10A

1	2	3	4	5	6	Switch number
2	2	2	2	2	1	Switch position

F) Rated load test (rated voltage):
- Set the load as in the table in **FIGURE M** and set a current of 150A.
- Press the torch button and verify that the voltage and current wave forms resemble those in **FIGURE M**.

Figure M



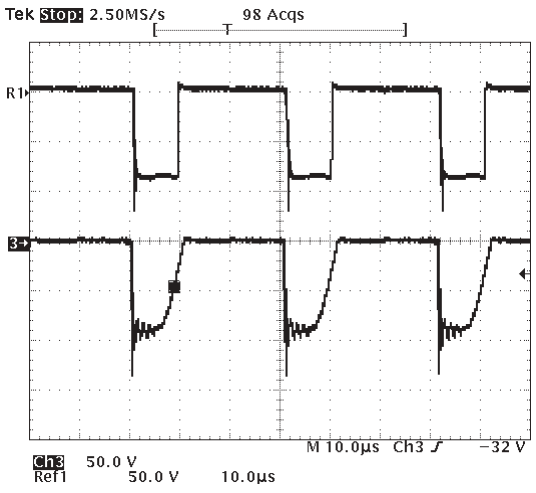
Amplitude tolerance: ±10%
Frequency: 1V = 10A

1	2	3	4	5	6	Switch number
3	3	3	3	2	2	Switch position

G) Maximum load test (rated voltage):
- Set a current of 160A and set the load with all the switches in position 3.
- Press the torch button and check that the peak current reading using the current probe (kept on J8 on the primary board) does not exceed the value of 58A +0A -5A.

H) Check the diodes voltages on the secondary board.
- Connect 2 voltage probes x100: one to the D8 anode and the other to the D11 anode with the earths on the secondary dissipator.
  - Reset the current at 80A and set the load as shown in the table in **figure L**.
  - Verify that the wave forms on the diodes D8 and D11 resemble those in **FIGURE N** (oscilloscope set for tracing peaks).

Figura N



Amplitude tolerance: ±10%
Inverse voltage peak should not exceed 350V

I) Operational check:
- Disconnect the oscilloscope and all instruments.
- Disconnect the machine from the static load generator and switch off. Connect the HF generator (original connections on fastons J2 and J4 on the HF board).

WARNING! The high frequency voltage will irreparably damage the load generator and any other instrument connected to the machine. Before proceeding, check carefully that all the instruments have been disconnected. Do not let parts of the body come into contact with the outlets or internal parts of the power source.
- Switch the machine back on, reload program 16 and press the torch button: the solenoid valve should trip and the HF power source should be activated.
  The HF should cut out after approx. 2 seconds. Release the torch button and check that the solenoid valve cuts out. Switch off the machine and disconnect from the mains.

J) Machine running time and cut out test:
Under the load conditions given in the table in **figure M** with the current set on 150A, leave the machine in operation until the thermostatic capsules trigger (machine in alarm status).
- Check the correct positioning of the internal wiring and finally re-assemble the machine.

K) Welding tests:
- With the machine preset as given in the instruction manual, make a test weld in MMA mode with the current at 70A (electrode diam. 2.5mm): check the dynamic behaviour of the machine and check Hot start and arc force operation.
- Refer to the instruction manual again to connect a TIG torch (green electrode 1.6 mm and gas at 4.5 l/min) and make a test weld on iron or steel in 2T DC HF at 40A with down slope and postgas to check TIG functions.
- Finally, make an operational test in AC on aluminium as well, keeping the current at 40 A (see instruction manual).

TAB. 1

OPERATING MODES

BASIC FUNCTIONS:	
MMA (electrode)	
TIG HF DC	• **CONTINUOUS**
	• **PULSED**
TIG HF AC	
TIG HF AC + MIX (mixed DC and AC welding)	
TIG HF AC + ASIMM (asymmetric AC current)	
TIG LIFT (in all le modes TIG HF illustrated)	
ADDITIONAL FUNCTIONS	
Operator control from panel (**LOCAL**)	
Remote operator control (**CAD**)	
2T (torch button cycle 2 periods)	
4T (torch button cycle 4 periods) Possibility of selecting up slope and base current parameters	
SPOT (with spot welding timer) Possibility of selecting spot time parameter	

TAB. 2

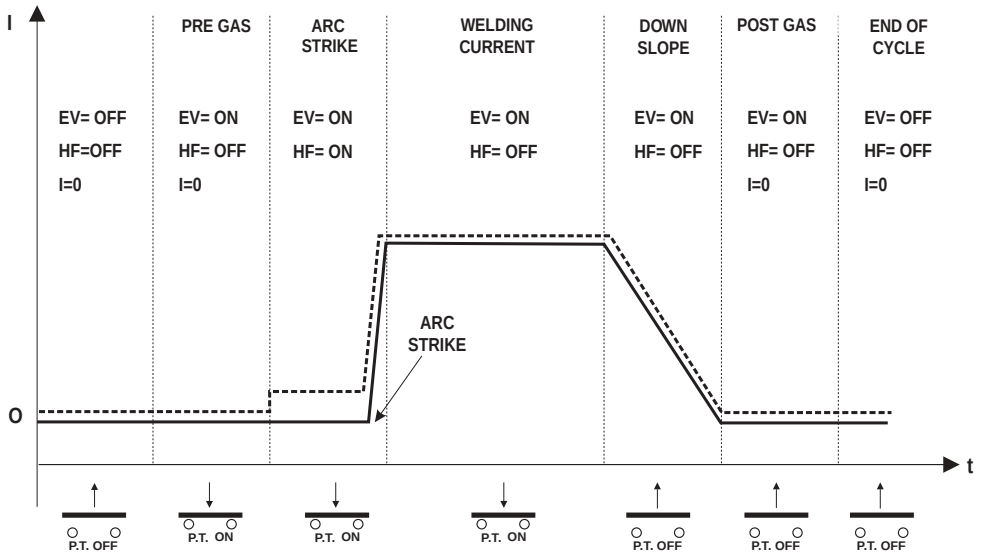
PARAMETERS FOR EACH MODE (IN 2T)

FUNCTIONS	BASE PARAMETERS
MMA	Main current
TIG HF DC CONTINUO	Main current Pregas Postgas Down slope
TIG HF DC PULSATO	Main current Base current Frequency Duty cycle Pregas Postgas Down slope
TIG HF AC **+** **TIG HF AC + MIX**	Main current Frequency Duty cycle Pregas Postgas Down slope
TIG HF AC + ASIMM	Main current Frequency Duty cycle Asymmetric current Pregas Postgas Downslope
TIG LIFT	Same paramaters as all TIG HG modes except Pregas (never present)

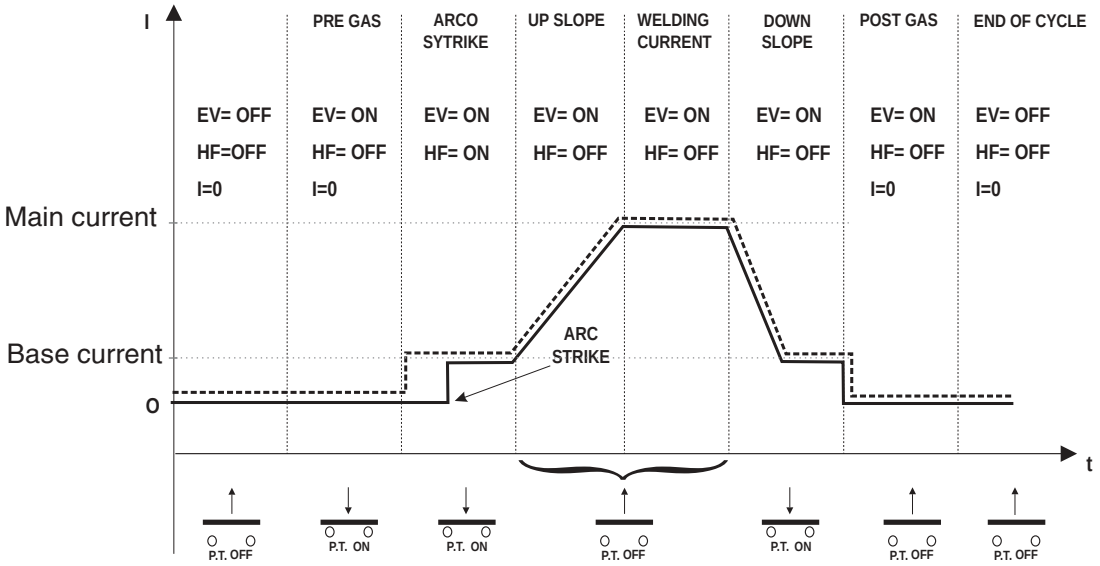
NOTE: functions 4T and SPOT allow modification of related parameters as well

TAB. 3

MACHINE CYCLE 2T WITH HF(──) – LIFT (----·)



MACHINE CYCLE 4 T WITH HF (──) - LIFT (----·)



LEGENDA: **EV** = solenoid valve **I** = welding current **PT** = torch button **HF** = high frequency (if active)

ILLUSTRATED REFERENCES

FIG. 1

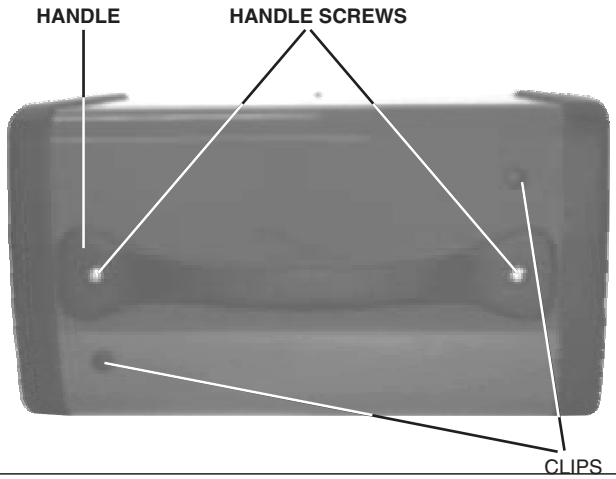


FIG. 3

FIG. 4

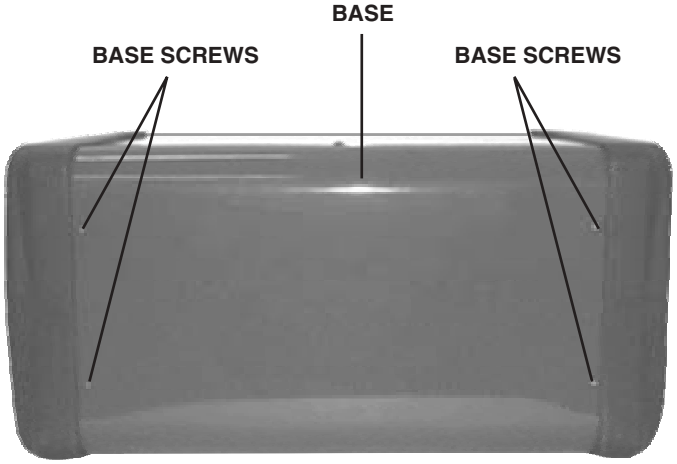
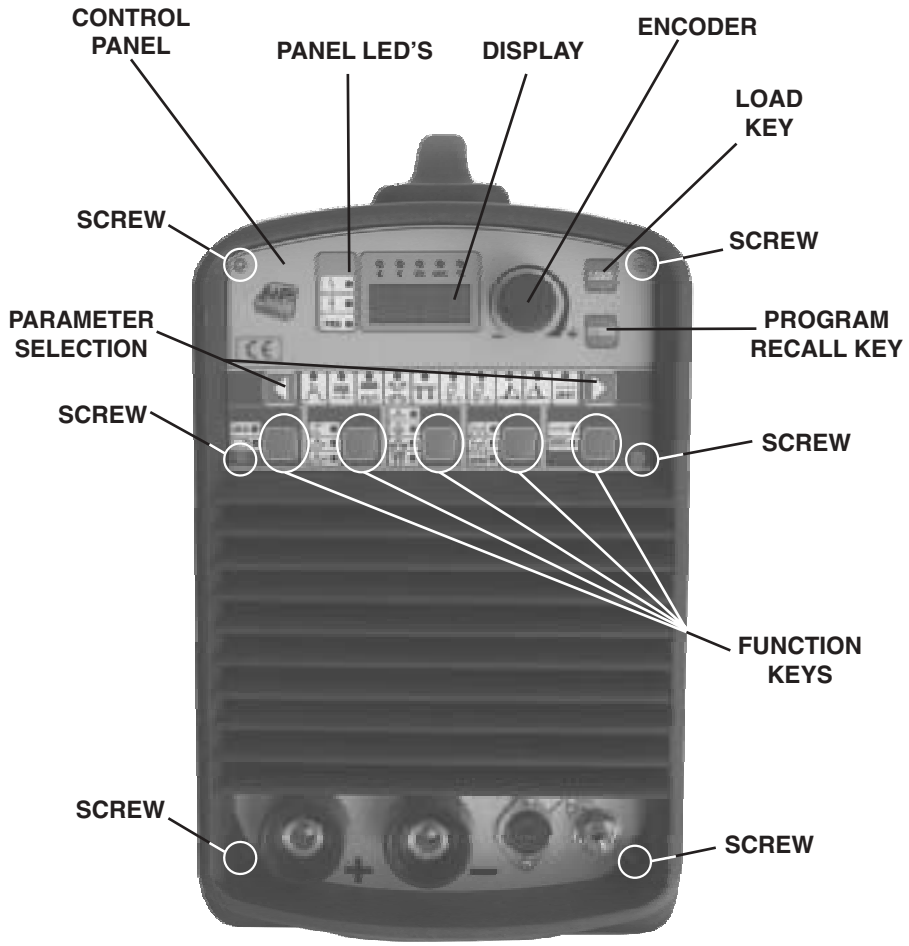


FIG. 2

FRONT



BACK

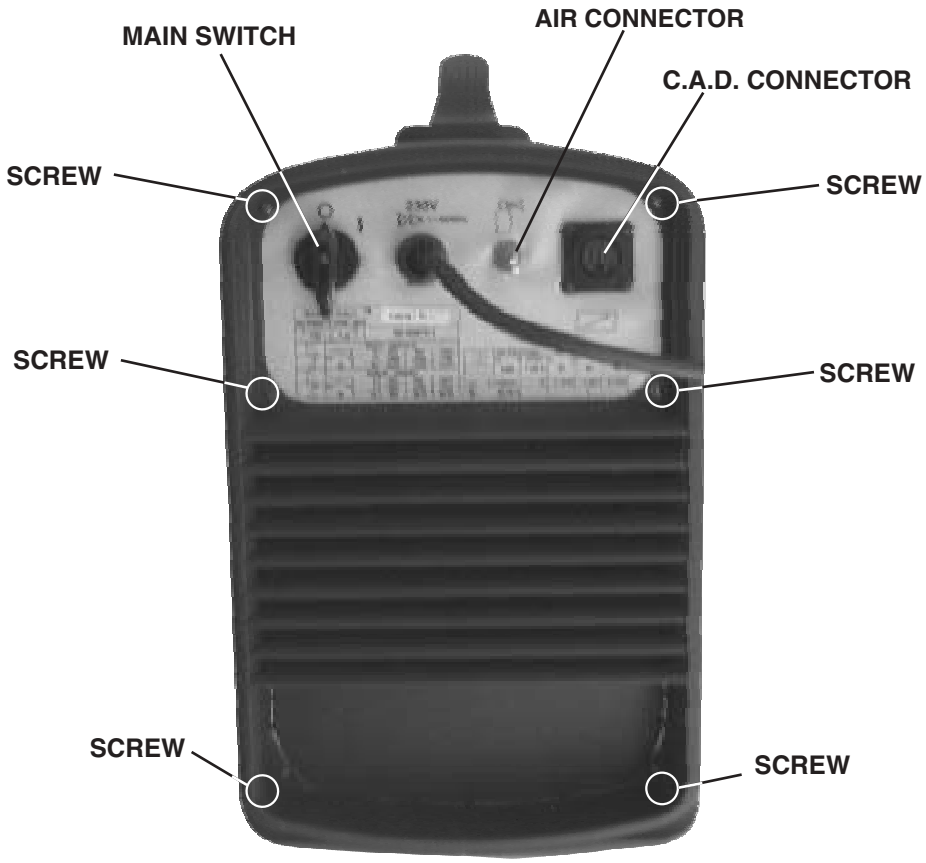


FIG. 5

MACHINE VIEWED FROM ABOVE

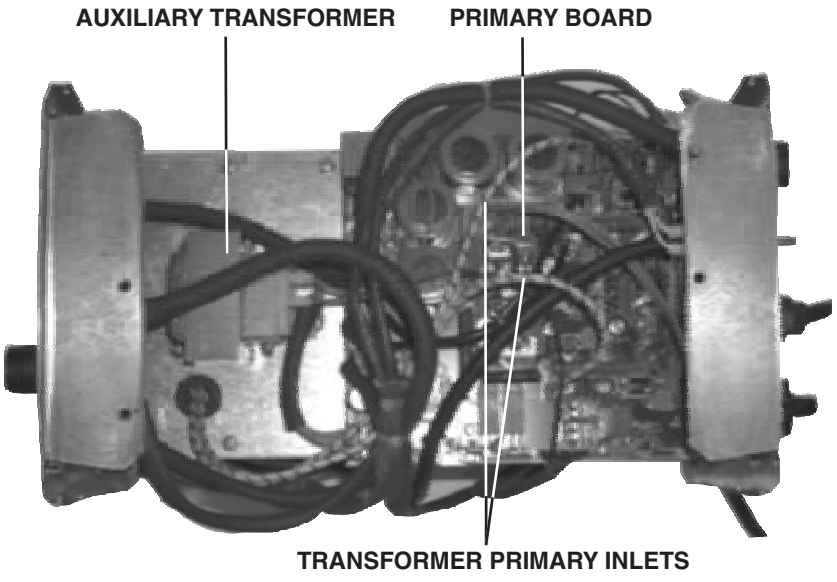


FIG. 6

MACHINE VIEWED FROM BELOW

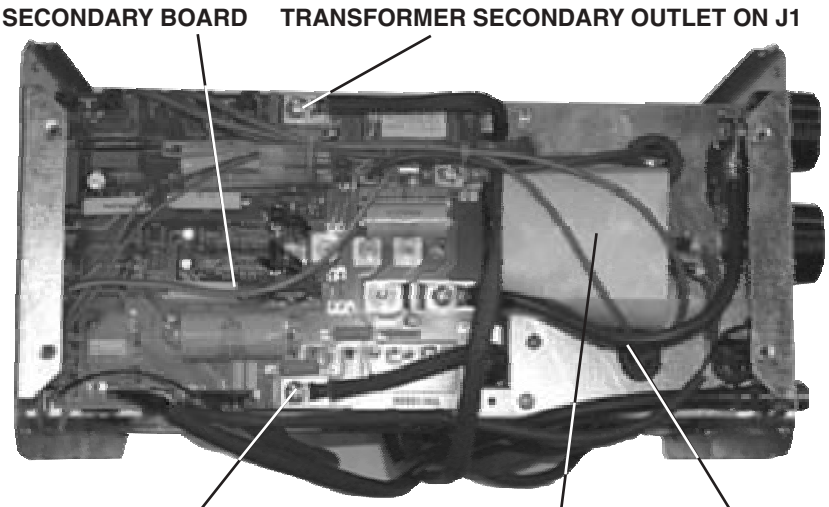


FIG. 7

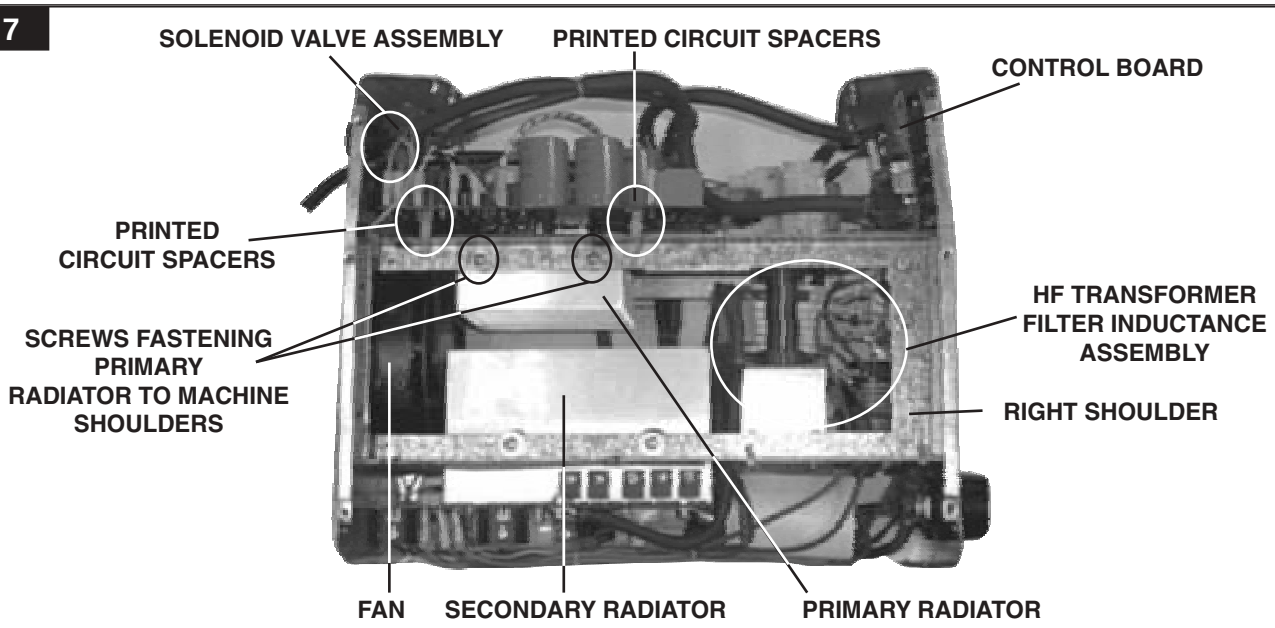


FIG. 8

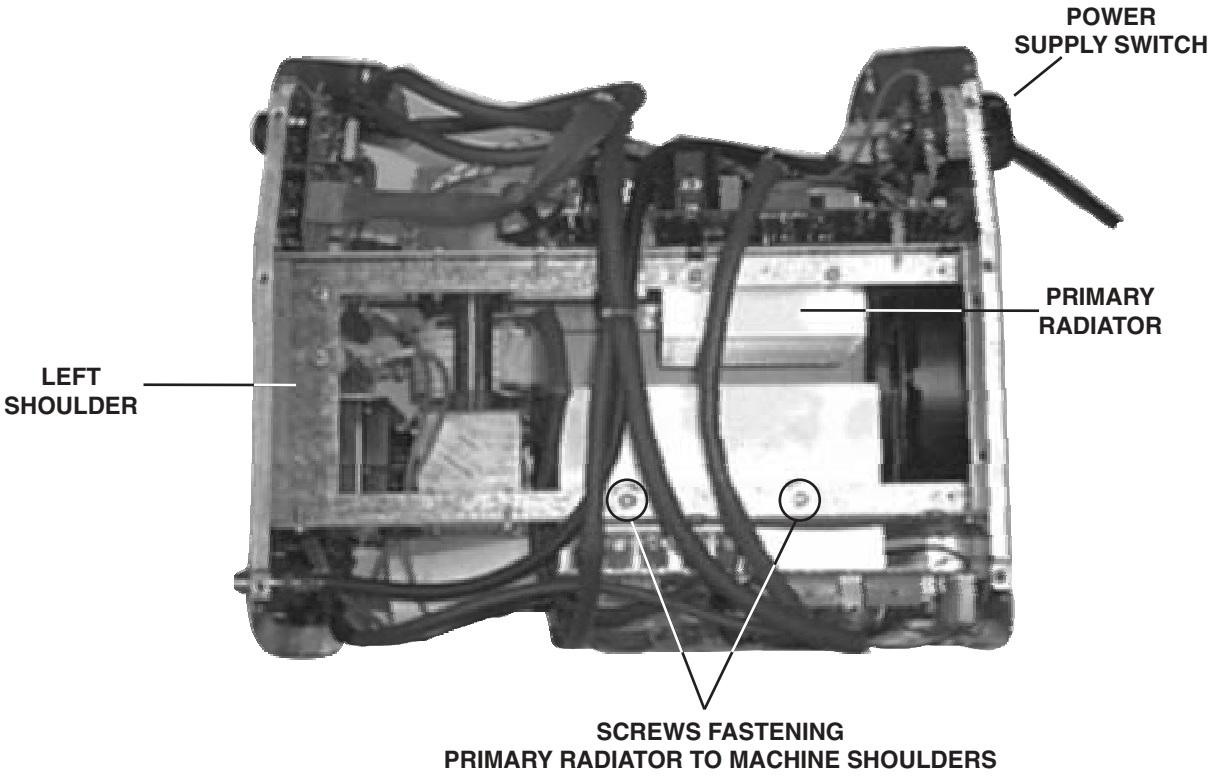


FIG. 9

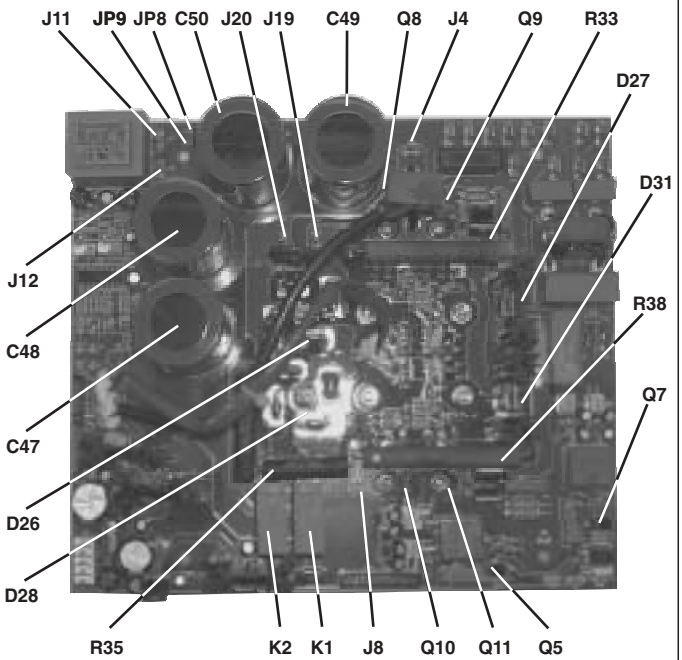
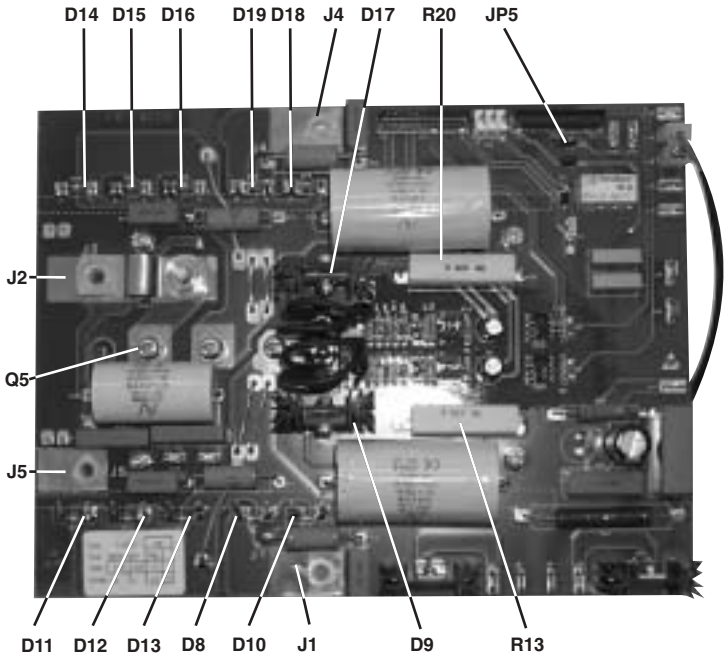
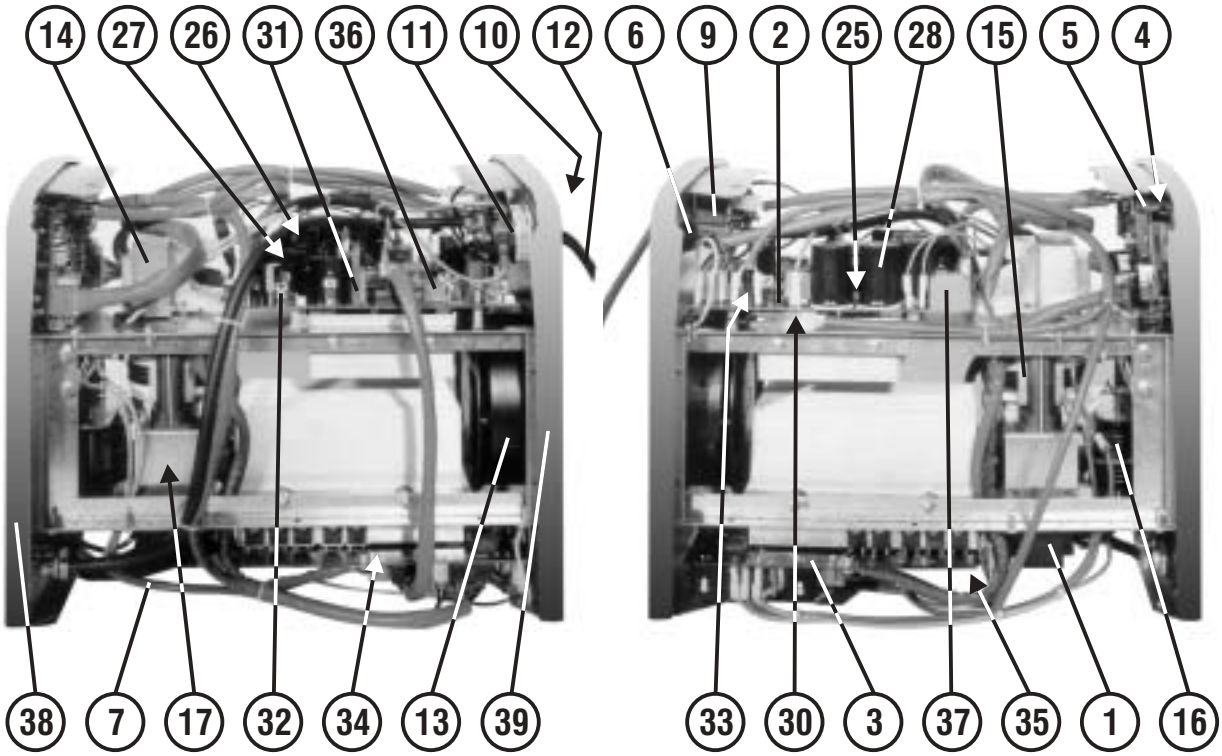


FIG. 10



ELENCO PEZZI DI RICAMBIO - LISTE PIECES DETACHEES
SPARE PARTS LIST - ERSATZTEILLISTE
PIEZAS DE REPUESTO

Esploso macchina, Dessin appareil, Machine drawing, Explosions Zeichnung des Geräts, Diseño seccionado maquina.



Per richiedere i pezzi di ricambio senza codice precisare: codice del modello; il numero di matricola; numero di riferimento del particolare sull'elenco ricambi.
Pour avoir les pieces detachees, dont manque la reference, il faudra preciser: modele, logo et tension de l'appareil; denomination de la piece; numero de matricule.
When requesting spare parts without any reference, pls specify: model-brand and voltage of machine; list reference number of the item; registration number.
Wenn Sie einen Ersatzteil, der ohne Artikel Nummer ist, benoetigen, bestimmen Sie bitte Folgendes: Modell-zeichen und Spannung des Geraetes; Teilliste Nuemmer; Registriernummer.
Por pedir una pieza de repuesto sin referencia precisar: modelo-marca e tension de la maquina; numero di riferimento de lista; numero di matricula.

	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE
1	Box Hf Tipo C Box Hf Tipo C Box Hf Type C Box Hf Type C Box Hf Tipo C
2	Kit Scheda Primario Kit Fiche Primaire Kit Primary Pcb Kit Primaertrafokarte Kit Tarjeta Primario
3	Kit Scheda Secondario Kit Fiche Secondaire Kit Secondary Pcb Kit SekundÄrtrafokarte Kit Tarjeta Secundario
4	Kit Scheda Pannello Kit Platine Frontal Kit Front Panel Card Kit GerÄtefrontskarte Kit Tarjeta Frontal
5	Kit Scheda Controllo Tig Kit Platine De Control Tig Tig Control Pcb Kit Wig Steurungskartekit
6	Kit Tarjeta De Controlo Tig Cablaggio Controllo Cable De Controle Control Cable Kontrolkabel
7	Cable De Control Cablaggio Secondario Cable Secondaire Secondary Cable SekundÄrkabel
9	Cable Secundario Elettrovalvola Electrovanne Electrovalve Elektroventil
10	Elektrovalvula Manopola Per Commutatore Poignee Pour Commutateur

	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE
11	Interruttore Interrupteur Switch Schalter Interruptor
12	Cavo Alimentazione Cable D'alimentation Mains Cable Netzkabel Cable Alimentacion
13	Ventilatore Ventilateur Fan Ventilator Ventilador
14	Trasformatore Ausiliario Transformateur Auxiliaire Auxiliary Transformer Hilfstransformator Transformador Auxiliar
15	Trasformatore Transformateur Transformer Transformator
16	Trasformador Trasformatore H.f. Transformateur H.f. H.f. Transformer H.f. Trasformator
17	Trasformador H.f. Induttanza Inductance Inductance Drossel
18	Induccion Assieme Frontale Ensamble Partie Frontale Front Panel Assembly GerÄtefrontsatz
19	Grupo Frontal Cornice Cadre Frame

	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE
20	Manopola Poignee Knob Griff Manija
21	Fondo Chassis Bottom Bodenteil Base
22	Mantello Capot Top Cover GehÄusedeckel Panel De Cobertura
23	Presa Dinse Prise Dix Dinse Socket Dinse Steckdose Enchufe Dinse
24	Kit Manopola Kit Poignee Knob Kit Griff Kit Kit Manija
25	Raddrizzatore Monofase Redresseur Monophase Singlephase Rectifier Einphasiger Gleichrichter Rectificador Monofasico
26	Resistenza Resistance Resistor Wiederstand Resistencia
27	Varistore Varistor Varistor Varistor Varistor
28	Condensatore Condensateur Capacitor

	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE
29	Diodo Diode Diode Diode Diodo
30	Igbt Igbt Igbt Igbt Igbt
31	Rele' Relais Relais Relais Rele
32	Diodo Diode Diode Diode Diodo
33	Fusibile Fusible Fuse Sicherung Fusible
34	Termostato Thermostat Thermal Switch Thermostat Termostato
35	Shunt Shunt Shunt Shunt Shunt
36	Shunt Trasformatore Impulsi Trasformateur Pulsee Pulse Transformer Pulse Transformator
37	Transformador Pulsado Trasformatore Ausiliario Transformateur Auxiliaire Auxiliary Transformer

	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE
38	Frontale Partie Frontal Front Panel GerÄtefront Frontal
39	Retro Partie Arriere Back Panel RÜckseite Parte Trasera
40	Raccordo Acqua Raccord Eau Pipe Fitting Wasseranschluss Racor Agua
41	Pressacavo + Ghiera Presse Cable + Embout Cable Bushing + Ring Nut Kabelhalter + Nutmutter Prensa Cable + Virola
42	Kit Igbt Kit Igbt Kit Igbt Kit Igbt Kit Igbt
43	Kit Igbt Raccordo Entrata Gas Raccord Entree Gaz Gas Pipe Connector Gaseintritt
	Racor Entrada Gas

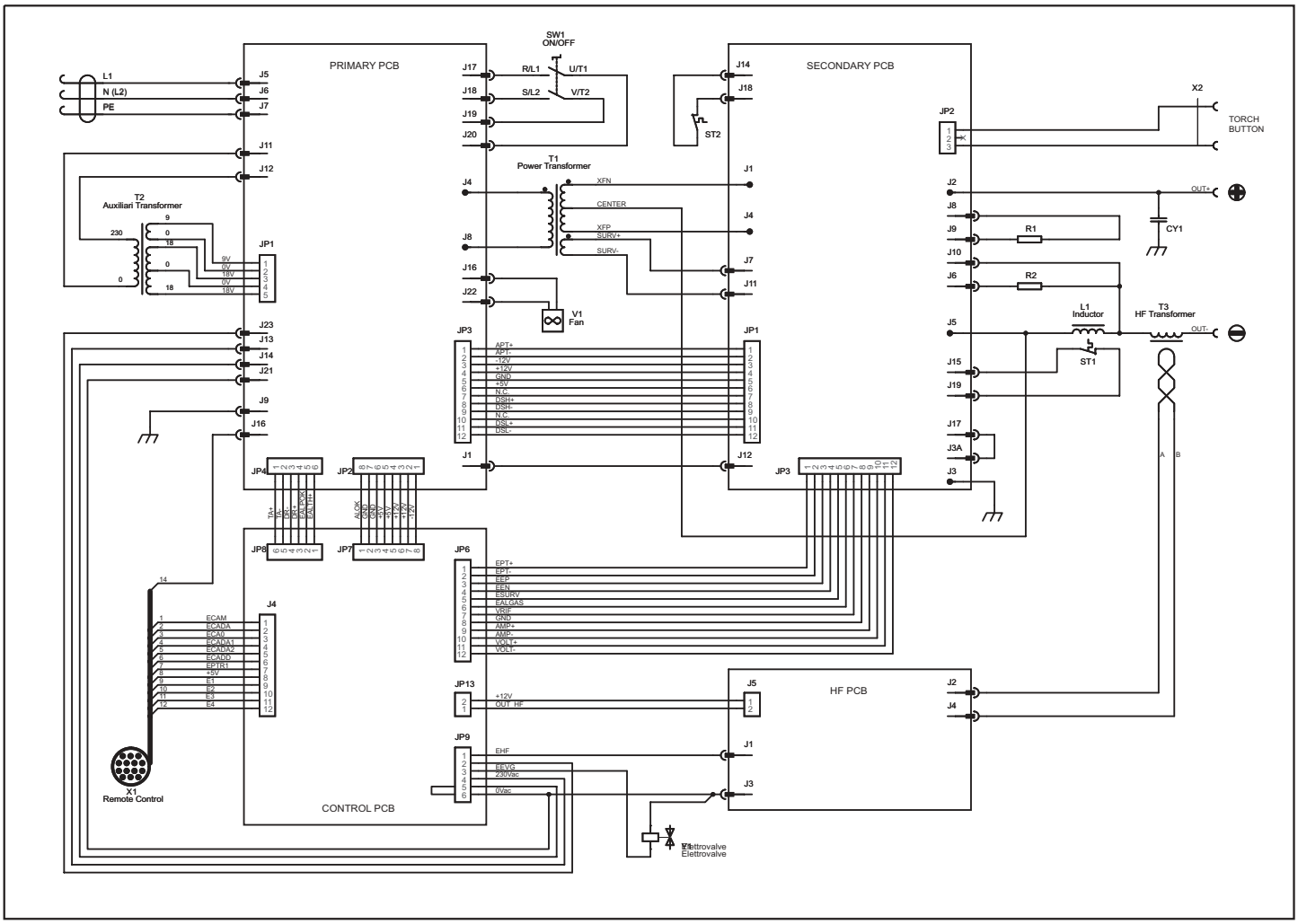
(I) Per individuare lo schema elettrico corrispondente alla vostra macchina, rifarsi all'ultima cifra "/**X**" del numero di matricola (N. 0000/**X**) riportato sul frontale.

(F) Pour reperer le schema electrique correspondant a votre appareil, verifier le dernier chiffre"/**X**" du numero de serie (N. 0000/**X**) reporte sur la partie frontale.

(GB) In order to find the electrical diagram corresponding to your model, check the last number "/**X**" of the serial number (N. 0000/**X**) printed on front panel.

(D) Um den schaltplan, der ihrem gerät entspricht, ausmachen zu können, müssen sie die letzte ziffer "/**X**" der matrikelnummer (N. 0000/**X**), die auf der frontseite angebracht ist, beachten.

(E) Para la identificacion del esquema eléctrico, correspondienten, a su máquina, refierase a la última cifra "/**X**" del número de placa (N. 0000/**X**) instalado sobre el frontal.



Notes:

TECHNICAL REPAIR CARD.

In order to improve the service, each servicing centre is requested to fill in the technical card on the following page at the end of every repair job. Please fill in this sheet as accurately as possible and send it to Telwin. Thank you in advance for your co-operation!

Official servicing centers Repairing card

Date: _____

Inverter model: _____

Serial number: _____

Company: _____

Technician: _____

In which place has the inverter been used?

☐ *Building yard*

☐ *Workshop*

☐ *Others:* _____

Supply:

☐ *Power supply*

☐ *From mains without extension*

☐ *From mains with extension m:* _____

Mechanichal stresses the machine has undergone to

Description: _____

Dirty grade

Dirty inside the machine

Description: _____

Kind of failure	Component ref.
Rectifier bridge	
Electrolytic capacitors	
Relais	
In-rush limiter resistance	
IGBT	
Snubber	
Secondary diodes	
Potentiometer	
Others	

Substitution of primary circuit board: *yes* ☐ *no* ☐

Substitution of primary control board: *yes* ☐ *no* ☐

Troubles evinced during repair :

_____

_____

_____

_____

_____

_____

_____

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ISO 9001
CERTIFIED QUALITY SYSTEM