REPAIRS MANUAL

ENGLISH

Genesis 302-382 AC/DC
WU21

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SELCO s.r.l.
Via Palladio, 19
I - 35010 ONARA DI TOMBOLO (Padova) Italy
Tel. +39 049 9413111
Fax +39 049 9413311
e-mail: info@selco.it

How to contact Selco Service Department:

SELCO s.r.l.
Service Department
c/o SELCO 2
Via Macello, 61
I - 35010 CITTADELLA (Padova) Italy
Tel. +39 049 9413111
Fax +39 049 9413311
e-mail: service.dept@selco.it

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1) PURPOSE OF THE MANUAL

This manual is designed to provide authorised service centres with the basic information necessary for performing repairs on the models Genesis 302 AC/DC and 382 AC/DC.

In order to avoid serious injury to persons or damage to things, this manual must be used only by qualified technicians.
Selco S.r.l. accepts no liability for any injury to persons or damage to things that may occur during performance of repairs, even after reading or practical application of this manual.

For a detailed description of the operation, use and ordinary maintenance of the machine, please refer to the "Instructions for use and maintenance manual" which must always accompany the machine. The purchaser must follow the directions contained in the above manual. Failure to do so will exempt Selco from all liability.

The operations described in this manual require the use of a digital multimeter, an AC/DC ammeter clamp and a basic knowledge of how the machine works. Basic electrotechnical knowledge is also required.

Repair consists in identification of the faulty part, included in the list of available spare parts, and replacement of it.
In the event of failure of an electronic board, repair entails replacement of the board and not replacement of the faulty electronic component on the board.

For troubleshooting advice, see introduction to chapter 9.

Do not carry out modifications or maintenance not scheduled in this manual.

If the problem cannot be solved by following the instructions provided in this manual, contact the Selco Service Department or send the machine to Selco for repair.

2) WARNINGS, PRECAUTIONS AND GENERAL NOTICES FOR PERFORMING REPAIRS

Repairs must be performed by qualified personnel only.

Before performing the repair, you should read and assimilate the contents of this manual, in particular the safety precautions.

Avoid performing repairs without the presence of another person able to provide help in the event of an accident.

The repair of a machine requires access to its internal parts and consequently removal of some of the protective panels. Additional precautions are therefore necessary with respect to use of the machine for welding in order to prevent possible injury or damage caused by contact with

- live parts
- moving parts
- parts at high temperature

Live parts:

CAUTION ! When handling internal parts of the machine, remember that opening of the switch does not prevent the risk of electric shocks: the machine must be unplugged from the power supply.
Wait approx. one minute before carrying out work on the internal parts as the capacitors may be loaded at high voltage.

CAUTION ! When taking measurements, remember that the measuring instruments can be live and you should therefore avoid touching their metal parts.

CAUTION! When TIG operation is selected with HF start, the machine generates a series of high voltage impulses (approx. 10,000 V) to spark the welding arc. When an arc sparking test in TIG with HF discharge is not specifically scheduled in the diagnostic phase, you are therefore advised to disconnect the terminals FN1 and FN2 of the HF 15.14.286 board.
After carrying out the repair, remember to reconnect FN1 and FN2 of the board 15.14.286 before finally closing the machine, then perform a few welding tests, including TIG HF sparking.

Moving parts:

CAUTION ! Keep your hands well away from the fan when the machine is connected to the power supply. Ensure that the machine is unplugged and that the fan is at a standstill before replacing it.

Parts at high temperature:

CAUTION ! When handling internal parts of the machine, remember that some of them may be very hot. In particular avoid contact with heat sinks.

3) INSTRUMENTS AND CONVENTIONS FOR PERFORMING DIAGNOSIS AND REPAIR

3.1) Instruments for basic diagnosis

The following are required:

- a multimeter with the following scales:
  Ohm: from 0 to a few Mohm
  Diode testing
  Direct voltage (Vdc): from mVdc to 1000 Vdc
  Alternating voltage (Vac): from 10 Vac to 700 Vac

  NOTE: You are advised to use an instrument with automatic scale since it is not theoretically possible to predict the electrical quantity to be measured when the machine has broken down.

- an AC/DC ammeter clamp at least in class 2.5 with e.o.s. 400A pk

- alternatively to the ammeter clamp, a shunt can be used with value 60 mV @ 400 A.

  NOTES:
  * remember that other types of shunts can also be used, but accuracy is reduced with higher capacities, whereas with lower capacities the measurement must be taken quickly to avoid overheating of the shunt
  * **once fitted, the shunt is at welding potential (be careful especially with discharges during arc striking in TIG HF)**
  * the ammeter clamp is preferable as it is more practical

3.2) Repair tools

- complete set of fork spanners
- complete set of pipe spanners for hexagonal nuts
- complete set of blade screwdrivers
- complete set of Phillips screwdrivers
- complete set of Allen keys
- Phillips torque screwdriver for M3 screws with tightening torque adjustable range from 1 to 3 Nxm, accuracy 0.1 Nxm
- crimper for insulated wire terminals (blue, red and yellow)
- pliers for AMP contacts
- tweezers and cutting nippers - type commonly used for electronic components
- tongs (dimensions suitable for closing gas pipe clamps)
- welder for electronic components, minimum power 50 W
- portable electric drill

3.3) Grid load

Use of grid load can speed up fault tracing and machine testing. Just remember that a fixed power resistor applied to machine's output is somewhat equivalent to a welding arc, but only inside of a narrow output voltage range, whose center value can be determined by the formula:

TIG DC WELDING:

$V_{OUT} \approx 10 + 0.04 \times I_{OUT}$

Es.: 12Vdc @ 50A
14Vdc @ 100A
18Vdc @ 200A etc.

STICK WELDING::

$V_{OUT} \approx 20 + 0.04 \times I_{OUT}$

Es.: 22Vdc @ 50A
24Vdc @ 100A
28Vdc @ 200A etc.

If output voltage goes too much above or below the rated value, the generator could either saturate or go into arc force or other special features could be performed (such as anti-flashing): in both cases real output current could be much different from expected value and the generator could even show an intermittent output power (output power led blinking, see also sec.7.1 in the following).

Grid load resistor's rated power is also important, 'cos a 24Vdc @ 100A grid load produces 2400W to be dissipated by air cooling.

So, when using grid load, pay attention to both output current & output voltage and use correct resistance value & power!

3.4) Conventions

By convention, when a measurement has to be taken between two points, for example **a** ⟵ **b** , the arrow point indicates where to apply the **red tip** of the multimeter (a),while the **black tip** is applied at the other end **(b).**

When a double arrow appears between two measuring points (e.g.: **c** ⟷ **d**), the voltage to be measured is alternating (normally at 50 Hz), therefore it does not matter in which order the multimeter terminals are applied.

In drawings and tables, when a voltage measurement appears referring to terminals of components such as DIODES, BJT, MOSFET and IGBT, the multimeter is used in "diode test" mode (these measurements are always taken with the machine switched off and normally give values in the range +0.10 … +0.90 Vdc). In this case the following symbol is affixed beside the value to be measured

Junction measurement (multimeter in "diode test" mode)

The following symbols will be used in the same way:

V AC or DC voltage measurement (multimeter in voltmeter mode)

Ω Resistance measurement (multimeter in ohmmeter mode)

A Current measurement (ammeter clamp or shunt + multimeter in millivoltmeter mode)

Hz Frequency measurement (multimeter in frequency meter mode)

The measuring conditions (power source on/off, MMA/TIG operating mode, etc.) are always clearly indicated beside the values to be measured.

In the tables the various auxiliary power supply voltages are marked with the initials V1, V2, etc. to permit identification when present in several boards. When a power supply voltage derives from another one, the second takes the name of the first with the addition of a letter in increasing order (e.g.: V1a, V1b, etc.). In these cases, all the derived voltages have the same earth in common.

The connector terminals are indicated by the name of the connector followed by a slash and the number of the terminal; for example CN1/2 indicates terminal 2 of connector CN1.

Unless otherwise specified, all the measurements must be performed with the boards fitted, together with their connections.

Remember that the first of the tests to be performed is the VISUAL CHECK!
The visual check reduces troubleshooting times and directs any subsequent tests towards the damaged part!

4) DESCRIPTION OF OPERATION OF THE POWER SOURCES AND TECHNICAL DATES

4.1) Use and routine maintenance (excerpt from the "Instructions for use" manual provided with each power source).

1.0 SAFETY

WARNING

Prior to performing any operation on the machine, make sure that you have thoroughly read and understood the contents of this manual.
Do not perform modifications or maintenance operations which are not prescribed.
For any doubt or problem regarding the use of the machine, even if not described herein, consult qualified personnel.
The productor cannot be held responsible for damage to persons or property caused by the operator's failure to read or apply the contents of this manual.

1.1 Operator and other persons' protection

The welding process is a noxious source of radiations, noise, heat and gas emissions. Persons fitted with pacemakers must consult their doctor before undertaking arc welding or plasma cut operations. If the above prescription is not observed, the manufacturer accepts no liability for any damages sustained in the event of an accident.

Personal protection:
- Do not wear contact lenses!!!
- Keep a first aid kit ready for use.
- **Do not underestimate any burning or injury**.
- Wear protective clothing to protect your skin from the arc rays, sparks or incandescent metal, and a helmet or a welding cap.
- Wear masks with side face guards and suitable protection filter (at least NR10 or above) for the eyes.
- Use headphones if dangerous noise levels are reached during the welding.
  Always wear safety goggles with side guards, especially during the manual or mechanical removal of welding slags.
  If you feel an electric shock, interrupt the welding operations immediately.

Other persons' protection:
- Position a fire-retardant partition to protect the surrounding area from rays, sparks and incandescent slags.
- Advise any person in the vicinity not to stare at the arc or at the incandescent metal and to get an adequate protection.
- If the noise level exceeds the limits prescribed by the law, delimit the work area and make sure that anyone getting near it is protected with headphones or earphones.

1.2 Fire/explosion prevention

The welding process may cause fires and/or explosions.
- Compressed gas cylinders are dangerous; consult the supplier before handling them.
  Protect them from:
  - direct exposure to sun rays;
  - flames;
  - sudden changes in temperature;
  - very low temperatures.
  Compressed gas cylinders must be fixed to the walls or to other supports, in order to prevent them from falling.
- Clear the work area and the surrounding area from any infiammable or combustible materials or objects.
- Position a fire-fighting device or material near the work area.
- Do not perform welding or cutting operations on closed containers or pipes.
- If said containers or pipes have been opened, emptied and carefully cleaned, the welding operation must in any case be performed with great care.
- Do not weld in places where explosive powders, gases or vapours are present.
- Do not perform welding operations on or near containers under pressure.
- Don't use this machine to defrost pipes.

1.3 Protection against fumes and gases

Fumes, gases and powders produced during the welding process can be noxious for your health.
- **Do not use oxygen for the ventition.**
- Provide for proper ventilation, either natural or forced, in the work area.
- In case of welding in extremely small places the work of the operator carrying out the weld should be supervised by a colleague standing outside.
- Position gas cylinders outdoors or in places with good ventilation.
- Do not perform welding operations near degreasing or painting stations.

1.4 Positioning the power source

Keep to the following rules:
- Easy access to the equipment controls and connections must be provided.
- Do not position the equipment in reduced spaces.
- Do not place the generator on surfaces with inclination exceeding 10° with respect to the horizontal plane.

1.5 Installing the apparatus

- Comply with the local safety regulations for the installation and carry out the maintenance service of the machine according to the constructor's directions.
- Any maintenance operation must be performed by qualified personnel only.
- The connection (series or parallel) of the generators is prohibited.
- Before operating inside the generator, disconnect the power supply.
- Carry out the routine maintenance on the equipment.
- Make sure that the supply mains and the earthing are sufficient and adequate.
- The earth cable must be connected as near the area to be welded as possible.
- Take the precautions relevant to the protection degree of the power source.
- Before welding, check the condition of the electric cables and of the torch, and if they are damaged repair or change them.
- Neither get on the material to be welded, nor lean against it.
- **The operator must not touch two torches or two electrode holders at the same time.**

The manufacturer accepts no liability if the above prescription is not duly observed and complied with at all times.

2.0 ELECTROMAGNETIC COMPATIBILITY (EMC)

WARNING

This device is built in compliance with the indications contained in the harmonized standard EN50199, to which the operator must refer for the use of this apparatus.

- **Install and use the apparatus keeping to the instructions given in this manual.**
- **This device must be used for professional applications only, in industrial environments It is important to remember that it may be difficult to ensure the electromagnetic compatibility in other environments.**

2.1 Installation, use and area examination

- The user must be an expert in the sector and as such is responsible for installation and use of the equipment according to the manufacturer's instructions.
  If any electromagnetic disturbance is noticed, the user must soave the problem, if necessary with the manufacturer's technical assistance.
- In any case electromagnetic disturbances must be reduced until they are not a nuisance any longer.
- Before installing this apparatus, the user must evaluate the potential electromagnetic problems that may arise in the surrounding area, considering in particular the health conditions of the persons in the vicinity, for example of persons fitted with pacemakers or hearing aids.

2.2 Emission reduction methods

MAINS POWER SUPPLY

- **The welding power source must be connected to the supply mains according to the manufacturer's instructions.**

In case of interference, it may be necessary to take further precautions like the filtering of the mains power supply.
lt is also necessary to consider the possibility to shield the power supply cable.

WELDING POWER SOURCE MAINTENANCE

The welding power source needs routine maintenance according to the manufacturer's instructions.
When the equipment is working, all the access and operating doors and covers must be closed and fixed.
The welding power source must not be modified in any way.

WELDING AND CUTTING CABLES

The welding cables must be kept as short as possible, positioned near one another and laid at or approximately at ground level.

EQUIPOTENTIAL CONNECTION

The earth connection of all the metal componente in the welding installation and near it must be taken in consideration.
However, the metal componente connected to the work-piece will increase the risk of electric shock for the operator, if he touches said metal componente and the electrode at the same time.
Therefore, the operator must be insulated from all the earthed metal componente.
The equipotential connection must be made according to the national regulations.

EARTHING THE WORKPIECE

When the workpiece is not earthed for electrical safety reasons or due to its size and position, the earthing of the workpiece may reduce the emissione. It is important to remember that the earthing of the workpiece should neither increase the risk of accidents for the operators, nor damage other electric equipment.
The earthing must be made according to the national regulations.

SHIELDING

The selective shielding of other cables and equipment present in the surrounding area may reduce the problems due to interference. The shielding of the entire welding installation can be taken in consideration for special applications.

3.0 RISK ANALYSIS

Risks posed by the machine	Solutions adopted to pervent them
Risk of wrong installation.	A manual with the instructions for use has been produced for this purpose.
Electrical risks.	Application of the EN 60974-1 Standard.
Risks connected with electromagnetic disturbances produced by the welding power source and induced on the welding power source.	Application of the EN 50199 Standard.

The contents of this chapter are of vital importance and therefore necessary for operation of the warranties. The manufacturer accepts no liability if the operator fails to observe the above precautions and instructions.

4.0 MACHINE DESCRIPTION

The Genesis 302 AC/DC e Genesis 382 AC/DC power sources offer excellent performance in the following welding procedures:
- TIG AC with square, sine and triangular wave;
- TIG DC with remote arc striking with high frequency (TIG HF-START) and gas delivery control via torch button;
- TIG DC with contact start with reduction of short circuit current (TIG LIFT-START) and gas delivery control via torch button;
- MMA.

In inverter welders the output current is insensitive to variations in the power supply voltage and length of the arc and is perfectly levelled, providing best weld quality.
On all the power sources features the following devices:
- a positive socket (+), a negative socket (-) and a central socket for connection of the TIG torch
- a front control panel with socket for remote controls
  - RC16 potentiometer remote control for MMA and TIG welding (optional)
  - RC12 pedal remote control for TIG welding (optional)
- a rear control panel with gas socket

The Genesis 302 AC/DC and Genesis 382 AC/DC can be supplied with WU21 cooling unit for liquid cooling of the TIG torch.

4.1 Front control panel (fig. 1)

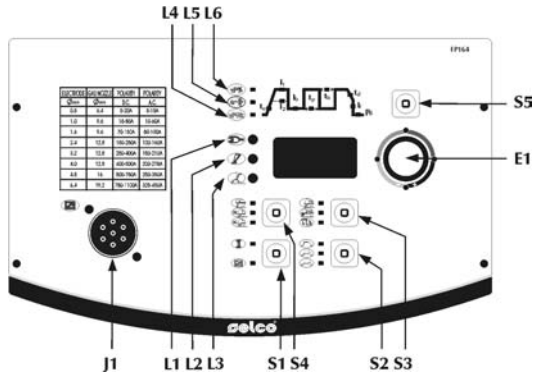


Fig.1

* **L1 : Power on: green led.**
Comes on when the ignition switch on the rear panel (Fig. 2) "**I1**" is in position "**I**". Indicates that the system is on and powered.

* **L2: Protection device: yellow led.**
Indicates cut-in of the thermal protection device or protection due to incorrect power supply voltage. With "**L2**" on, an alarm code blinks on "**D1**". The power source remains connected to the mains but does not deliver power at the output. If an overtemperature has occurred, "**L2**" remains on until the internal temperatures have returned to normal; in this case, leave the power source on and wait for the welder to cool. In the event of alarms connected to the mains voltage, press any button to resume operations.

* **Alarm codes.**
The system manages the following alarms:
10 mains alarm: no phases, undervoltage or overvoltage
11 no cooling liquid
12 primary module thermal switch
13 AC module thermal switch
19 load too inductive: inversions not possible
20 memory fault
24 incorrect system parameters or memory still empty (first switch-on)
25 system parameters could not be stored (24C08)
26 standard parameters checksum incorrect: either the memory has failed or powerful interferences have damaged it
27 advanced parameters checksum incorrect: either the memory has failed or powerful interferences have damaged it

* **L3: Voltage output (work): red led.**
Indicates presence of voltage at the output.

* **Display D1.**
Displays the welding current or value of the welding parameter chosen via "**S5**" on the graph "**G1**". It is used to show alarm and error messages and to enter the set-up parameters.

* **E1 : Encoder for entering the welding current, welding parameters and set-up values.**
Allows you to change the value shown in "**D1**" of the parameter selected via "**S5**" in graph "**G1**" (also during welding).
Allows you to enter the required set-up line and vary the value.
Allows you to continuously adjust the welding current both in TIG and MMA. (This current remains unchanged during welding when the power supply and welding conditions vary within the ranges declared in the technical specifications).
In MMA the presence of HOT-START and ARC-FORCE means that the mean output current can be higher than the one set.

* **S1 : Current regulation system key.**
Selects the welding current regulation system:
- from front panel in "internal" mode
- from remote control in "external" mode

In this case via "**E1**" it is possible to enter the maximum current value that can be selected via the remote control.

* **J1 : 7-pole military standard connector.**
For connection of the remote controls RC16 and RC12.

* **S2 : Tasto selezione tipo di corrente per saldatura TIG.**
Key for selecting type of TIG welding current
- CONSTANT current with or without SLOPES.
- PULSED current with or without SLOPES.
- MEDIUM FREQUENCY current with or without SLOPES.

Switch-on of the led at the side of the symbol confirms the selection.
The MEDIUM FREQUENCY function is not enabled in AC.

* **S3 : Key for selecting control mode in TIG.**
- 2-stroke welding (2T)
- 4-stroke welding (4T)
- 2-level welding (BILEVEL)

Switch-on of the led at the side of the symbol confirms the selection.
With the RC12 pedal control, only the 2T mode is possible.
In **2-stroke,** when the button is pressed the gas flows and the arc is struck; when the button is released, the current goes to zero in the slope-down time; once the arc is off, the gas flows for the post-gas time.
In **4-stroke**, the first time the button is pressed the gas flows for the manual pre-gas time; when the button is released, the arc is struck. If the button is pressed again and definitively released, the current slope-down and post-gas time begin.
In **BILEVEL** the welder can weld with 2 different currents previously set via "**S5**".

The first time the torch button is pressed, the pre-gas time is run, the arc is struck and welding is performed with the initial current.
The first time it is released, slope-up to current "**I1**" occurs. If the welder presses and quickly releases the button, the machine will go to "**I2**"; by pressing and quickly releasing the button it returns to "**I1**" and so on.
If the button is pressed for longer, the current slope-down begins which leads to the final current.
When the button is released the arc goes out while the gas continues to flow for the post-gas time.

*** S4: Welding procedure selection key.**
Permits selection of the welding procedure.
Switch-on of the led at the side of the symbol confirms the selection.
Procedures:
- MMA (electrode)
- TIG DC
- TIG AC

*** S5: SET-UP/parameters key.**
Permits access to the SET-UP and welding parameter values.
When pressed at switch-on, it permits access to the set-up parameters while the software version appears on "**D1**".
If pressed after the end of the welder switch-on procedure, it selects in sequence the welding parameters presented in the graph "**G1**" with value shown by "**D1**" and variable with "**E1**".

Tu	Slope-up time
I	Welding current
Ib	Basic current in pulsed and medium frequency welding
Tp	Peak time in pulsed and medium frequency welding
Tb	Basic time in pulsed and medium frequency welding
Td	Slope-down time
If	Final current
Pg	Post-gas time
I2	Second welding current in BILEVEL

When in MEDIUM FREQUENCY operation, the leds Tp and Tb come on simultaneously and the pulse frequency value appears on the display "D1".

By keeping the key "**S5**" pressed for 1 second, you access adjustment of the following parameters:
- frequency in AC (Led **L4**);
- electrode diameter setting in AC (Led **L5**);
  by setting this value on the power source the Genesis 302/382 AC/DC can optimise (using the FUZZY LOGIC) the welding start parameters in AC;
- balance AC (Led **L6**); adjustment in % of the positive wave value during the AC period.
  A higher value indicates greater cleaning action of the electric arc on the weld pool; a lower value indicates greater penetration and melting action of the arc.

*** Set-up parameters.**
When "S5" is pressed after switch-on, the set-up menu is accessed (confirmed by a central "0" on the display "D1") while the software version appears on "D1". Via E1 the set-up line is varied, via "S5" the required line is confirmed, via "E1" the value is varied, via "S5" the value is confirmed and so on.

0 Quit and save
1 Initial current as a percentage with respect to welding current
2 Pre-gas time
3 HOT-START percentage
4 ARC-FORCE percentage
5 Waveform in AC

The following table shows the correspondence between the numbers and the half waves:

Number	Half wave -	Half wave +
0	Sine	Sine
1	Triangle	Triangle
2	Square	Square
3	Sine	Triangle
4	Sine	Square
5	Triangle	Sine
6	Triangle	Square
7	Square	Sine
8	Square	Triangle

6 Min current value in TIG EXT
7 Max current value in TIG EXT welding
8 LIFT start in TIG DC (1) or HF start (0) (default=0)
9 Reset of parameters
12 Welding in DC+ (1) or DC - (0) (default=0)
14 Pulsed TIG basic I setting mode (0=in amps, 1=percentage of peak I) (default=0)
15 HF first pulse polarity (1= on same side as current, 0= inverted, improved sparking)
16 Cooling unit activity time from end of welding (s); if 0 is set, the unit never comes on.
17 With "1" in AC in the fastpulse position the mix AC/DC procedure is enabled.
18 Current reference during the HF start in TIG DC
19 Current reference during HF start in TIG AC
20 Extra energy (% of positive wave amplitude in respect of negative wave amplitude)
23 TIMER mode setting (23 = 0: 2-stage mode, 23 ≠ 0: welding time)
99 Reset of all parameters

If we enter lines "9" and "99" and press "S5", all the set-up parameters will go to the factory-set values.

To quit set-up and save the set values, return to line "0" and press "S5".

Parameter	*um*	*Notes*	*min*	*max*	*predef.*
Pre-gas time	s	Can be entered only from set-up	0.0	25.0	0.0
Initial current	%	Percentage of welding current, only set-up	2	200	50
Slope-up time tu	s	Can be entered from front panel	0.0	10.0	0.0
Welding curr. I	A	Can be entered from front panel	6	300/380	100
Back curr. Ib	A (%)	Only pulsed, adjustable from front panel	6 (1%)	300/380 (100%)	6 (50%)
Pulse time tp	s	Only pulsed slow, adjustable from front panel	0.02 (AC 0.05)	2.00	0.24
Frequency tp & tb	Hz	Only in fastpulse, adjustable from front panel	20	500	100
AC frequency	Hz	Adjustable from panel	20	150	50
AC balance	%	Adjustable from panel	15	65	35
AC waveforms	n°	Selectable from set-up	0	8	2
Electrode diameter	mm	Selectable from panel	1.0	5.0	2.4
Back time tb	s	Only pulsed slow, adjustable from front panel	0.02 (AC 0.05)	2.00	0.24
Slope-down time td	s	Can be entered from front panel	0.0	10.0	0.0
Final current If	A	Can be entered from front panel	6	300/380	8
Post-gas time	s	Can be entered from front panel	0.0	25.0	5.0
Current in MMA	A	Can be entered from front panel	6	300/380	100
I max in external mode	A	Adjustable from front panel and from set-up	6	300/380	300/380
I min in external mode	A	Can be entered only from set-up	6	300/380	6
I2 in BILEVEL	A	Regolabile da frontale	6	300/380	50
Hot-Start	%	MMA, can be entered only from set-up	0	500	80
Arc-Force	%	MMA, can be entered only from set-up	0	500	30

4.2 Rear control panel (Fig. 2)

* **I1 : Ignition switch**
  Controls electric ignition of welder.
  It has two positions: "**O**" off and "**I**" on.

WARNING

* **With I1 set to the position "I" on, the welder is operational and voltage is present between the positive (+) and negative sockets (-) on the electrode. In TIG the welder requires the pedal or torch button start for voltage to be present between the sockets (+) and (-).**
* **When the welder is connected to the mains, even with I1 set to the "O" position some of the internal parts will be live. Carefully follow the warnings given in this manual.**

* **1 : Power supply cable**
* **2 : Gas fitting**

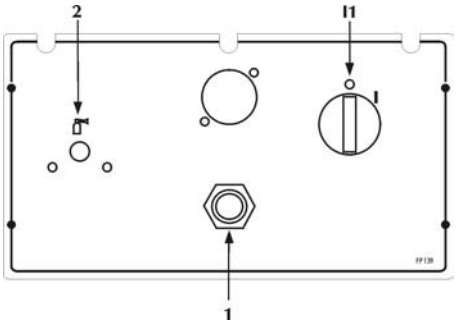


Fig.2

4.3 Operation

The machine stores the last welding status and displays it when switched back on.

* Set the ignition switch "**I1**" to "**I**"; switch-on of the power led "**L1**" (green led) confirms that the system is powered.
* The display "**D1**" shows the figure 302/382 and all the leds come on (for control) for 3 seconds. The leds on the front panel then go out and "**D1**" shows the welder software version (e.g. 1.0) for 4 seconds; during this time it is possible:
  - to enter the SET-UP mode by pressing the key "**S5**";
  - or proceed with welding (or parameter variation).
* If chosen, entry to the SET-UP mode is confirmed by a central "**0**" on the display "**D1**":
  - Turn the potentiometer "**E1**": the numbers corresponding to the parameters appear (in sequence) on the display "**D1**"; stop on the parameter required and press "**S5**". Via parameter (9) all the modifications performed in the SET-UP are cancelled and you return to the standard values set by SELCO.
  - The number on the display "**D1**" is replaced by the value of the parameter which is modified via the potentiometer "**E1**".
* If it is necessary to modify the welding parameter values of the graph "**G1**":
  - Let 4 seconds elapse from switch-off of the panel leds; led "**I**" (welding current) will remain on in the graph.
  - Press "**S5**"; every time it is pressed one of the leds in the graph "**G1**" will come on (in clockwise sequence) and the value of the related parameter will appear on the display "**D1**"; stop on the parameter required.
  - Turn the potentiometer "**E1**" and modify the parameter value.
  - Press the "**S5**" SET-UP/parameters key again to go on to another parameter or wait 5 seconds (led "**I**" in the graph "**G1**" will automatically come back on).

The machine is always ready to weld and the status is indicated by the set of leds lit up on the panel.

The fan only starts once the system has warmed up.

4.4 Cooling unit WU21

It is optional and permits liquid cooling of the TIG torch. There is one single electrical connection between WU21 and Genesis 302/382 AC/DC and once assembled, they form one single body.

*All WU21 replacement, repair or connection operations must be performed by expert personnel instructed by SELCO.

*Filling or topping up of the tank with cooling liquid must be performed with the power source and WU21 assembled and positioned on a horizontal surface.

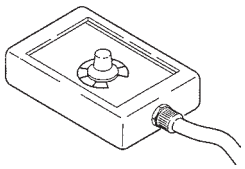
*Filling or topping up of the tank must be performed with Selco cooling liquid, code 18.91.001.

*In order not to damage the cooling unit, always fit the by-pass pipe when the torch is not connected to the cooling liquid inlet/outlet terminals.

4.5 Remote controls

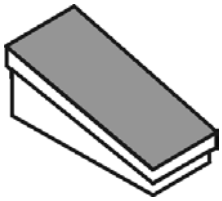
4.5.1 RC16 potentiometer remote control for MMA and TIG welding.

This device allows you to vary, by remote control, the amount of current necessary without interrupting the welding process or abandoning the work area. 5, 10 and 20 m connection cables are available.



4.5.2 RC12 pedal remote control for TIG welding.

Once the power source has been switched to the EXTERNAL CONTROL mode, the output current is varied from a minimum to a maximum value (can be entered from SETUP) by varying the angle between the pedal surface (where the foot rests) and base. A microswitch provides the weld start signal at minimum pressure.



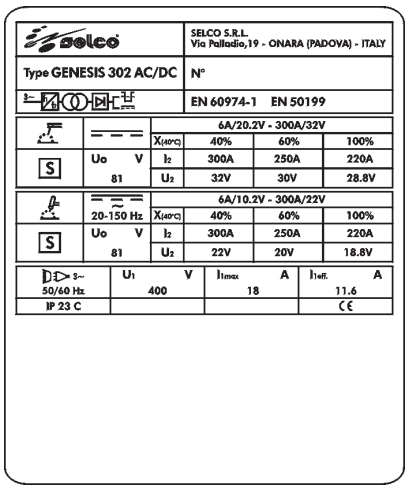
4.6 Technical specifications

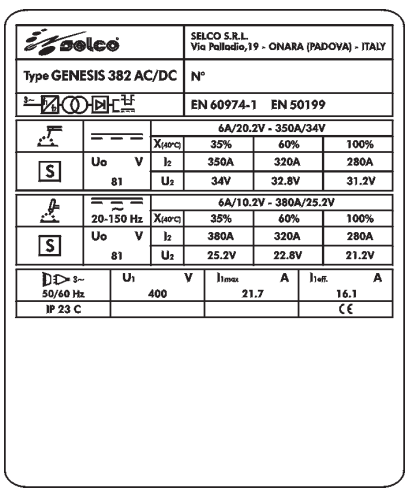
	G 302 AC/DC	G 382 AC/DC
Power supply voltage (50/60Hz)	3x400V ± 15%	3x400V ± 15%
Maximum power absorbed in TIG	9.7kW (x=40%)	13kW (x=35%)
Maximum current absorbed in TIG	16 A (x=40%)	21.5 A (x=35%)
Current absorbed in TIG (x=100%)	9 A	13 A
Maximum power absorbed in MMA	11.8kW (x=40%)	15kW (x=35%)
Maximum current absorbed in MMA	17 A (x=40%)	22.8 A (x=35%)
Current absorbed in MMA (x=100%)	11 A	16 A
Power factor	0.95	0.95
Cosφ	0.99	0.99
Welding current in TIG (x=40%) (x=60%) (x=100%)	 300 A 250 A 220 A	 380 A 320 A 280 A
Welding current in MMA (x=35%) (x=60%) (x=100%)	 300 A 250 A 220 A	 350 A 320 A 280 A
TIG (MMA) Adjustment range	6-300	6-380 (350 A)
Loadless voltage	80 V	80 V
Protection rating	IP23C	IP23C
Insulation class	H	H
Construction standards	EN60974-1 EN50199	EN60974-1 EN50199
Dimensions (lxdxh)	275x620x500 mm	275x620x500 mm
Weight	33 Kg.	33 Kg.

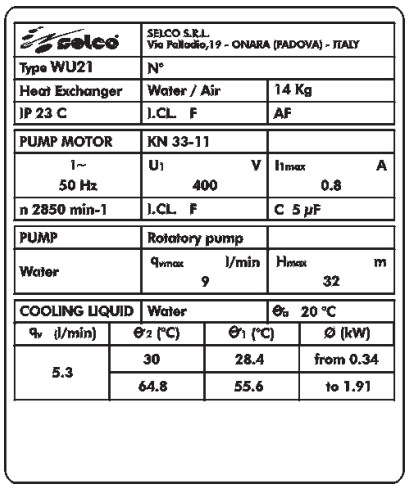
Data at 40°C ambient temperature

	WU21
Power supply voltage (50/60 Hz)	1x400 V ± 15%
Rated current absorbed	0.8 A
Tank capacity	6 l
Cooling power	2000 W
Protection rating	IP23C
Dimensions (lxdxh)	250x655x280 mm
Weight with liquid	16 Kg.

RATING PLATE



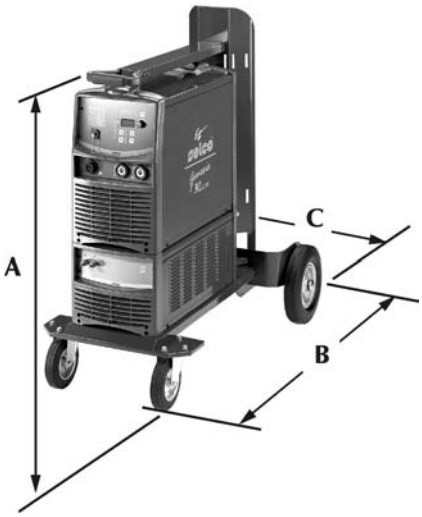




Dimensions and mass

Trolley type	Dimensions in mm			Mass Kg
	A	B	C	
GT23	930	1000	610	29

Model	Trolley	Power source	WU21 with liquid	Tot. Kg
G. 302	29	33	16	78
G. 382	29	33	16	78



5.0 TRANSPORT - UNLOADING

Never underestimate the weight of the equipment, (see technical specifications).

Never make the cargo pass or leave it suspended over people or things.

Neither let the equipment or the single unit fall, nor put it down with force.

Once it has been removed from the packing, the power source is supplied with an extendible belt which can be used to move it in the hand or on the shoulder.

6.0 INSTALLATION

Choose an adequate installation area by following the criteria provided in Section "1.0 SAFETY" and "2.0 ELECTROMAGNETIC COMPATIBILITY (EMC)".

Do not position the power source and the equipment on surfaces with inclination exceeding 10° with respect to the horizontal plane.
Protect the installation from heavy rain and sun.

Do not use the power source to thaw pipes.

6.1 Electrical connection to mains

The system is provided with one single electrical connection with 5 m cable at the rear of the power source.
Power source input cable and fuse sizing table:

Power source	G 302 AC/DC
Rated voltage	3x400 V ± 15%
Voltage range	340 V - 460 V
Delayed fuses	20 A
Power supply cable	4x6 mm2

Power source	G 382 AC/DC
Rated voltage	3x400 V ± 15%
Voltage range	340 V - 460 V
Delayed fuses	30 A
Power supply cable	4x6 mm2

WARNING

* **The electrical system must be made by skilled technicians with the specific professional and technical qualifications and in compliance with the regulations in force in the country where the equipment is installed.**
* **The welding power source supply cable is provided with a yellow/green wire that must ALWAYS be earthed. This yellow/green wire must NEVER be used with other voltage conductors.**
* **Verity the existence of the earthing in the used plant and the good condition of the socket/s**
* **Install only plugs that are homologated according to the safety regulations.**

6.2 Connecting the equipment components

Keep to the safety regulations contalned in section "1.0 SAFETY".

Connect the componente carefully, in order to avoid power losses.

7.0 ASSEMBLING THE EQUIPMENT

7.0.1 Assembling the movable trolley

For the assembly of the generator trolley GT23, see SPARE PARTS TABLES.

7.0.2 Installing the WU21 and the generator (Fig. 3)

* Rest the WU21 on the GT23 and fix it with the 4 screws.
* Remove the left side panel of the power source.
* Remove the plastic plug on the bottom near the rear cover.
* Rest the power source on the unit, passing the unit wiring through the hole.
* Fasten the power source to the WU21 with the 4 screws.

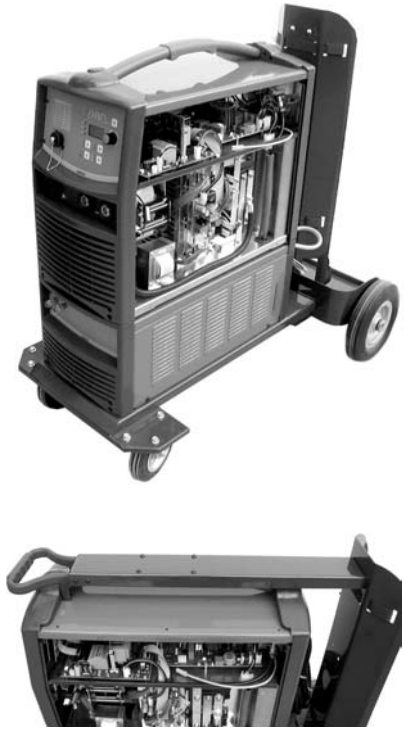


Fig. 3

7.1 CONNECTING THE UNIT

7.1.1 Electric/electronic connection between the generator and the WU21 (Fig. 4)

Make the connection with the generator plug disconnected from the mains socket.

* Insert the connector as shown in the figure.
* Close the power source side panel, connecting the yellow-green wire (ground or earth).

Fig. 4

7.1.2 Filling the coolant tank (Fig. 5)

Fill the coolant tank with the generator plug disconnected from the mains socket.

Fig. 5

* Unscrew the plug and remove it.
* Remove the sealed plug from the inlet channel, levering by means of a tool on the edge of the plug.
* Keep the sealed plug for future transport of the unit.
* Filling or topping up of the tank must be performed with Selco cooling liquid, code 18.91.001.
* Tighten the plug completely.

Periodically check the coolant level in the tank. If the tank is completely empty andlor there is air in the pump, this may fail to start.

In this case, proceed as follows:

* **With the tank full and power source off, open the unit right-hand side panel by unscrewing the two screws at the bottom.**
* **Partially unscrew the screw valve.**
* **Wait for a few seconds, close the valve and the side panel and restart the power source.**

7.1.3 Hydraulic connection to the WU21

Failure to carry out the operations indicated below may cause irreparable damage to the torches.

Check the tightening of the connections.

For TIG welding operations in which the torch is liquid-cooled, carry out the following connections:

Ref. Fig. 6

* Make the connection illustrated in Fig. 6.

Fig. 6

Ref. Fig. 7

Connect the torch pipes as follows:

* torch delivery: generally blue (cold water) at the quick-fit coupling indicated by the symbol ( )
* torch return: generally red (hot water) at the quick-fit coupling indicated by the symbol ( )

Fig. 7

For TIG welding in the torch is NOT liquid-cooled, it is advisable to close the cooling circuit and make the connections illustrated in Fig.8:

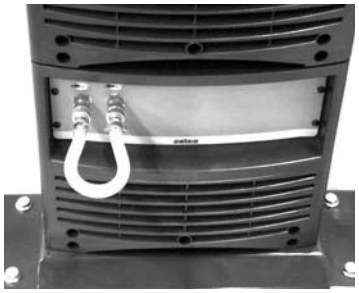


Fig. 8

7.1.4 Connection for MMA welding

Carefully read 6.2.

* Connect the earth clamp to the negative socket of the generator.
* Connect the electrode holder to the positive socket (+) of the generator.

Fig. 9

The connection described above ensures welding with reverse polarity. To weld with straight polarity, reverse the connection.

7.1.5 Connection for TIG welding

Carefully read 6.2.

1) Connect the earth clamp (Fig. 10) to the positive socket (+) of the generator.
2) Connect the TIG torch coupling to the torch socket ( ) of the generator.
* Connect the gas pipe coupling (Fig.11) to the gas coupling ( ) on the generator rear panel.

Fig. 10

If the TIG torch is cooled with liquid:

* Connect the hydraulic pipes of the torch to the cooling unit, see 7.1.3 (Hydraulic connection to the WU21).
3) Connect the gas pipe coupling (Fig.11) to the gas coupling ( ) on the generator rear panel.

Fig. 11

8.0 PROBLEMS - CAUSES

8.1 Possible faults in the MMA welding

Fault	Cause
Excessive spatter	1) Long arc. 2) High current.
Craters	1) Fast movement of the electrode away from piece.
Inclusions	1) Poor cleanliness or distribution of the passes. 2) Defective movement of the electrode.
Insufficient penetration	1) High progression speed. 2) Welding current too low. 3) Narrow chamfering. 4) Deseaming failure on top.
Sticking	1) Arc too short. 2) Current too low.
Blow-hole and porosity	1) Humidity in electrode. 2) Long arc.
Cracks	1) Current too high. 2) Dirty materials. 3) Hydrogen in weld (present on electrode coating).

8.2 Possible faults in the TIG welding

Fault	Cause
Oxidations	1) Insufficient gas. 2) No protection on the reverse.
Tungsten inclusions	1) Incorrect electrode sharpening. 2) Electrode too small. 3) Operating failure (contact of the tip with the workpiece).
Porosity	1) Dirt on the edges. 2) Dirt on the filler material. 3) High advancement speed. 4) Current intensity too low.
Hot cracks	1) Unsuitable filler material. 2) High heat supply. 3) Dirty materials.

8.3 Possible electrical failures

Fault	Cause
Machine does not come on (Green led off)	1) No voltage at power supply socket. 2) Faulty power supply plug or cable. 3) Internal fuse blown.
Power delivery not correct (Green LED on)	1) Incorrect setting of welding parameters. 2) Mains voltage low. 3) Faulty current regulation potentiometer.
No current at output (Green LED on)	1) Yellow led on and ERROR code blinking on display.

If you have any doubts or problems, do not hesitate to consult your nearest technical service centre.

9.0 NECESSARY ORDINARY MAINTENANCE

Avoid accumulation of metal dust near and on the ventilation fins.

Disconnect the system before all operations!

Periodical checks on the power source and WU21:

*** Clean the inside using compressed air at low pressure and soft bristle brushes.**
*** Check the electrical connections and all connection cables.**

For maintenance and use of the pressure reducers, consult the specific manuals.

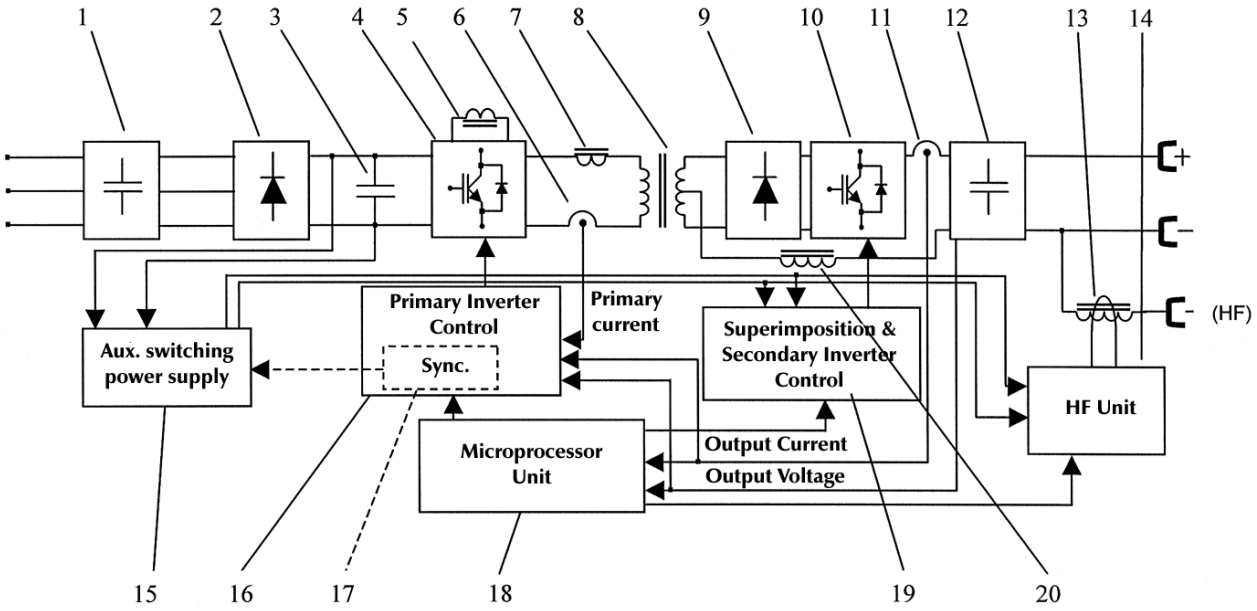
For maintenance and replacement of the components of the TIG torches, electrode gun and/or ground cables:

*** Disconnect the system before all operations.**
*** Check the temperature of the components and ensure that they are not overheated.**
*** Always use gloves in compliance with regulations.**
*** Use suitable spanners and tools.**

Note: Failure to perform said maintenance will invalidate all warranties and exempt the manufacturer from all liability.

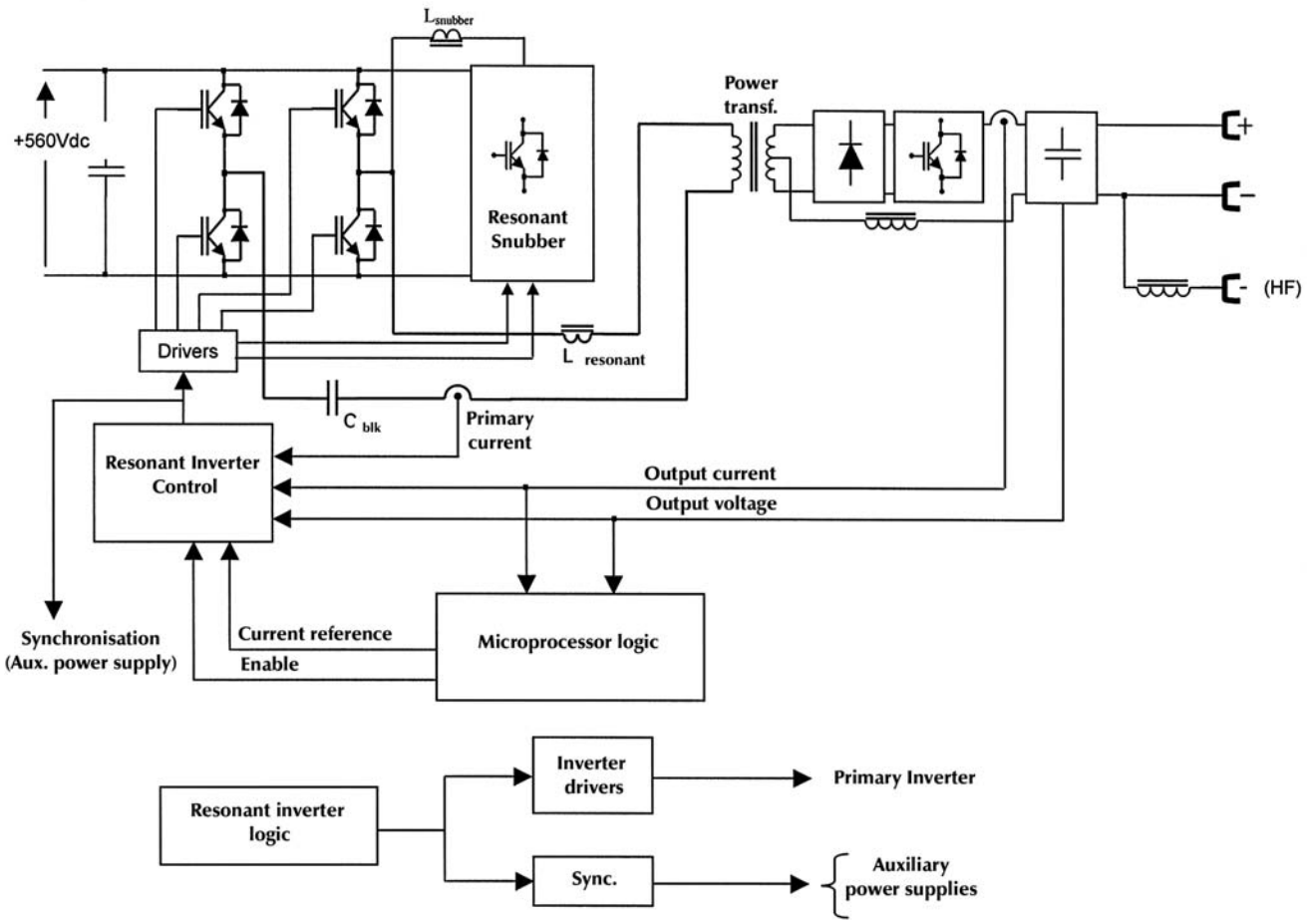
4.2) Operating principle - Block diagram

General overview



1. EMI input filter
2. Three phases input rectifier
3. Smoothing capacitor
4. Quasi-resonant full bridge inverter
5. Snubbing inductor
6. Primary current transformer
7. Resonant inductor
8. Power transformer
9. Secondary power rectifier
10. Secondary inverter
11. Hall-effect secondary current sensor
12. Output filter
13. HF transformer
14. HF generator
15. Auxiliary multi-output switching power supply
16. Resonant inverter logic
17. Synchronisation unit
18. Microprocessor logic
19. Superimposition & AC control
20. Smoothing inductor

Quasi-resonant full bridge power inverter



- 30kHz switching frequency*
= Fast response welding current loop
= High stability welding arc

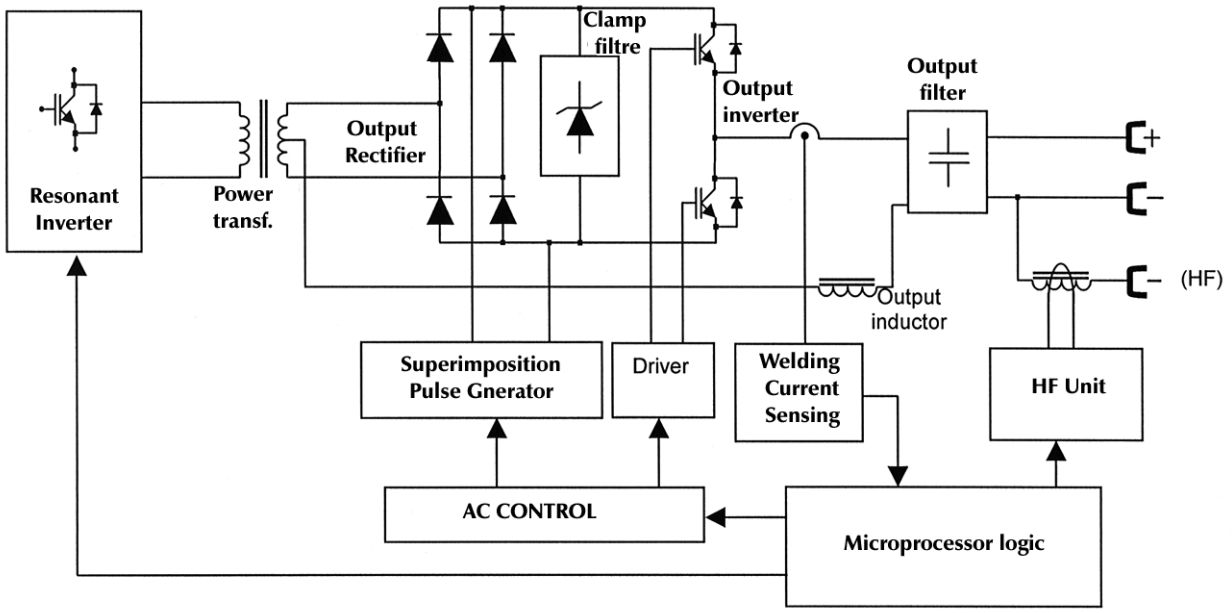
- ZVS/ZCS for power switches (IGBTs)
= Improved efficiency + lower EMI
= Space saving
= Low weight

- Primary overcurrent fast protection circuit

- Auixiliary power supplies switching frequency derived from inverter logic
= System synchronization for noiseless Tig welding arc (audible subarmonic frequency generation avoided in TIG welding arc)

* Note: due to resonant topology of primary power inverter, switching frequency is not constant: it varies in [27 ... 33]kHz range, depending on actual output power; due to full bridge topology, secondary rectifier works at double inverter frquency, that is 55...65kHz, thus allowing a very precise arc control.

Output Rectifier & AC Inverter



- Full bridge FRED rectifier

- Microprocessor AC current shaping

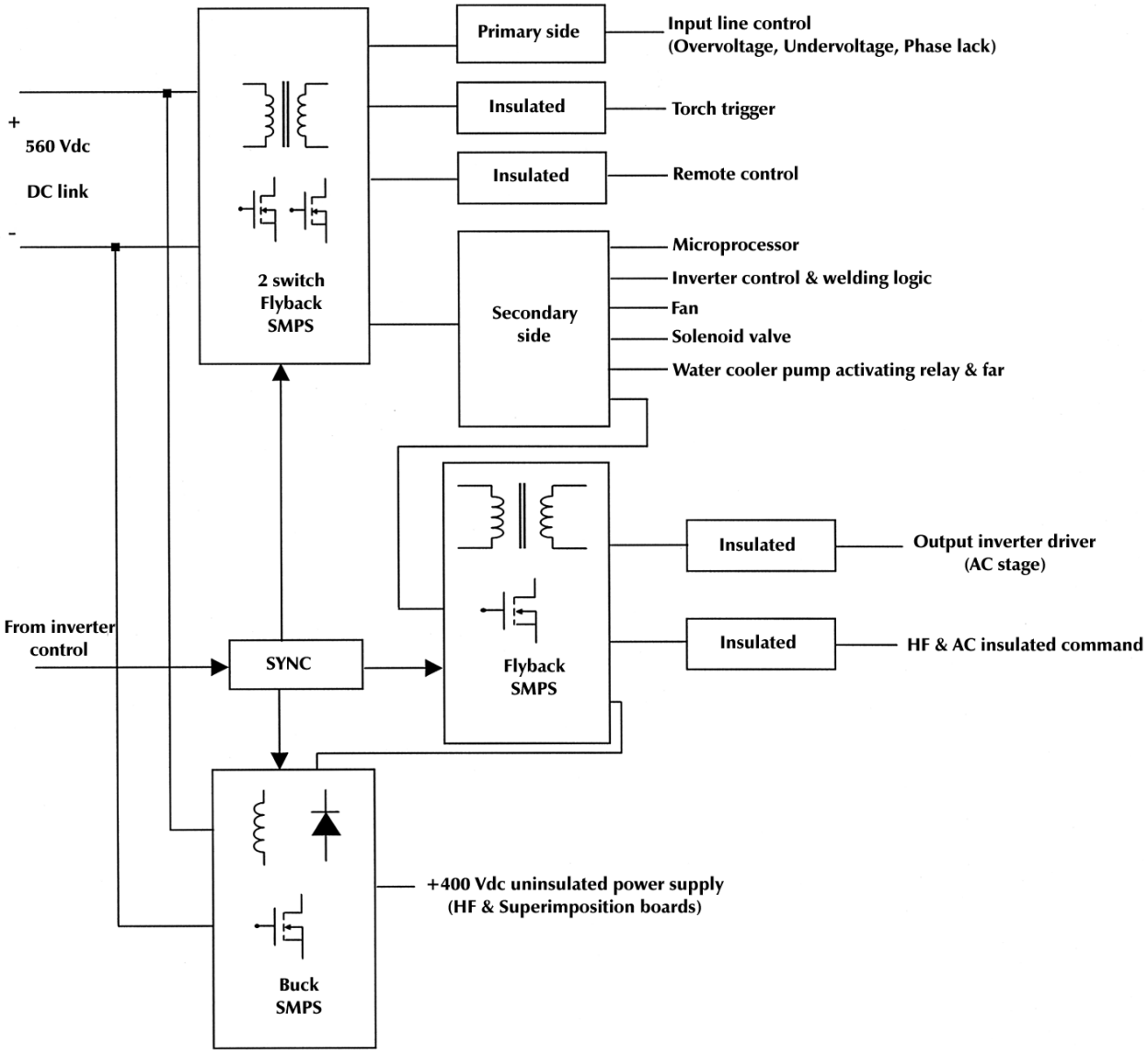
- Microprocessor controlled inversion
  = Minimized voltage clamp

- Superimposition pulse generator
  = Easy arc inversion and stable arc in AC welding

- Microprocessor triggered arc striking circuit

- Superimposition pulse + arc striking pulse
  = Very easy arc striking even in worst operational contidions
  (hard oxide on workpiece)

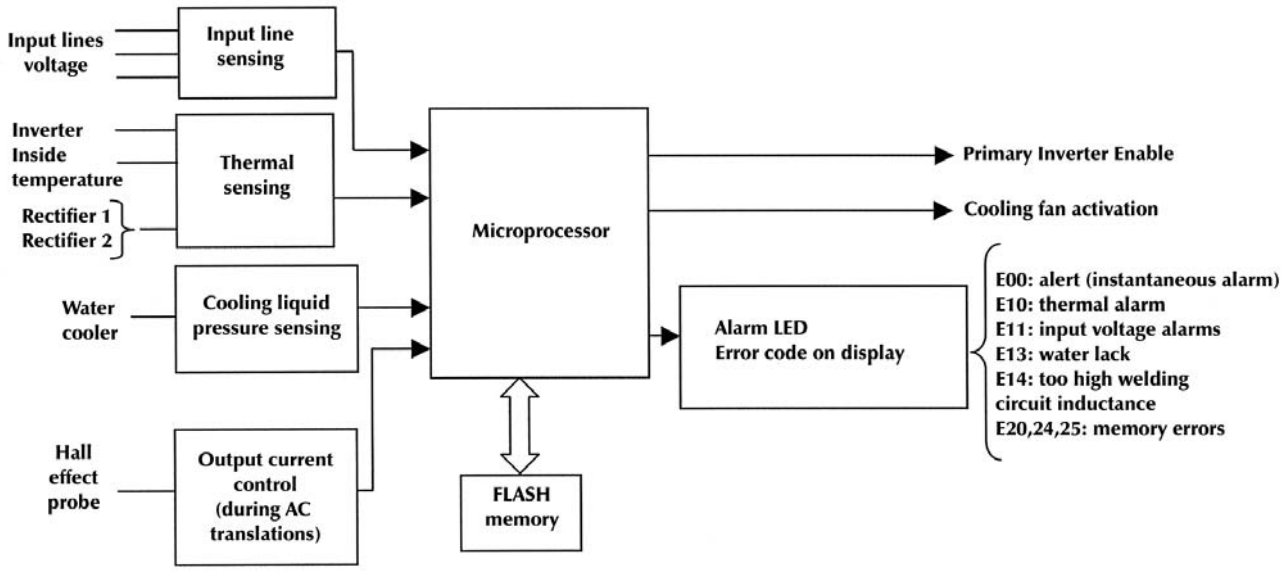
Auxiliary Switching Mode Power Supply (SMPS)



- Flyback topology running @ 30kHz switching frequency*
- Buck topology running @ 30kHz switching frequency*
- Directly derived from 560V DC link
- Post-regulated primary side auxiliary supplies
- Post-regulated secondary side auxiliary supplies
- Regulated secondary side auxiliary supplies
- Synchronization circuit for noise free TIG welding arc

* Note: due to resonant topology of primary power inverter, switching frequency is not constant: it varies in [27 ... 33]kHz range, depending on actual output power.

Microprocessor supervision



- Overvoltage, undervoltage, phase lack alarms for safety operational mode

- Thermal protections management for power stages: inverter, output rectifier & AC inverter

- Microprocessor programming of temperature level that activates fan cooling
  = less noise, less dust incoming, power saving

- Microprocessor recognized alarm events
  = Alarm code displayed on front panel

- Wide range of parameters settable via software (setup)
  = customisation of welding procedures

5) WIRING AND CONNECTION DIAGRAMS

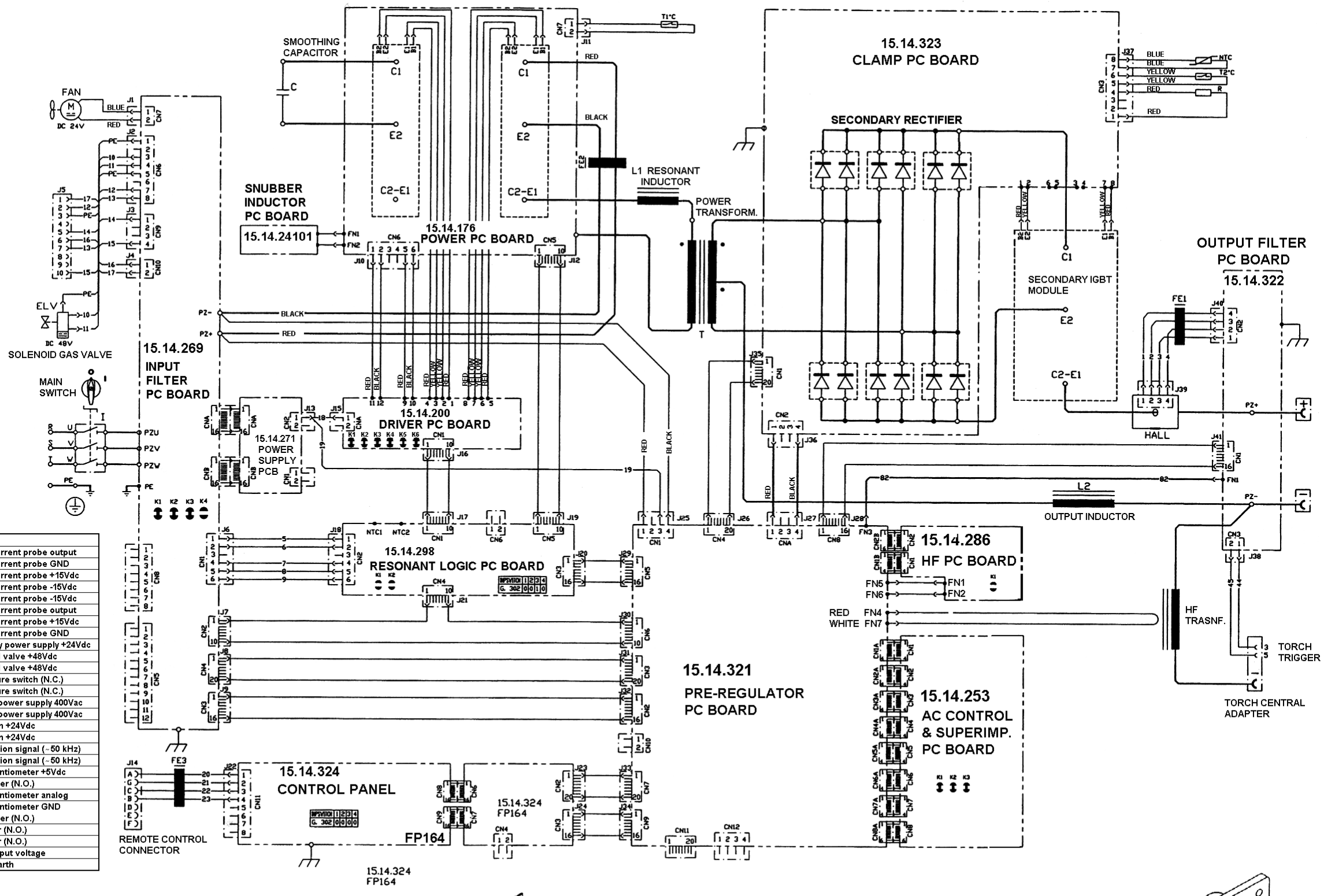
The power sources in the Genesis 302-382 AC/DC series consist basically of the same electronic boards, possibly with some configuration and/or calibration differences (cf. in the following chapter 9 the sections dedicated to the individual boards).

The basic differences between the two models are (cf. also following sec. 6 "Arrangement of the boards"):
- different size of primary inverter IGBT power modules
- different composition of secondary inverter stage

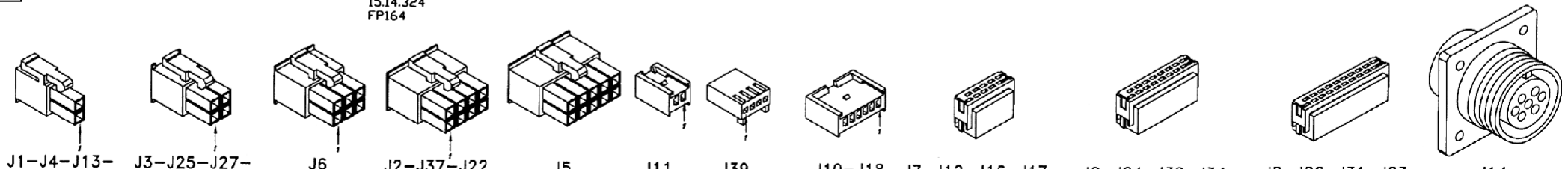
In fact, the spare parts codes for the primary and secondary units are different for the two models.

5.1) GENESIS 302 AC/DC WIRING DIAGRAM

Rev. 20/06/03

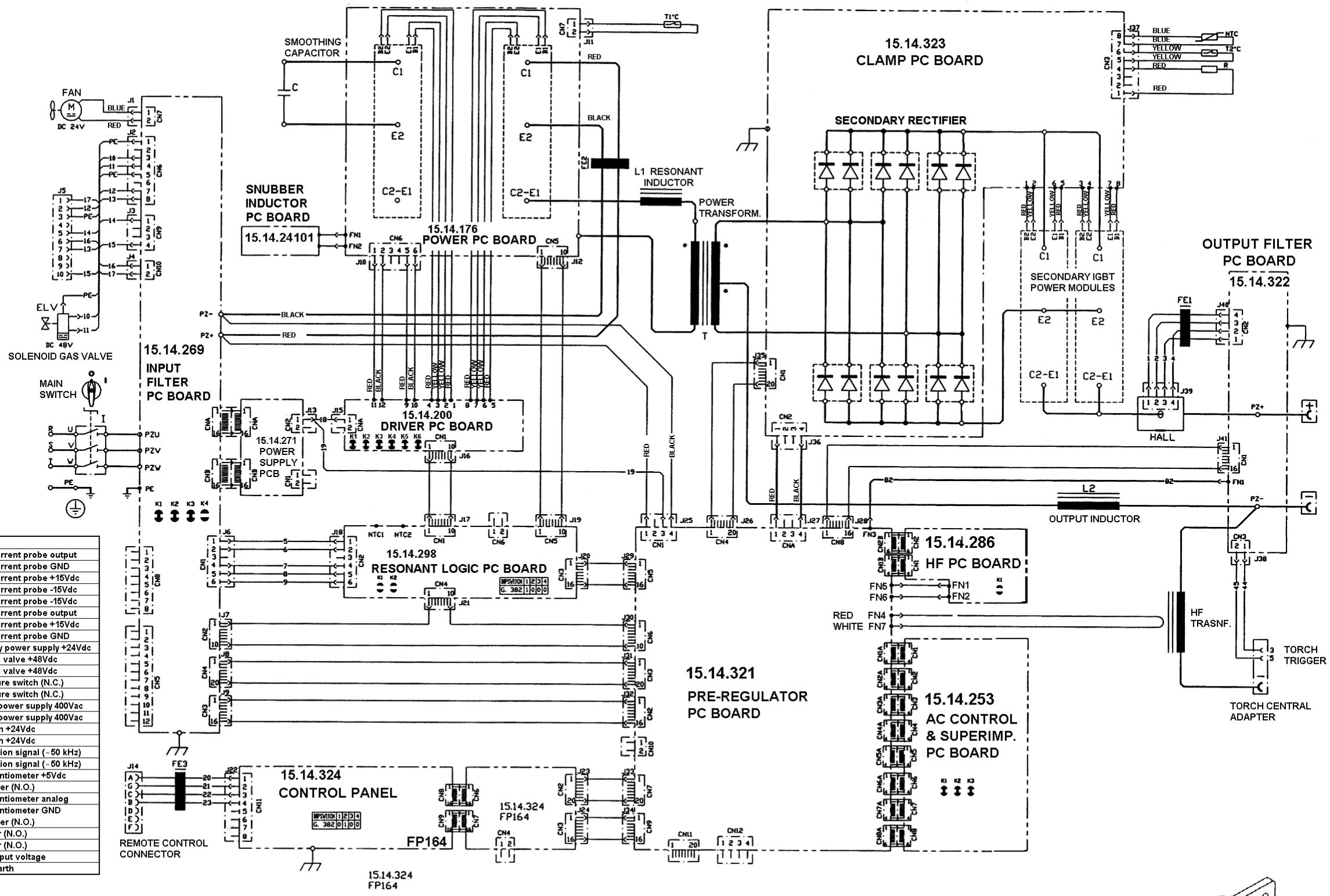


Wire n°	Description
1	Hall effect current probe output
2	Hall effect current probe GND
3	Hall effect current probe +15Vdc
4	Hall effect current probe -15Vdc
5	Hall effect current probe -15Vdc
6	Hall effect current probe output
7	Hall effect current probe +15Vdc
8	Hall effect current probe GND
9	Main auxiliary power supply +24Vdc
10	Gas solenoid valve +48Vdc
11	Gas solenoid valve +48Vdc
12	Water pressure switch (N.C.)
13	Water pressure switch (N.C.)
14	Water pump power supply 400Vac
15	Water pump power supply 400Vac
16	Water unit fan +24Vdc
17	Water unit fan +24Vdc
18	Synchronisation signal (~50 kHz)
19	Synchronisation signal (~50 kHz)
20	Remote potentiometer +5Vdc
21	Remote trigger (N.O.)
22	Remote potentiometer analog
23	Remote potentiometer GND Remote trigger (N.O.)
44	Torch trigger (N.O.)
45	Torch trigger (N.O.)
82	Negative output voltage
PE	Protection Earth

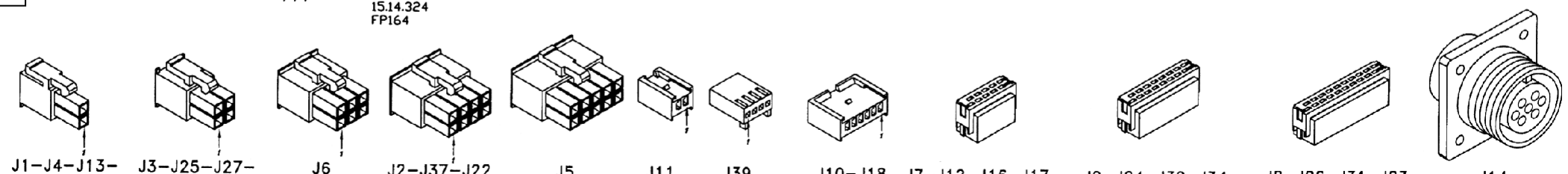


5.2) GENESIS 382 AC/DC WIRING DIAGRAM

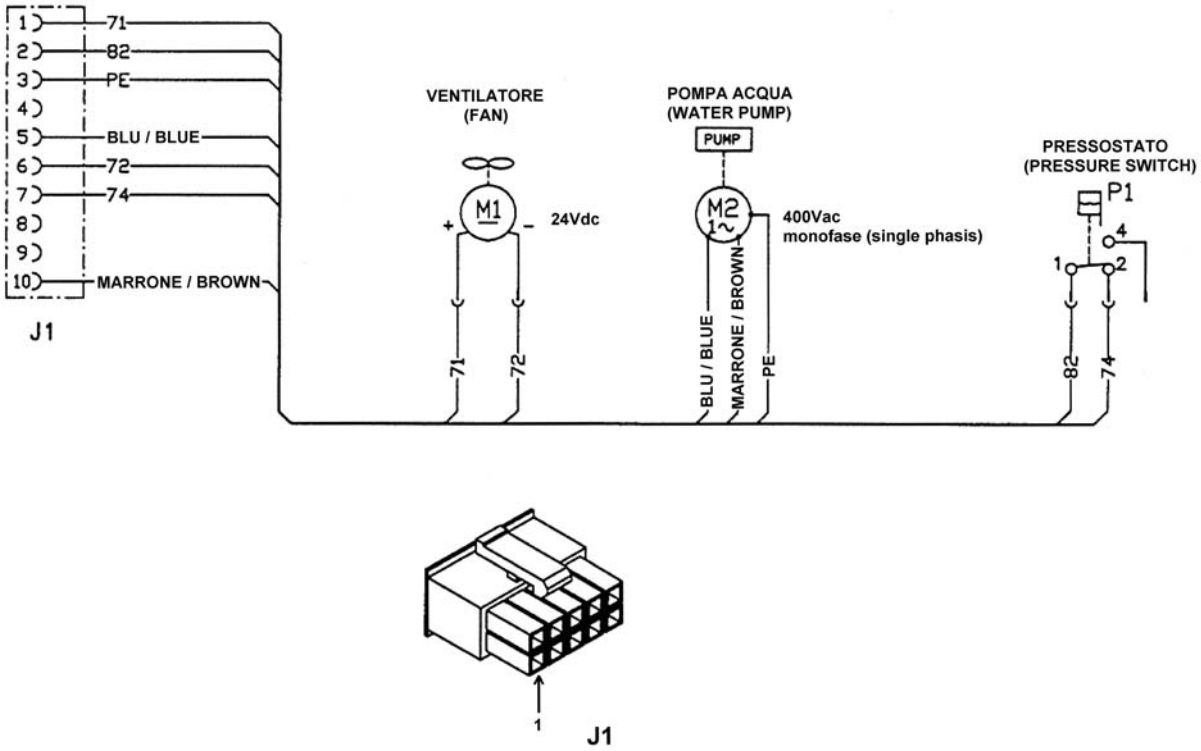
Rev. 20/06/03



Wire n°	Description
1	Hall effect current probe output
2	Hall effect current probe GND
3	Hall effect current probe +15Vdc
4	Hall effect current probe -15Vdc
5	Hall effect current probe -15Vdc
6	Hall effect current probe output
7	Hall effect current probe +15Vdc
8	Hall effect current probe GND
9	Main auxiliary power supply +24Vdc
10	Gas solenoid valve +48Vdc
11	Gas solenoid valve +48Vdc
12	Water pressure switch (N.C.)
13	Water pressure switch (N.C.)
14	Water pump power supply 400Vac
15	Water pump power supply 400Vac
16	Water unit fan +24Vdc
17	Water unit fan +24Vdc
18	Synchronisation signal (~50 kHz)
19	Synchronisation signal (~50 kHz)
20	Remote potentiometer +5Vdc
21	Remote trigger (N.O.)
22	Remote potentiometer analog
23	Remote potentiometer GND Remote trigger (N.O.)
44	Torch trigger (N.O.)
45	Torch trigger (N.O.)
82	Negative output voltage
PE	Protection Earth

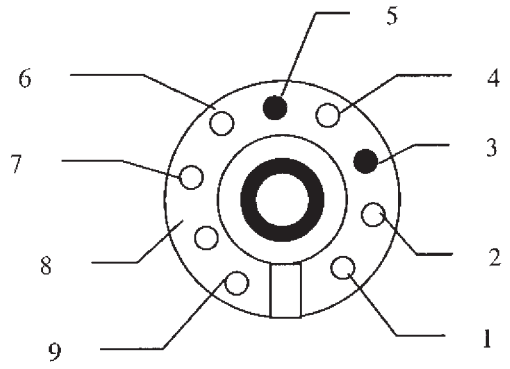


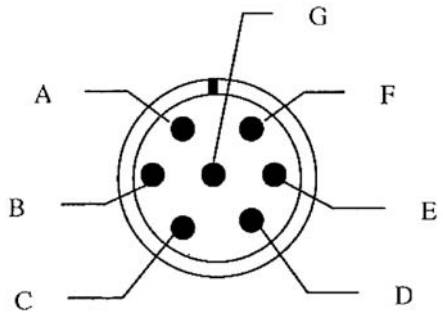
5.3) Cooling unit wiring diagram



5.4) Connections for central adapter and remote control connector

FRONT VIEWS





CENTRAL TORCH ADAPTER

3 - 5 = Torch trigger

REMOTE CONTROL

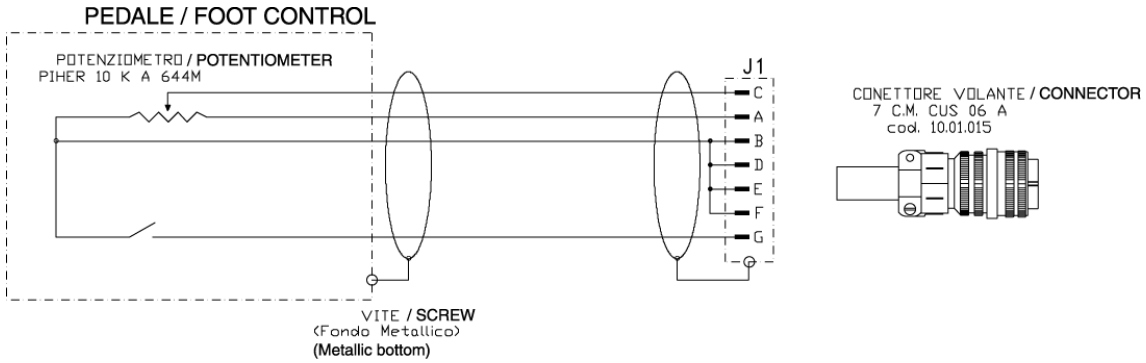
A = EXT 5V	(max power)
B = EXT GND	(min power + torch trigger)
C = EXT POT	(to central ref.)
D = -	(not connected)
E = -	(not connected)
F = -	(not connected)
G = EXT PT	(torch trigger)

Note:

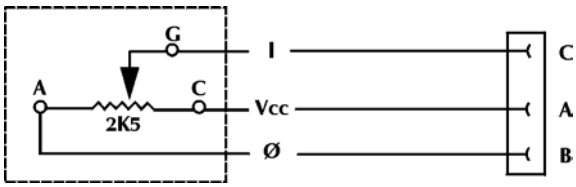
- To connect the trigger on the torch, use the central adapter only;
- The sole purpose of the military connector is to connect the button on the remote control, where applicable (e.g.: RC 12);
- if there is a potentiometer, it should have a value in the range [2.5 ~ 10] k Ω .

5.5) Remote control wiring diagrams

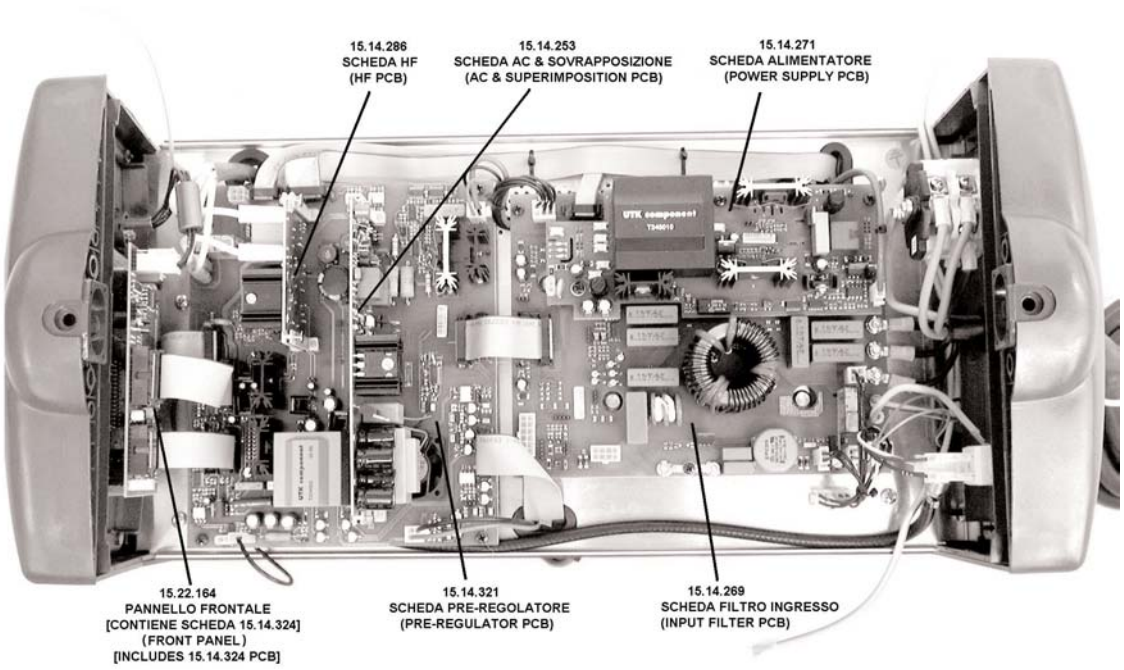
RC12 Wiring diagram



RC16 Wiring diagram



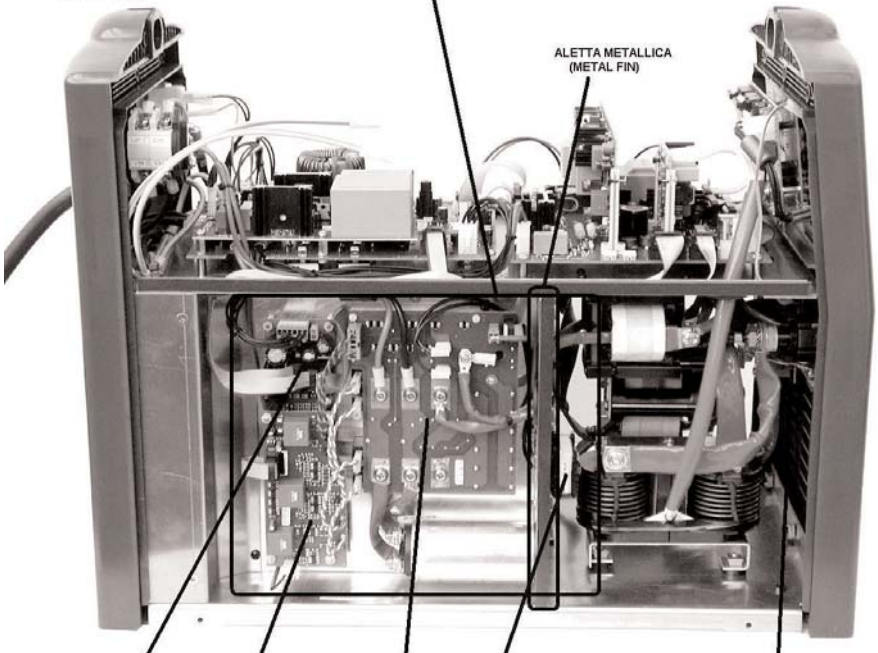
6) PC BOARDS' LOCATION

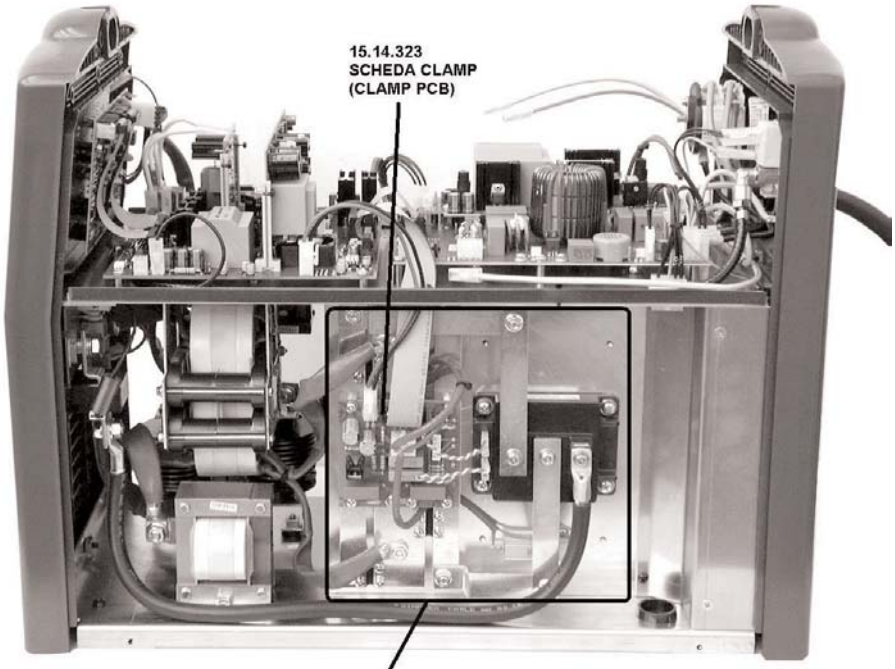


14.60.078 G302 AC/DC
14.60.079 G382 AC/DC

GRUPPO INVERTER PRIMARIO
[GIA' ASSEMBLATO E TESTATO, INCLUDE: DISSIPATORE DI ALLUMINIO, MODULI IGBT, SCHEDA 15.14.198, SCHEDA 15.14.200, SCHEDA 15.14.176, SCHEDA 15.14.24101 + ALETTA METALLICA, PROTETTORE TERMICO, CAVI FLAT]

PRIMARY INVERTER GROUP
[ALREADY ASSEMBLED & TESTED, IT INCLUDES: ALUMINIUM HEATSINK, IGBT POWER MODULES, 15.14.198 PCB, 15.14.200 PCB, 15.14.176 PCB, 15.14.24101 PCB + METAL FIN, THERMAL SWITCH, FLAT CABLES]

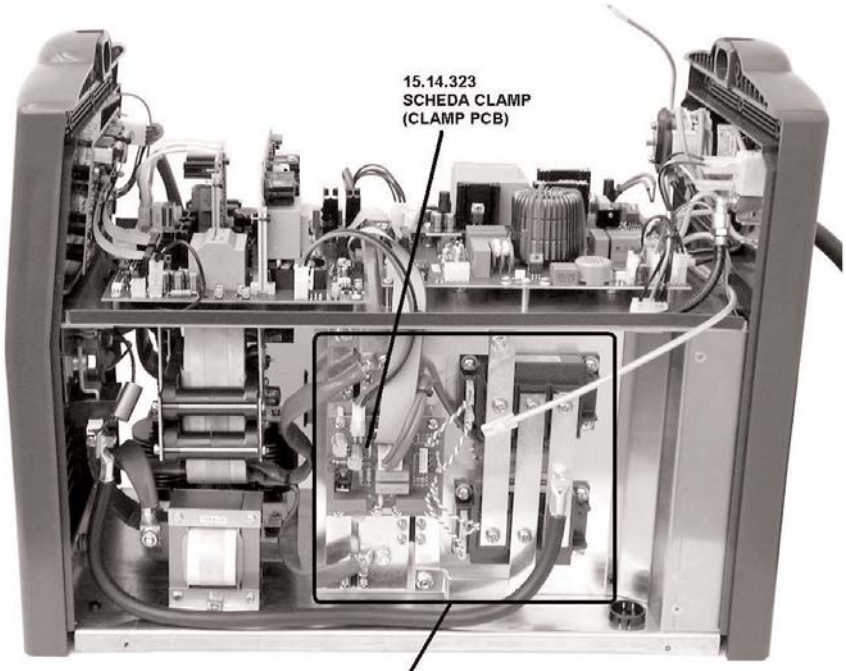




14.60.080 G302 AC/DC

GRUPPO INVERTER SECONDARIO
[GIA' ASSEMBLATO E TESTATO, INCLUDE: DISSIPATORE DI ALLUMINIO, SCHEDA 15.14.323, PROTETTORE TERMICO, SENSORE TERMICO, RADDRIZZATORE SECONDARIO, MODULO INVERTER SECONDARIO, RESISTORE DI POTENZA, BARRE RAME, CABLAGGIO ESSENZIALE]

SECONDARY INVERTER GROUP
[ALREADY ASSEMBLED & TESTED, IT INCLUDES: ALUMINIUM HEATSINK, 15.14.323 PCB, THERMAL SWITCH, THERMAL PROBE, SECONDARY RECTIFIER, SECONDARY INVERTER POWER MODULE, POWER RESISTOR, COPPER BARS, ESSENTIAL WIRING]



14.60.081 G382 AC/DC

GRUPPO INVERTER SECONDARIO
[GIA' ASSEMBLATO E TESTATO, INCLUDE: DISSIPATORE DI ALLUMINIO, SCHEDA 15.14.323, PROTETTORE TERMICO, SENSORE TERMICO, RADDRIZZATORE SECONDARIO, MODULO INVERTER SECONDARIO, RESISTORE DI POTENZA, BARRE RAME, CABLAGGIO ESSENZIALE]

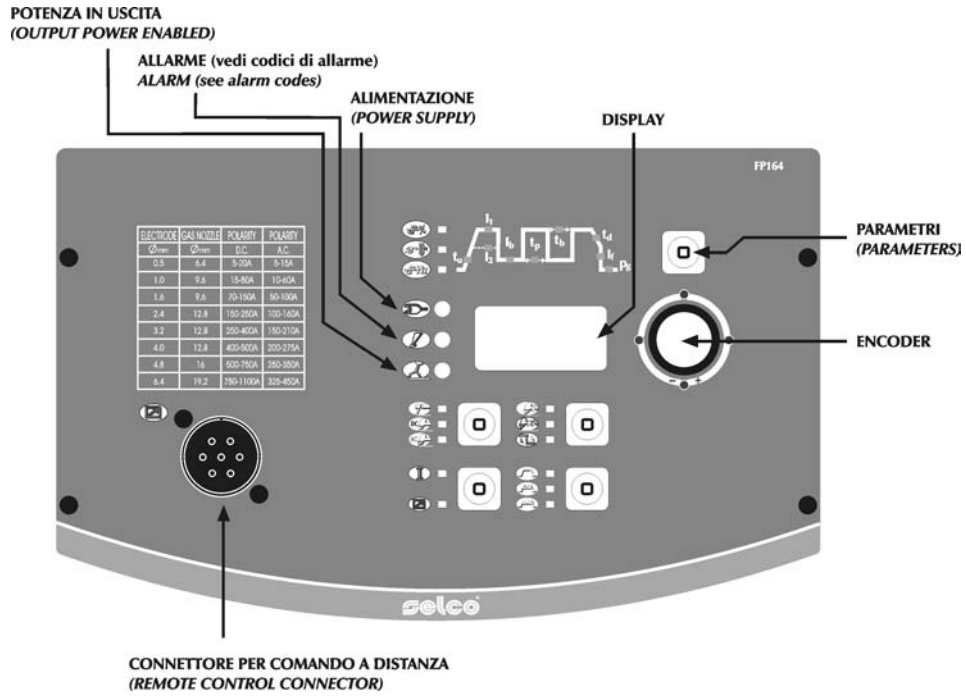
SECONDARY INVERTER GROUP
[ALREADY ASSEMBLED & TESTED, IT INCLUDES: ALUMINIUM HEATSINK, 15.14.323 PCB, THERMAL SWITCH, THERMAL PROBE, SECONDARY RECTIFIER, SECONDARY INVERTER POWER MODULE, POWER RESISTOR, COPPER BARS, ESSENTIAL WIRING]

7) DESCRIPTION OF DIAGNOSTIC INDICATIONS

For the meaning and use of the various controls, please refer to the respective user manuals; only the diagnostic indications are described in this section.

The Genesis 302-382 AC/DC series automatically compensates for the variations in power supply voltage, i.e. variations of ±15% with respect to the rated power supply voltage do not produce significant variations in the welding current.

7.1) External diagnostic indications



The microprocessor on the mainboard controls the status of the equipment and communicates it to the operator via the leds and the display on the panel.

Power supply led (GREEN)
Indicates the machine on status. Always on if the panel, and therefore the machine, is correctly powered.

Thermal led + protections (YELLOW)
Indicates an alarm status of the equipment. Only on if there is a problem.
The type of alarm is indicated by means of a code on the display (see below).

Display
At switch-on, the power source performs an autotest during which the display shows the size of the power source "302" or "382"; immediately after, the display briefly indicates the software version installed (e.g. u01).
The display indicates the welding parameters required by the operator (with the help of the other keys) and immediately after striking of the arc goes to reading mode, providing the actual value of the current delivered.

Simultaneously with switch-on of the yellow led, it indicates an alarm status via blinking codes (in this status only the two power supply and alarm leds are on):

Indicat.	Type of error	Action
E00	General error due to a temporary fault in the power supply or in the output current	See errors E10 & E19.
E10	Mains alarm (overvoltage, undervoltage, no phase)	Check the power supply voltages 400Vac ± 15% on the board 15.14.269 (see following sec. 7.2).
E11	No cooling fluid	Check the cooling fluid level. Remove the WU21 side panel and check the state of the pressure switch (N.C., see below).
E12	Primary inverter stage overtemperature	Leave the power source to cool. If the error persists: remove covers, check internal temperature, check fan, check primary thermal sensor (see following sec. 7.3).
E13	Secondary rectifier or AC stage overtemperature	Leave the power source to cool. If the error persists: remove covers, check internal temperature, check fan, check secondary thermal sensor (see following sec. 7.3).
E19	Welding circuit excess inductance	Welding cables too long. If the piece to be welded has inductive characteristics (windings etc.), move the earth clamp to minimise the overall circuit inductance.
E20 E24 E25 E26 E27	Control panel memory error	Switch the machine off and then on again and perform a MASTER RESET*. If the error persists, the machine operates but is no longer able to store the modified parameters or recall the last welding configuration used: replace the control panel.

* N.B.: to perform a MASTER RESET, *see procedure in following section 8*.

Normally, when cause(s) of alarm(s) is(are) removed, press one of the keys to exit from alarm status (or switch off and on the machine): machine will execute a new autotest and then start as in normal operation.

In case of error code E00, see also next section 7.2 "Internal diagnostic indicators": this could help to recognize specific cause of instantaneous alarm.

In the case of error E10, check the power supply voltages on the input filter board 15.14.269 (see also following section 7.2 "Internal diagnostic indications"), with reference to the following table:

Under/Overvoltage alarm thresholds		
Power supply rated voltage	Undervoltage	Overvoltage
3x400 V (50-60Hz)	340V	460V

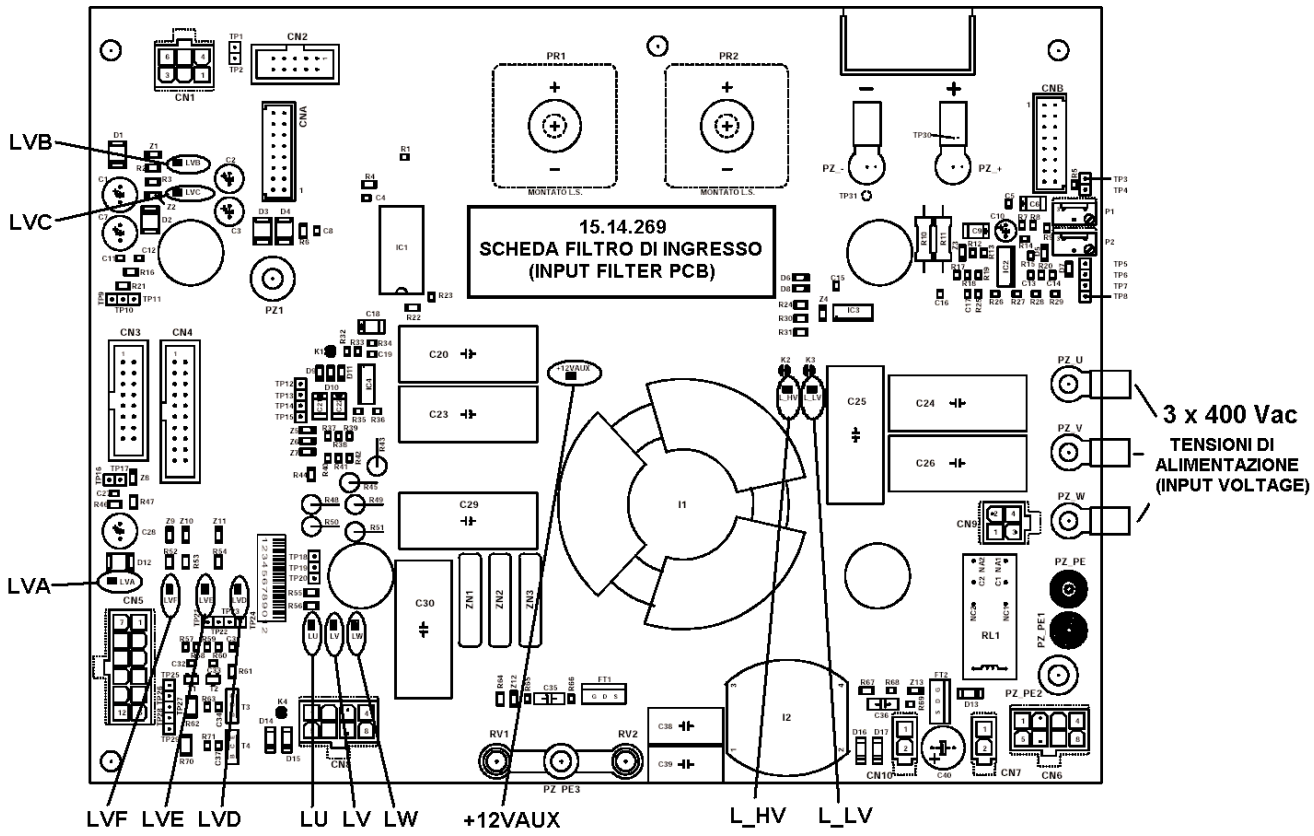
In the case of error E11: check the state of the pressure switch inside the cooling unit WU21 (see wiring diagram in previous sec. 5.3). When the water pump is off, the contact is normally closed, whereas with the pump operating, +5Vdc should be measured between terminals 1 & 2 of the pressure switch.
To exclude the pressure switch, simply disconnect one of the terminals (e.g. wire n° 74).
Caution: the delay in de-activating the water pump can be set via setup parameter 16 (see following sec. 8).

In the case of error E12 or E13, check the state of the thermal protection devices in the following section 7.3 "Arrangement of the thermal protections".
In the case of actual overheating, cooling of the power source is optimised by leaving the machine on in TIG 2T with torch button released (no-load voltage at output = 0Vdc).
When checking the ventilation, remember that the G302/382 controls the fan in order to minimise noise, energy consumption and sucking in of dust from the outside: the fan is activated only when the power source internal temperature exceeds 42°C.

Blinking of "Power at output" led

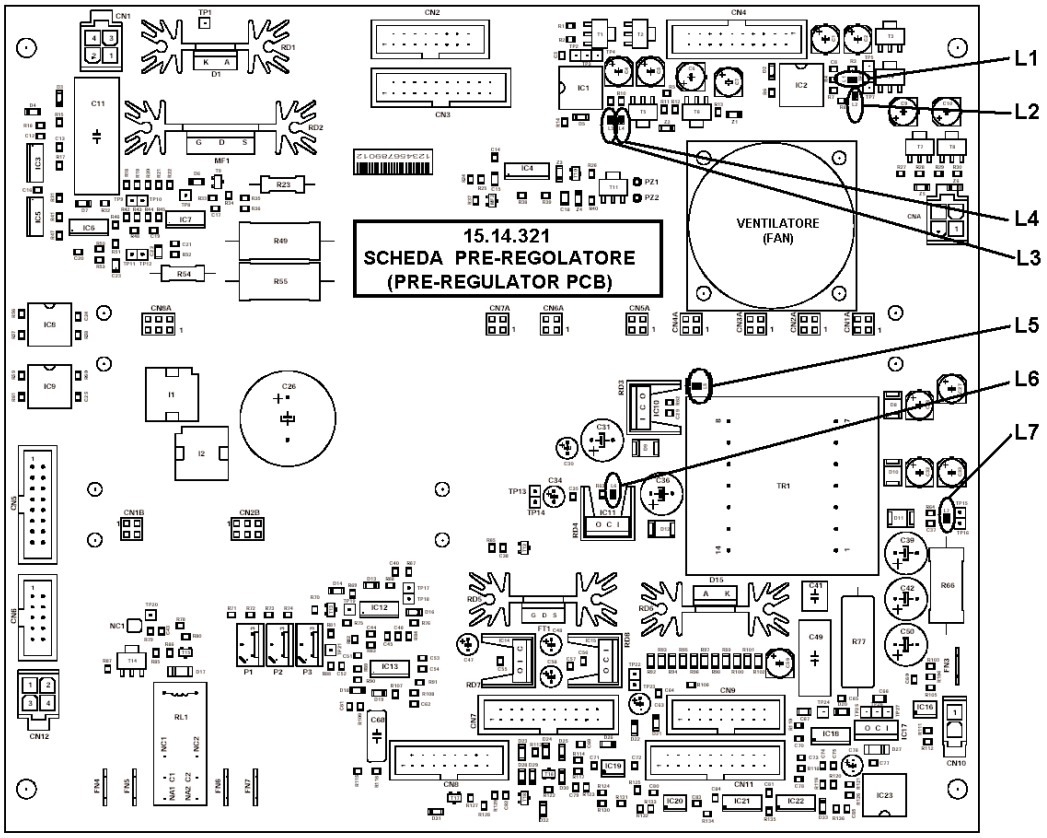
If the "Power at output" led blinks in MMA mode, perform the following checks:
- output voltage too low:
  may be due to a short circuit outside (welding clamps, torch, welding cables) or inside the power source (secondary rectifier, secondary inverter, overimposition board);
- output voltage on load too high (does not happen loadless):
  could be due to incorrect use of any static load (excess resistive value, see also sec. 3.3).

7.2) Internal diagnostic indications



Led	Meaning	Status under normal conditions
LVA	+30Vdc Torch Trigger power supply	LIT
LVB	+24Vdc Remote Control power supply	LIT
LVC	-24Vdc Remote Control power supply	LIT
LVD	+26Vdc Main Internal power supply	LIT
LVE	+10Vdc μP logic power supply	LIT
LVF	-20Vdc Main Internal power supply	LIT
+12VAUX	+12Vdc Primary Logic power supply	LIT
LU	Alarm: phase lack!	OFF
LV	Alarm: phase lack!	OFF
LW	Alarm: phase lack!	OFF
L_HV	Alarm: overvoltage!	OFF
L_LV	Alarm: undervoltage!	OFF

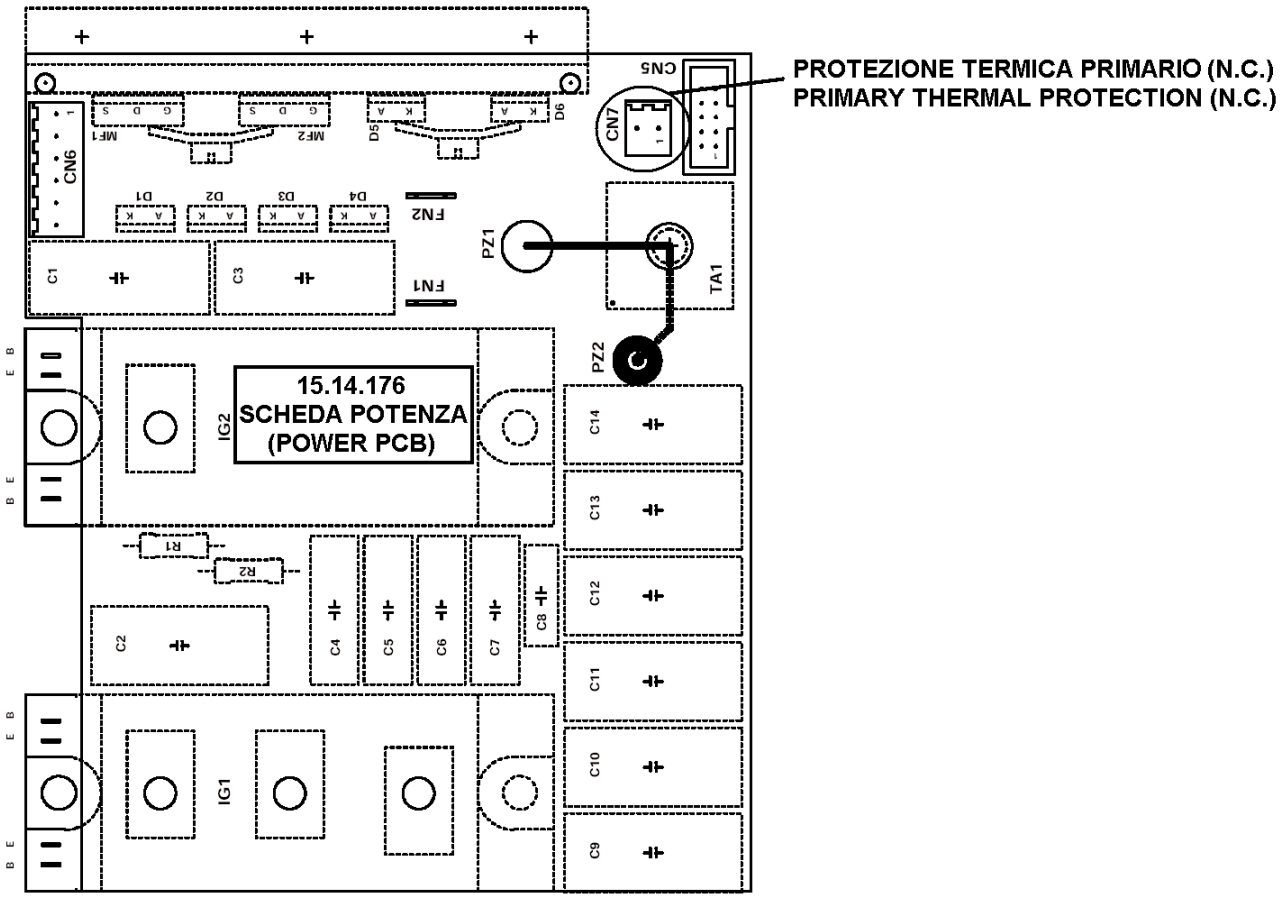
Note: all the above auxiliary power supplies are generated by Auxiliary Power Supply 15.14.271!



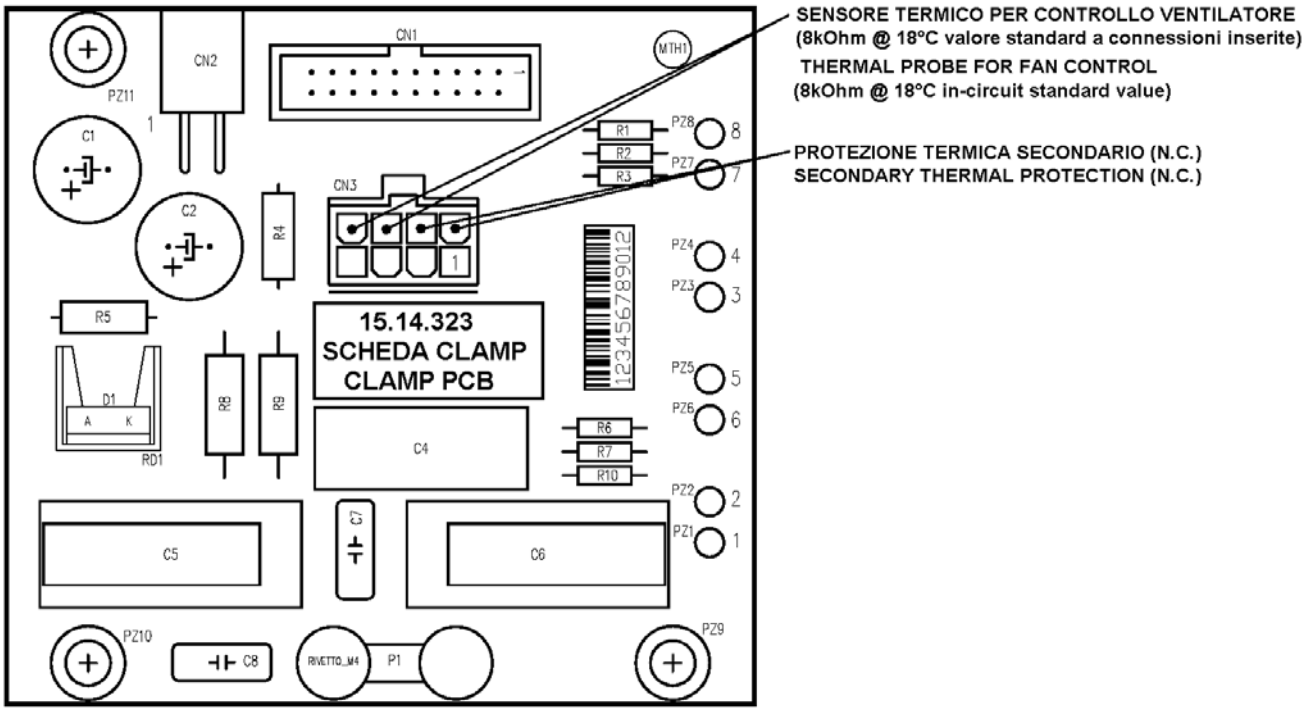
Led	Meaning	Status under normal conditions
L1	-20Vdc Secondary Inverter Driver power supply	LIT
L2	+20Vdc Secondary Inverter Driver power supply	LIT
L3	-20Vdc Secondary Inverter Driver power supply	LIT
L4	+20Vdc Secondary Inverter Driver power supply	LIT
L5	+15Vdc Aux. power supply (+400Vdc to HF and Superimposition PCBs)	LIT
L6	+15Vdc Aux. power supply (insulate commands to HF and Superimp. PCBs)	LIT
L7	+10Vdc Aux. power supply (not used)	LIT

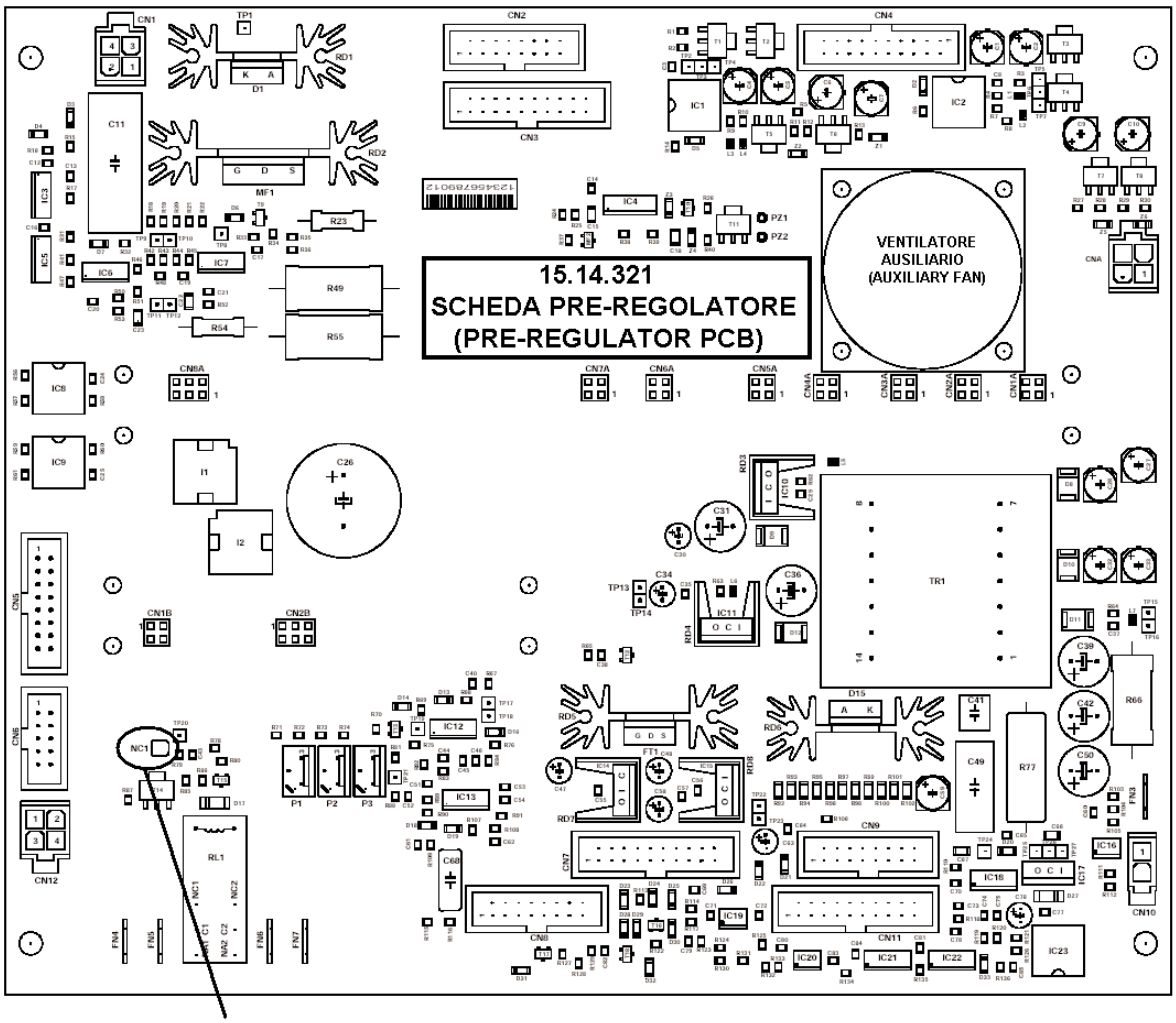
Note: all the above auxiliary power supplies are generated within Pre-regulator PCB (on the basis of +26Vdc Main Internal power supply coming from Input Filter 15.14.269!)

7.3) Thermal devices connectors locations



Nota: i componenti tratteggiati sono montati sul lato saldature
Note: dotted components lay on solder side





Operation of the power source fan (not the auxiliary one mounted on the board 15.14.321 and shown in the figure above) is controlled by means of two sensors NTC: the first sensor detects the temperature of the secondary dissipator, the second sensor detects the temperature of the air inside the power source.
If one of these two temperatures exceeds the factory-set value (currently 42°C) the power source fan will cut in, otherwise it will remain off. This operation is independent of whether the power source is delivering power or not and is controlled by the μP on the control panel.
In the case of overtemperature of the primary or secondary dissipators, the specific thermal protection will cut in: the output power will be interrupted and the thermal alarm will appear (see errors E12-E13 in the previous section).

Notes:
- The thermal alarm does not depend on the state of the two NTCs, which serve only to control the power source fan.
- Due to the tolerance of these components, the values indicated for the NTC sensors are only approximate and must be measured with the machine switched off and cold, with all the connections fitted.
- The auxiliary fan mounted on the board 15.14.321 is active only during TIG AC welding and does not depend on the power source temperature.
- The WU21 cooling unit fan operates together with the cooling fluid pump (they are activated simultaneously during TIG welding, independently of all temperature conditions).
- The cooling unit operation time after the end of welding can be set from Set-up (see parameter 16 in the following section 8).

8) SET-UP PARAMETERS

The settings of the G 302-382 AC/DC front panel are incremented by those present inside the set-up, which is accessed as follows (see also figure in sec. 6.2):

- Switch the equipment on.
- The machine performs an autotest during which only the green power supply led remains on; the display shows the power source size ("302" or "382") and the software version (e.g.: u01), then the machine goes to the last welding conditions set.
- Press the "PARAMETERS" key for at least 3 seconds.
- The display will show "0".
- By turning the current encoder (knob on the panel), figures from "0" to "99" can be set and by pressing the "PARAMETERS" key it is possible to see the value of the associated parameter, according to the following tables:

Param.	Description/meaning	Range	Default
0	Exit From Set Up	-	-
1	Setting the initial "I" percentage on the welding "I"	0 - 200%	50%
2	Pre Flow Time	0.0 - 25.0s	0.0s
3	Hot Start, Percent above Peak Current	0 - 500%	80%
4	Arc Force, Percent above Peak Current	0 - 500%	30%
5	Setting the AC Wave Form	0 - 8 **(see table below)	2 (Square)
6	Min Current Value with Remote Control	6 - Imax* A	6A
7	Max Current Value with Remote Control	6 - Imax* A	Imax* A
8	Lift or HF Start in DC, Ignored in AC	0 = HF 1 = LIFT	0
9	Reset of all Parameters	-	-
	..... parameters not used		
12	Welding in DC+ or DC- (ignored in TIG AC)	0 = DC- 1 = DC+	0
	..... parameter not used		
14	Ibase setting mode in pulsed TIG DC.	0 = Amps 1 = % of welding current	0
15	HF first impulse polarity. N.B.: inverted polarity facilitates sparking.	0 = inverse with respect to output voltage 1 = complying with output voltage	0
16	Cooling unit activation time after the end of welding. N.B.: by setting "0" the cooling unit will be always off.	0 - 600s	180s
17	MIX AC/DC enable by selecting "Medium Frequency" in TIG AC. N.B.: Medium Frequency operation cannot be activated in AC.	0 = Medium Frequency 1 = MIX AC/DC	0
18	Current reference during HF start in TIG DC	6 - Imax*	100A
19	Current reference during HF start in TIG AC	6 - Imax*	30A
20	Energy Saving (amplitude % of positive half-wave with respect to negative)	1 - 200%	100%
21	Slope-down interruption with torch button	0 = non-active 1 = active	0
22	Maximum current with remote control in MIX AC/DC operation for DC part	6 - Imax*	Imax* A
	.....parameters not used		
98	Reset of all the parameters (use only in the case of persistent errors on the display - see sec. 7.1) [MASTER RESET] For use only in countries with reduced no-load output voltage (e.g.: Belgium), otherwise use following code "99".		
99	Reset of all parameters (use only in the case of persistent errors on the display - see sec. 7.1) [MASTER RESET]	-	-

* note: Imax = 300A for G302 AC/DC, 380A for G382 AC/DC.

** note: waveform in AC

Parameter	Half wave -	Half wave +
0	Sine	Sine
1	Triangle	Triangle
2	Square	Square
3	Sine	Triangle
4	Sine	Square
5	Triangle	Sine
6	Triangle	Square
7	Square	Sine
8	Square	Triangle

- The value of the parameter selected during the previous step can be changed by turning the knob on the panel.
- We can see from the table that some parameters do not really have a value associated: if we select one of these parameters and press the "Parameters" key, the associated operation is performed (e.g. if we enter Setup, select parameter "9" and press the "Parameters" key, factory settings are resumed for all parameters.
- Parameters labelled "not used" cannot be accessed, i.e. nothing happens when the "Parameters" key is pressed.
- To save changes made to parameters and exit the Setup menu, return to parameter "0" and press the "Parameters" key; otherwise, switching the machine off directly will mean none of the changes will be saved, and the last confirmed parameter settings will remain.
- After quitting Set-up, the machine resumes normal operation, if necessary taking account of the new configuration of the parameters set.

9) DESCRIPTION, TESTING AND REPLACEMENT OF THE ELECTRONIC BOARDS, CURRENT CALIBRATION

Introduction

Malfunctioning of a machine can be due to various causes.
Firstly you should check that the machine has been correctly installed and connected to the power supply (use of motor generator, extensions, plugs, presence of other large-size equipment that can interfere with the electrical power supply, etc.).
Secondly, you should check correct use of the power source according to the type and whether the problem could be due to causes outside the power source (gas, pressure reducers, torches, expendable materials, earth clamps, welding cables, remote controls etc.).
You should then assess whether the problem could be due to incorrect setting of the welding parameters (e.g. check how the Setup has been configured, perform Reset of the user parameters, cf. param. 9 in previous sec. 8).
Only after you have carried out the above checks should you look at the power source itself, opening the covers and performing an initial visual inspection. If necessary, carry out routine maintenance (blow-clean the power source).
Sometimes a fault in a machine can be due to loose contacts in the wiring and in the internal connections and these should therefore be inspected, at least visually.
In other cases the problem may be due to a faulty electronic board.
To speed up troubleshooting and optimise repair times, you are advised to proceed as follows:

1. visual inspection and checking of connections
2. with the machine switched off: instrumental check on power parts and any boards that may be faulty; if faults are found, replace the parts with equivalent spares (be careful of any configurations/calibrations to be performed on multi-purpose spares); instrumental re-check with the machine switched off
3. with the machine on: instrumental check on power parts and any parts that have been replaced
4. power source test to check that the fault is no longer present
5. if an electronic board has been replaced, it may be advisable to perform the following check:
   remove the board you have just fitted and replace it with the board previously removed, then re-test the machine to check that the fault re-appears:
   - if the original problem does not reappear when the original board is re-installed, then the problem is not due to that board and you must continue the troubleshooting procedure;
   - if the original problem re-appears, then the fault is due to that board; re-install the spare part and perform a final test on the power source.

Caution! Performance of the check in point 5 above requires particular care and is not necessary when the board shows signs of burning or evident faults (in this case re-installation of the faulty board can cause further damage to the remaining parts of the power source).

In accordance with the above procedure, the following sections illustrate the normal working conditions of the power source boards and provide the standard electrical values at the main points of the boards, both with the machine off and with the machine on.

All the measurements indicated can be performed with a digital multimeter.

Remember that the first test to be performed is the VISUAL CHECK!
The visual check reduces troubleshooting times and directs any subsequent tests towards the damaged part!

In general, points to be visually checked are:
- input filter area
- electrolytic levelling capacitors
- traces of smoke on the inside of the bonnet
- power and signal connections
- overall condition of the boards

Caution: unless specified otherwise, before taking any measurement described below on the Genesis 302-382 AC/DC, disconnect the HF circuit (FN1 & FN2 in board 15.14.286).

Caution: when the machine is connected to the power supply, the main switch is live, regardless of its status (open or closed)! It is therefore important to unplug the machine before touching any internal part of the power source! Wait approx. one minute before carrying out work on the internal parts as the capacitors may be loaded at high voltage!

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

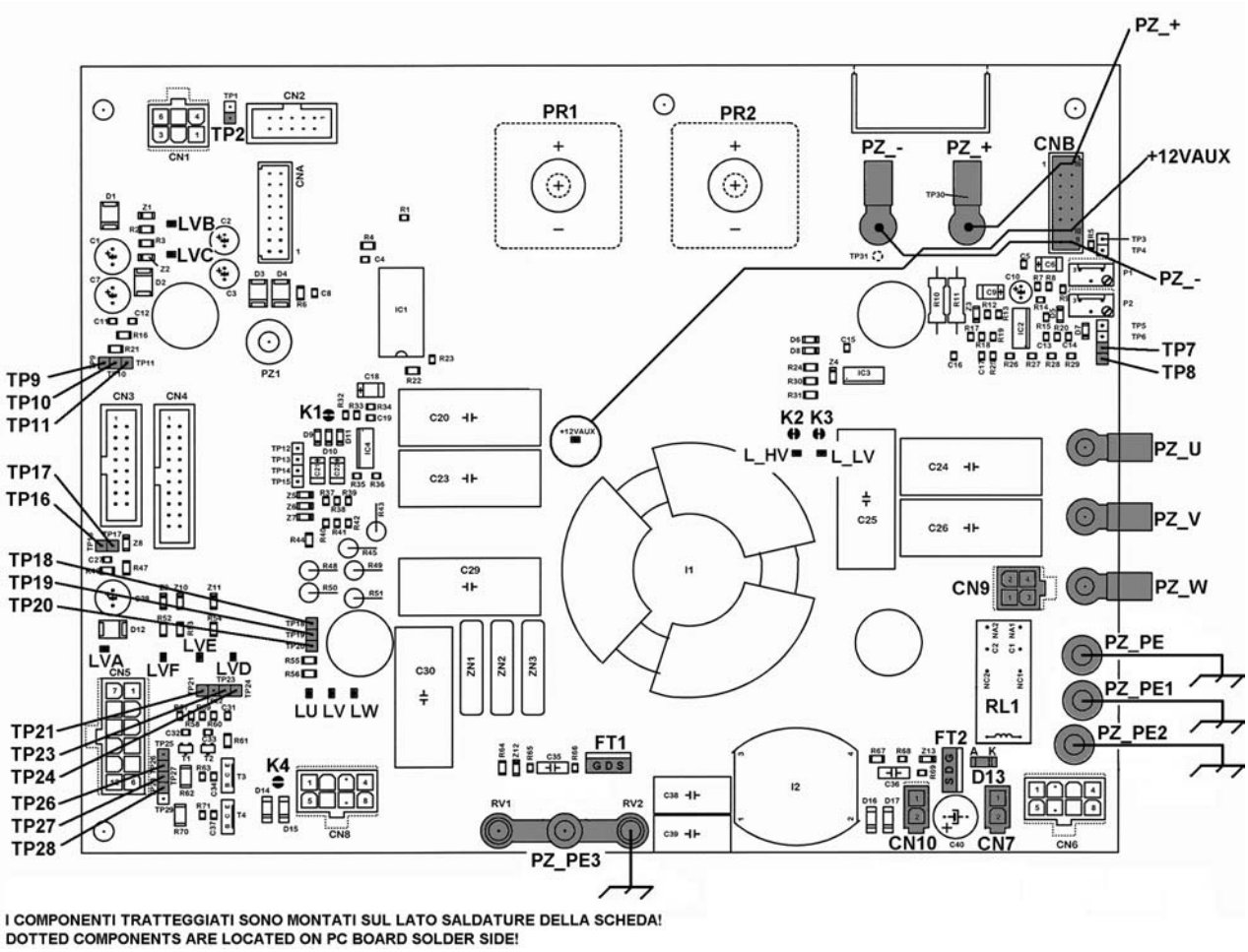
INDEX :

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.1) Input filter PC board 15.14.269

This board performs the following functions:
- EMC input filter
- power input rectifier
- power source voltages supervision
- isolated auxiliary power sources for the various machine circuits (see table on following page)
- gas solenoid valve, fans and WU21 water pump control relay power supply

The weld switching points on the board are factory-set and must not be modified by the user.



WARNING!
- PZ_PE, PZ_PE1, PZ_PE2, PZ_PE3 must be always earthed!
- PZ_PE3 brass jumpers must be always closed!

Soldered jumpers (factory setted):
K1 = CLOSED
K2 = CLOSED
K3 = CLOSED
K4 = OPEN

Power diode module (PR1 & PR2) replacing instructions:
- MOUNTING: use torque screw driver @ 3 Nxm (26 lbxin)
- use thermal grease as necessary.

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

Functional part	Generator/Mode	Component	Test point	Value	Notes
Input rectifier	**OFF**	PR1 / PR2	PZ_U ← PZ+ PZ_V ← PZ+ PZ_W ← PZ+ PZ- ← PZ_U PZ- ← PZ_V PZ- ← PZ_W	+ 0.5Vdc + 0.5Vdc + 0.5Vdc + 0.5Vdc + 0.5Vdc + 0.5Vdc	
Generator fan	OFF	FT1	S ← G S ← D	+ 0.7Vdc + 0.6Vdc	
WU21 fan	OFF	FT2	S ← G S ← D	+ 0.7Vdc + 0.6Vdc	
WU21 pump	OFF	RL1 (coil) (contact)	D13 K ← A CN9/1 ← PZ_U	880 Ω ∞ (open contact)	

Input voltage	**ON**	-	PZ_U ↔ PZ_V PZ_U ↔ PZ_W PZ_W ↔ PZ_V	400Vac ± 15% 400Vac ± 15% 400Vac ± 15%	
Input rectifier	ON	PR1 / PR2	PZ+ ← PZ-	+560Vdc ± 15%	V1
Aux power supplies	ON	+12VAUX = LIT	CNB/10 ← CNB/9	+12Vdc	V2
		LVA = LIT	TP17 ← TP16	+30Vdc	V3
		LVB = LIT	TP9 ← TP11	+24Vdc	V4
		LVC = LIT	TP10 ← TP11	-24Vdc	V5
		LVD = LIT	TP24 ← TP21	+26Vdc	V6
		LVE = LIT	TP27 ← TP21	+10Vdc	V7
		LVF = LIT	TP23 ← TP21	-20Vdc	V8
Phase lack alarms	ON	LU = OFF	TP20 ← CNB/9	+12Vdc	
		LV = OFF	TP19 ← CNB/9	+12Vdc	
		LW = OFF	TP18 ← CNB/9	+12Vdc	
Overvoltage alarm	ON	L_HV = OFF	TP7 ← CNB/9	+12Vdc	
Undervoltage alarm	ON	L_LV = OFF	TP8 ← CNB/9	+12Vdc	
Generator fan	ON *	-	CN7/2 ← CN7/1	+26Vdc	
WU21 fan	ON / TIG**	-	CN10/2 ← CN10/1	+26Vdc	
WU21 pump	ON / TIG**	RL1 (coil)	D13 K ← A	+26Vdc	
		RL1 (contact)	CN9/1 ↔ PZ_W	400Vac ± 15%	

Notes:

* to activate fan, machine should be warmed up by welding for 5 minutes @ 200A (18°C Ambient Temperature)

** to activate cooler unit, pull torch trigger in TIG mode; once started, cooler unit remains active for 3 minutes after welding job is terminated.

Hints:

- removing of Auxiliary Power Supply 15.14.271 is not required to perform checks listed above
- to ease measurements, PZ_- , +12VAUX , PZ_+ signals are electrically connected to CNB/9, CNB/10, CNB/16 respectively.

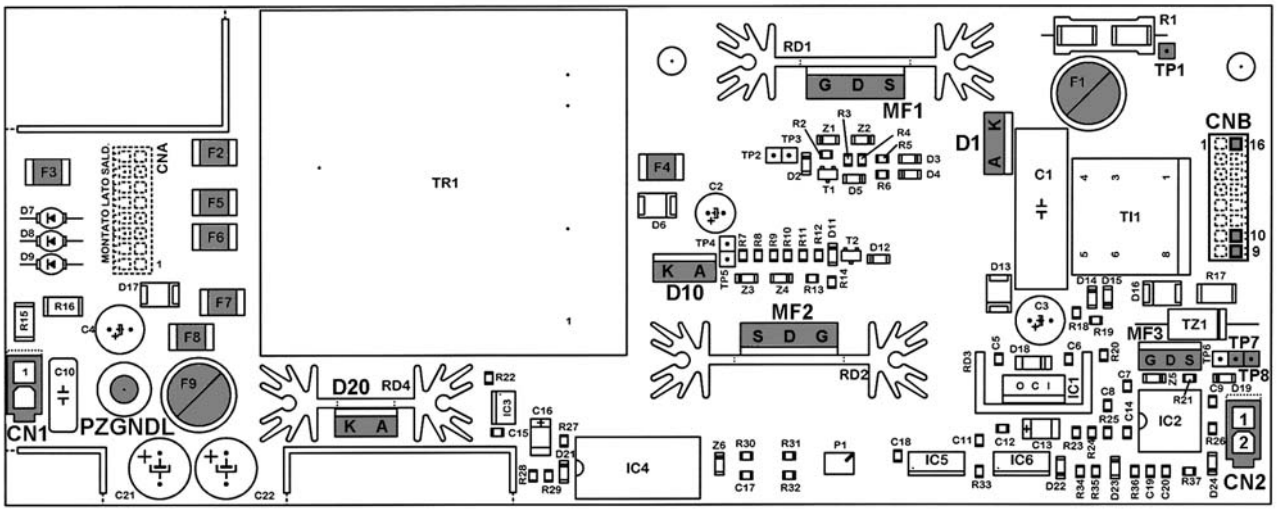
Power supply	Fuse*	Related circuit
V1	-	Inverter input voltage, HF & Superimposition high voltage power supply input
V2	F4	Input voltage alarms (overvoltage, undervoltage, phase lack)
V3	F2	Torch trigger
V4, V5	F5, F6	Remote control
V6	F9	Main positive auxiliary power supply (inverter control logic, microprocessor, welding logic, Hall probe, thermal alarm, power source fan, gas solenoid valve, WU21 fan and water pump power supply relay, HF and overimposition boards logic).
V7	F8	- (power supply output not used)
V8	F7	Negative auxiliary power (inverter control logic, microprocessor, welding logic, Hall probe, gas solenoid valve).

* **Note:** fuses are located on Aux. Power Supply PC board 15.14.271 (see related section below).

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.2) Auxiliary power supply PC board 15.14.271

This board performs the following functions:
- auxiliary power supplies of all the boards



CN1 = high voltage output, NOT USED!
CN2/1 = synchronization signal from main clock generator
PZGNDL = ground connection to Input Filter PC Board, well tighten screw needed

Fuse	Protected circuit
F1*	Auxiliary power supply input
F2	Torch trigger
F3	- (not used power supply output)
F4	Input voltage alarms (over/under voltage & phase lack)
F5, F6	Remote control logic
F7	Negative auxiliary power supply (inverter control logic, microprocessor, welding logic, Hall probe, gas solenoid valve).
F8	- (not used power supply output)
F9	Main positive auxiliary power supply (inverter control logic, microprocessor, welding logic, Hall probe, thermal alarm, power source fan, gas solenoid valve, WU21 fan and water pump power supply relay, HF and overimposition boards logic).

Note:
* F1 fuse MUST be 2A 250Vac T (Time delay) ceramic body filled with sand type!

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

Functional part	Generator/Mode	Component	Test point	Value	Notes
Input fuse	**OFF**	F1*	-	0Ω Ⓠ	2A 250Vac GT *
Output fuses	OFF	F2	-	0Ω Ⓠ	1A 250Vac T
		F3	-	0Ω Ⓠ	1A 250Vac T
		F4	-	0Ω Ⓠ	1A 250Vac T
		F5	-	0Ω Ⓠ	1A 250Vac T
		F6	-	0Ω Ⓠ	1A 250Vac T
		F7	-	0Ω Ⓠ	1A 250Vac T
		F8	-	0Ω Ⓠ	1A 250Vac T
		F9	-	0Ω Ⓠ	5A 250Vac T
Driver	OFF	MF3	S ← G	+ 0.3Vdc Ⓐ	
			S ← D	+ 0.5Vdc Ⓐ	
Power switches	OFF	MF1	S ← G	10kΩ Ⓠ	
			S ← D	+ 0.4Vdc Ⓐ	
		MF2	S ← G	10kΩ Ⓠ	
			S ← D	+ 0.4Vdc Ⓐ	
Power diodes	OFF	D1	A ← K	+ 0.4Vdc Ⓐ	
		D10	A ← K	+ 0.4Vdc Ⓐ	
		D20	A ← K	+ 0.4Vdc Ⓐ	

Input voltage	**ON**	-	CNB/16 ← CNB/9	+560Vdc Ⓥ	V1
Auxiliary power supply (output voltage)	ON	-	CNB/10 ← CNB/9	+12Vdc Ⓥ	V2

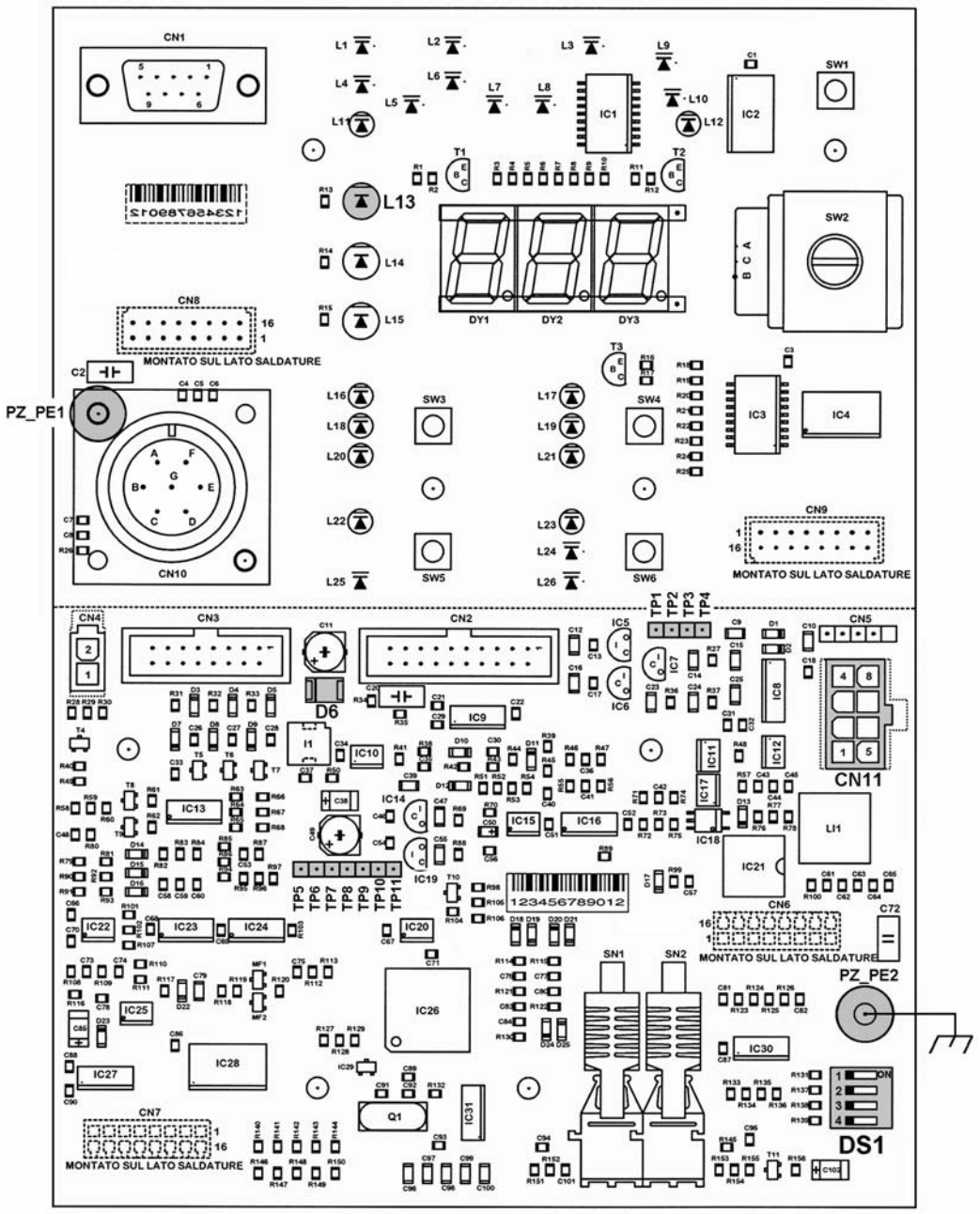
Note:
* F1 fuse MUST be 2A 250Vac T (Time delay) ceramic body filled with sand type!

Power supply	Fuse*	Related circuit
V1	-	Inverter input voltage, HF & Superimposition high voltage power supply input
V2	F4	Input voltage alarms (overvoltage, undervoltage, phase lack)

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.3) Control panel PC board 15.14.324

This board performs the following functions:
- microprocessor control of all the machine
- interface for remote control



I COMPONENTI TRATTEGGIATI SONO MONTATI SUL LATO SALDATURE!

DOTTED COMPONENTS ARE LOCATED ON SOLDER SIDE!

Dip-switch (factory setted):

DS1	G302	G382
1	OFF	OFF
2	OFF	ON
3	OFF	OFF
4	OFF	OFF

REMOTE CONTROL CONNECTOR CN11:

pin 1	wire n° 20	A	+5Vdc (to remot pot.)
pin 2	wire n° 21	G	Remote trigger
pin 3	wire n° 22	C	Potentiometer (to central ref.)
pin 4	wire n° 23	B	GND (to minimum potentiometer + remote trigger)

CAUTION!
- PZ_PE1 and PZ_PE2 must always be electrically connected to the metal plate on the front via the metal spacers.
- The metal plate on the front must always be connected to the earth protection.

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

Functional part	Generator / Mode	Component	Test point	Value	Notes
Microprocessor power supply	**OFF**	D6	A ◄— K	+0.4Vdc Ⓐ	
Auxiliary power supplies	**ON**	L13 = LIT	TP9 ◄— TP8 TP10 ◄— TP8 TP7 ◄— TP8 TP11 ◄— TP8	+15Vdc Ⓥ -15Vdc Ⓥ +5Vdc Ⓥ +5Vdc Ⓥ	V6d V8d V6e V6f
Reference for inverter control	ON/TIG		TP5 ◄— TP8	+3.0 Vdc Ⓥ in TIG welding to 300A	
Remote control auxiliaries power supplies	ON		TP2 ◄— TP3 TP4 ◄— TP3 TP1 ◄— TP3	+15Vdc Ⓥ +5Vdc Ⓥ -15Vdc Ⓥ	V4a V4b V5a

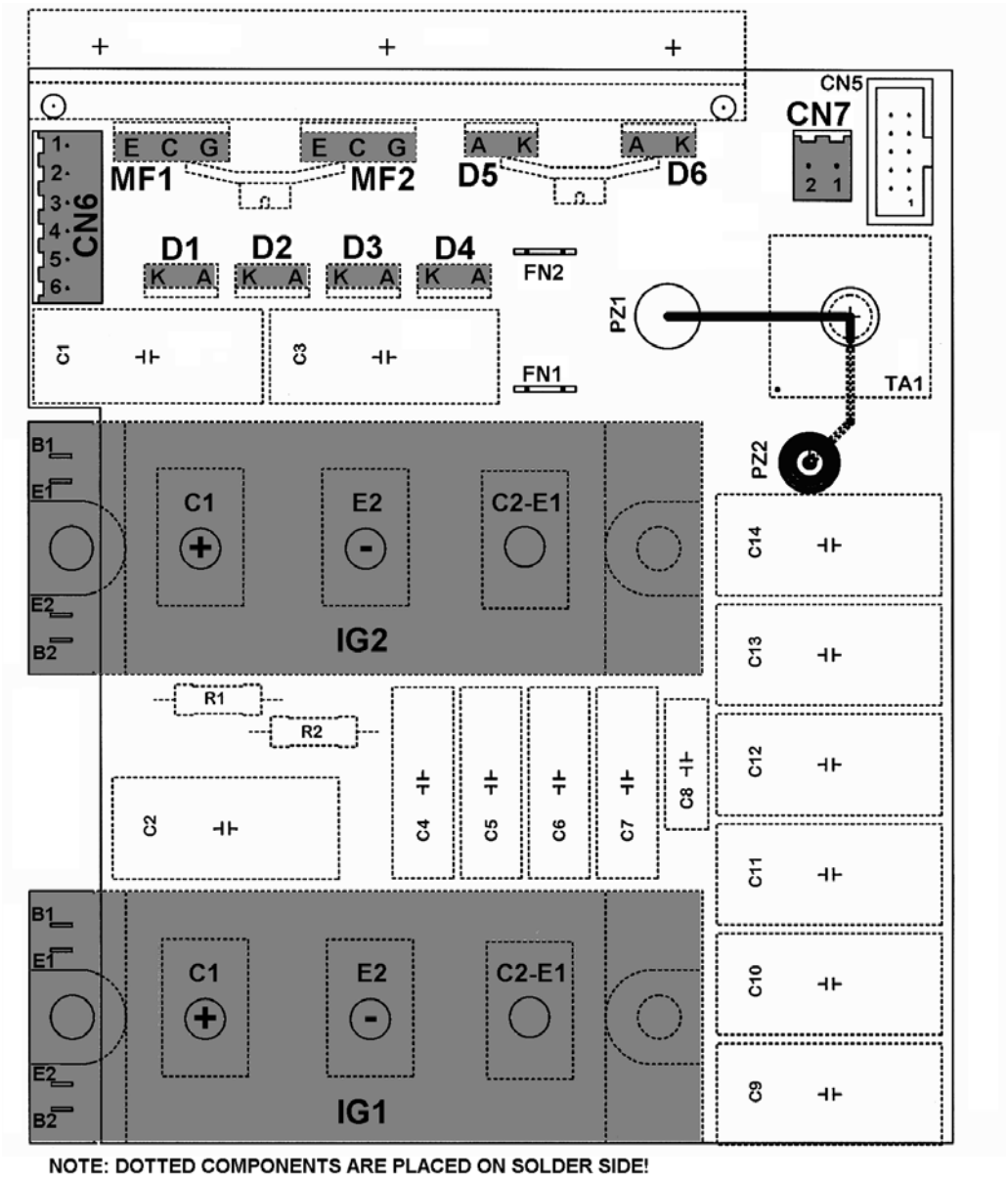
Power supply	Fuse*	Related circuit
V6d, V6e, V6f	F9	Positive auxiliary power supply (microprocessor logic, led, controls and control panel display)
V8d	F7	Negative auxiliary power supply (microprocessor logic)
V4a, V4b, V5a	F5, F6	Remote control

* **Note:** fuses are located on Aux. Power Supply PC board 15.14.271 (see related section above).

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.4) Power inverter PC board 15.14.176

This board performs the following functions:
- power inverter



NOTE: DOTTED COMPONENTS ARE PLACED ON SOLDER SIDE!

Power IGBT module (IG1 & IG2) replacing instructions:
- MOUNTING & TERMINALS: use torque screw driver @ 3 Nxm (26 lbxin)
- use thermal grease as necessary.

Anyway, in case of inverter failure use of replacement kit is suggested (see also "PC Boards location" section above).
14.60.078 for G302
14.60.079 for G382

NOTE: Values below are referred to each sigle component tested alone (without any connection); any other other value in this page is referred to normal conditions (with all connections correctly made).					
IGBT MODULE	OFF	IG1/IG2	C2-E1 ← C1 E2 ← C2-E1 B1 ← C2-E1 B1 ← C1 B2 ← E2 B2 ← C2-E1	+0.4Vdc +0.4Vdc ∞ Ω ∞ Ω ∞ Ω ∞ Ω	

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

Functional part	Generator / Mode	Component	Test point	Value	Notes
Fiull bridge inverter	**OFF**	IG1	C2-E1 ◄— C1	0.40 Vdc	
			E2 ◄— C2-E1	0.40 Vdc	
			B1 ◄— E1	10kΩ	
			B2 ◄— E2	10kΩ	
		IG2	C2-E1 ◄—C1	0.40 Vdc	
			E2 ◄—C2-E1	0.40 Vdc	
			B1 ◄— E1	10kΩ	
			B2 ◄— E2	10kΩ	
Resonant snubber	OFF	D1	A ◄— K	0.40 Vdc	
		D2	A ◄— K	0.40 Vdc	
		D3	A ◄— K	0.40 Vdc	
		D4	A ◄— K	0.40 Vdc	
		D5	A ◄— K	0.40 Vdc	
		D6	A ◄— K	0.40 Vdc	
		MF1 (G ◄—E)	CN6/5 ◄—CN6/6	22Ω	
		MF2 (G ◄—E)	CN6/1 ◄—CN6/2	22Ω	
Thermal switch	ON	-	CN7/1 ◄—CN7/2	0Ω	
Inverter input high voltage	**ON** / TIG 2T (trigger released)	IG1 or IG2	C1 ◄— E2	+560Vdc	V1
Output voltage	ON / STICK		Vout	+80Vdc	

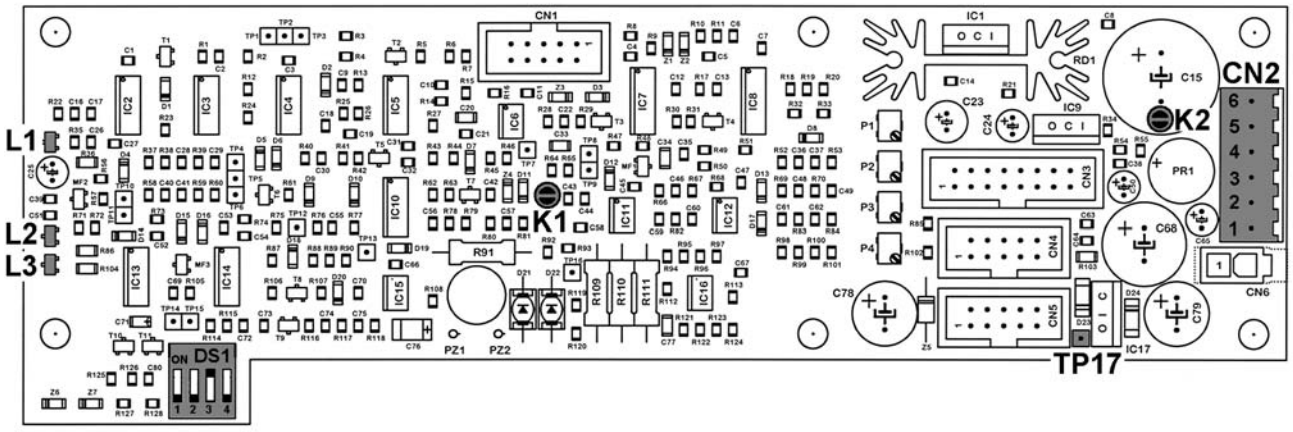
WARNING:
To test operation of the inverter in safe conditions, it may be useful to disconnect the power cables from C1 ("+" red) and E2 ("-" black) of IG2, re-tighten the screws and power the inverter power stage with an insulated external power supply source at low voltage and limited current (protected against short circuits); in this case when the G302/382 power source is switched on in TIG 2T, everything operates correctly but reading of the output voltage must be appropriately scaled (e.g. by connecting a +48Vdc external power supply to C1 and E2 you should obtain approximately 7Vdc no-load voltage in TIG 2T); in this way it is possible to safely test correct operation of the inverter, the secondary power rectifier and the AC stage.
CAUTION! The external power supply source must be electrically insulated from the power source 400Vac three-phase power supply.

Caution: before implementing the above procedure, disconnect the HF (FN1 & FN2 in board 15.14.286) in order to prevent damage due to HF discharges.

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.5) Resonant inverter control PC board 15.14.298

This board performs the following functions:
- resonant inverter control logic
- welding current reading



Soldered jumpers (factory setted):
K1 = OPEN
K2 = OPEN (located on solder side of PC Board).

Dip-switch (factory setted):

DS1	G302	G382
1	OFF	ON
2	OFF	OFF
3	ON	OFF
4	OFF	OFF

Functional part	Generator/Mode	Component	Test point	Value	Notes
Aux. Power supplies	**ON**	-	CN2/6 ← CN2/5	+26Vdc (V)	V6
		-	TP17 ← CN2/5	-10Vdc (V)	V8a
Inverter control	ON / TIG 2T (trigger released)	L1 L2 L3	- - -	ON OFF ON	
	ON / STICK (or TIG with trigger pulled*)	L1 L2 L3	- - -	OFF ON OFF	
Output current (Hall effect probe)	ON	- -	CN2/4 ← CN2/5 CN2/1 ← CN2/5	+15Vdc (V) -15Vdc (V)	V6a V8b
	ON / TIG DC	-	CN2/2 ← CN2/5	-2.3Vdc (V) (welding to 300A)	

* **WARNING! Before executing this test, disconnect FN1 & FN2 terminals from HF pc board to avoid possible damages to instruments or body injuries due to HF discharge!**

Notes:
L1 = Inverter Disabled (no power out), due to "POT" signal or internal aux. power supply voltage low or primary overcurrent
L2 = Inverter Enabled (power out)
L3 = "POT" signal, that is Inverter Disabled due to microprocessor logic command, coming from Front Panel PC Board.

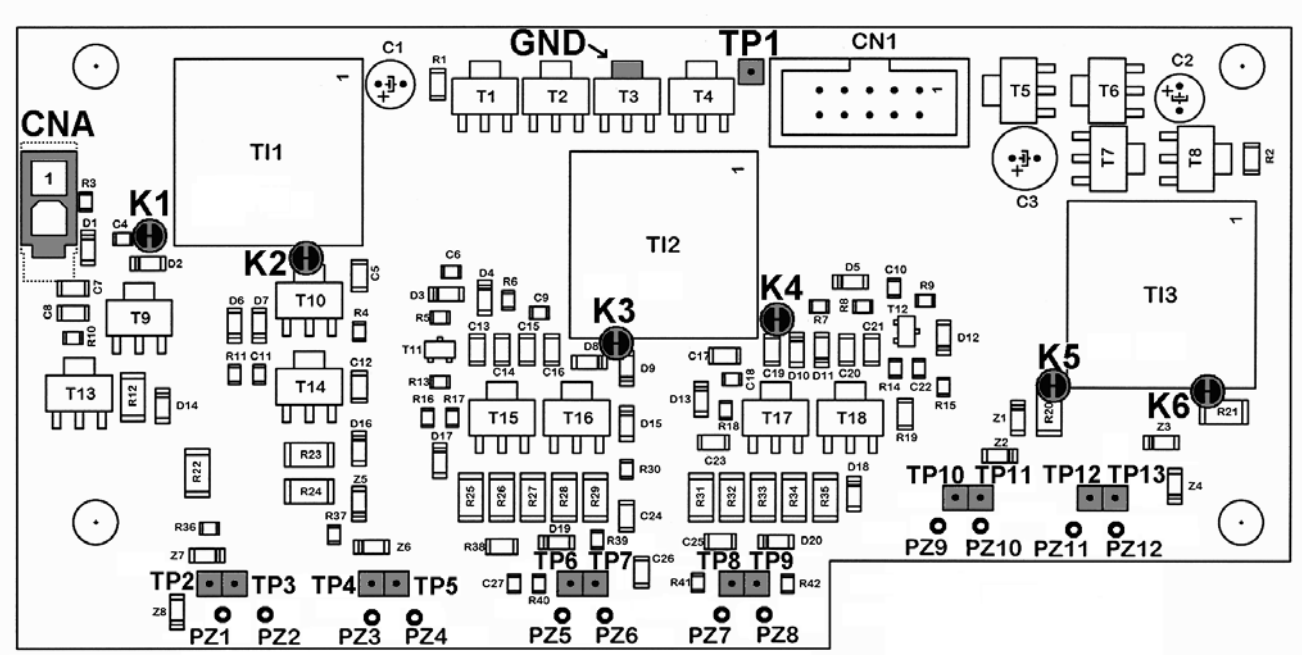
Power supply	Fuse*	Related circuit
V6a	F9	Inverter control logic, Hall probe, thermal alarm
V8a, V8b	F7	Main positive supply (welding & inverter control logic, Hall probe).

* *** Note: fuses are located on Aux. Power Supply PC board 15.14.271 (see related section above).**

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.6) Inveter driver PC board 15.14.200

This board performs the following functions:
- driving of resonant inverter power components



Soldered jumpers (factory setted, all located on solder side of PC Board):
K1 = CLOSED
K2 = CLOSED
K3 = CLOSED
K4 = CLOSED
K5 = CLOSED
K6 = CLOSED.

CNA/1 = synchronization signal

Functional part	Generator/Mode	Component	Test point	Value	Notes
Driver input	**OFF**	-	TP1 ← GND	10kΩ Ω	
Output driver (to inverter)	OFF	-	TP2 ← TP3	10kΩ Ω	
		-	TP4 ← TP5	10kΩ Ω	
		-	TP6 ← TP7	10kΩ Ω	
		-	TP8 ← TP9	10kΩ Ω	
Driver output (to resonant snubber)	OFF	-	TP10 ← TP11	22Ω Ω	
		-	TP12 ← TP13	22Ω Ω	

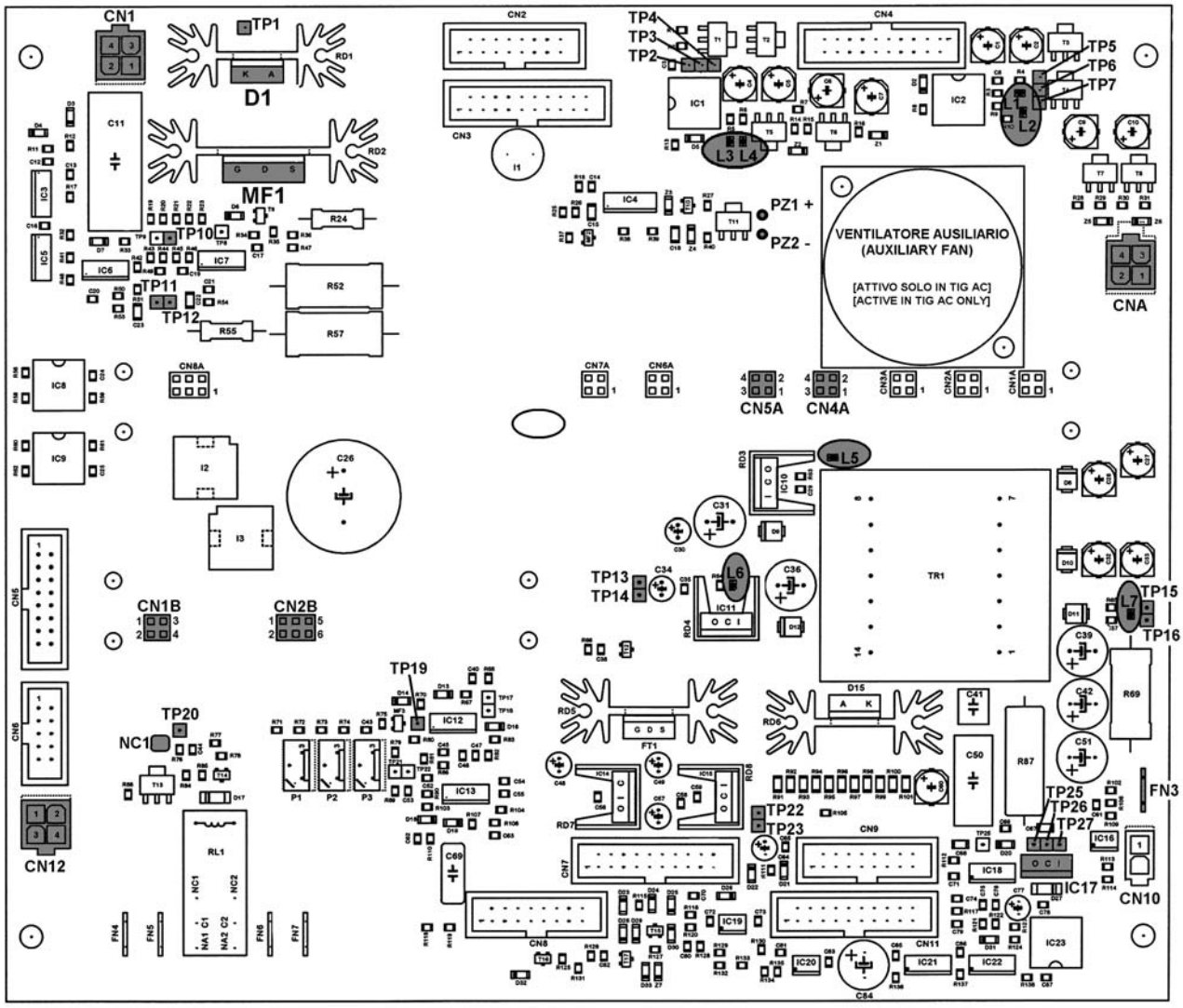
Driver input	**ON** / TIG 2T*	-	TP1 ← GND	0Vdc V	
Driver output (to inverter)	ON / TIG 2T*	-	TP2 ← TP3	0Vdc V	
		-	TP4 ← TP5	0Vdc V	
		-	TP6 ← TP7	0Vdc V	
		-	TP8 ← TP9	0Vdc V	
Driver output (to resonant snubber)	ON/ TIG 2T *	-	TP10 ← TP11	0Vdc V	
		-	TP12 ← TP13	0Vdc V	

* Note: torch trigger released

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.7) Pre-regulator PC board 15.14.321

This board performs the following functions:
- generation of auxiliary power supplies
- powering and control of HF and Overimposition boards
- power source internal temperature detection
- power source fan control



CN1/3 = synchronization signal

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

Functional part	Generator / Mode	Component	Test point	Value	Notes
Aux. power supply	**OFF**	MF1	S ◄— D	+0.5Vdc ⏚	
		D1	A ◄— K (=MF1/D ◄— TP1)	+0.4Vdc ⏚	
Thermal protection (on board NTC)	OFF	NC1	TP20 ◄— TP26	8kΩ @ 18°C T.A. Ω	
Aux. power supplies	**ON**		CN1/1 ◄— CN1/4	+560Vdc V	V1
			TP27 ◄— TP26	+26Vdc V	V6
			CN12/4 ◄—CN12/1	+24Vdc V	V4
			CN12/2 ◄—CN12/1	-24Vdc V	V5
			TP25 ◄— TP26	+15Vdc V	V6b
		L4 = LIT	TP2 ◄— TP3	+20Vdc V	V9
		L3 = LIT	TP4 ◄— TP3	-20Vdc V	V10
		L1 = LIT	TP5 ◄— TP6	-20Vdc V	V11
		L2 = LIT	TP7 ◄— TP6	+20Vdc V	V12
		L5 = LIT	TP12 ◄— TP11	+15Vdc V	V13
		L6 = LIT	TP13 ◄— TP14	+15Vdc V	V14
		L7 = LIT	TP16 ◄— TP15	+10Vdc V	V15
			TP22 ◄— TP26	+15Vdc V	V6c
			TP23 ◄— TP26	-15Vdc V	V8c
			CN4A ◄—CN5A	+400Vdc V	V16
			CN2B/2 ◄—CN2B/6	+400Vdc V	V16
Secondary rectifier voltage	ON / STICK		CNA/1 ◄—CNA/4	+160Vdc V	
Power source fan control	ON (machine cool)		TP19 ◄— TP26	+3 ~ +5Vdc V	Fan off
	ON (machine hot)			< 2Vdc V	Fan on
Fan (on pc board)	ON / TIG AC 2T*		PZ1 ◄— PZ2	+15Vdc V	
HF (command)***	ON / TIG 2T		CN1B/2 ◄—CN1B/4	0Vdc V	Trigger released
			CN1B/2 ◄—CN1B/4	+3Vdc V	Lasts for 2 sec. once trigger on **

* **Note:** the auxiliary fan operates only if there is output current in TIG AC mode.

** **Note:** the command (+3Vdc) lasts approx. 2 sec. after the torch button has been pressed, but only if the arc is not sparked. If an output current is established during these 2 seconds, the command is immediately switched off. This test must therefore be performed without sparking, holding the torch in the air.

*** **CAUTION!** Before performing this measurement, disconnect the HF circuit (FN1 & FN2 in board 15.14.286) in order to prevent injury to persons or damage to things due to HF discharges.

HINTS for ease of measurements:
- CN1B, CN2B, CN4A, CN5A can be reach also through solder side of HF & Superimposition pc boards
- TP26 is electrically connected to IC17 metal tab

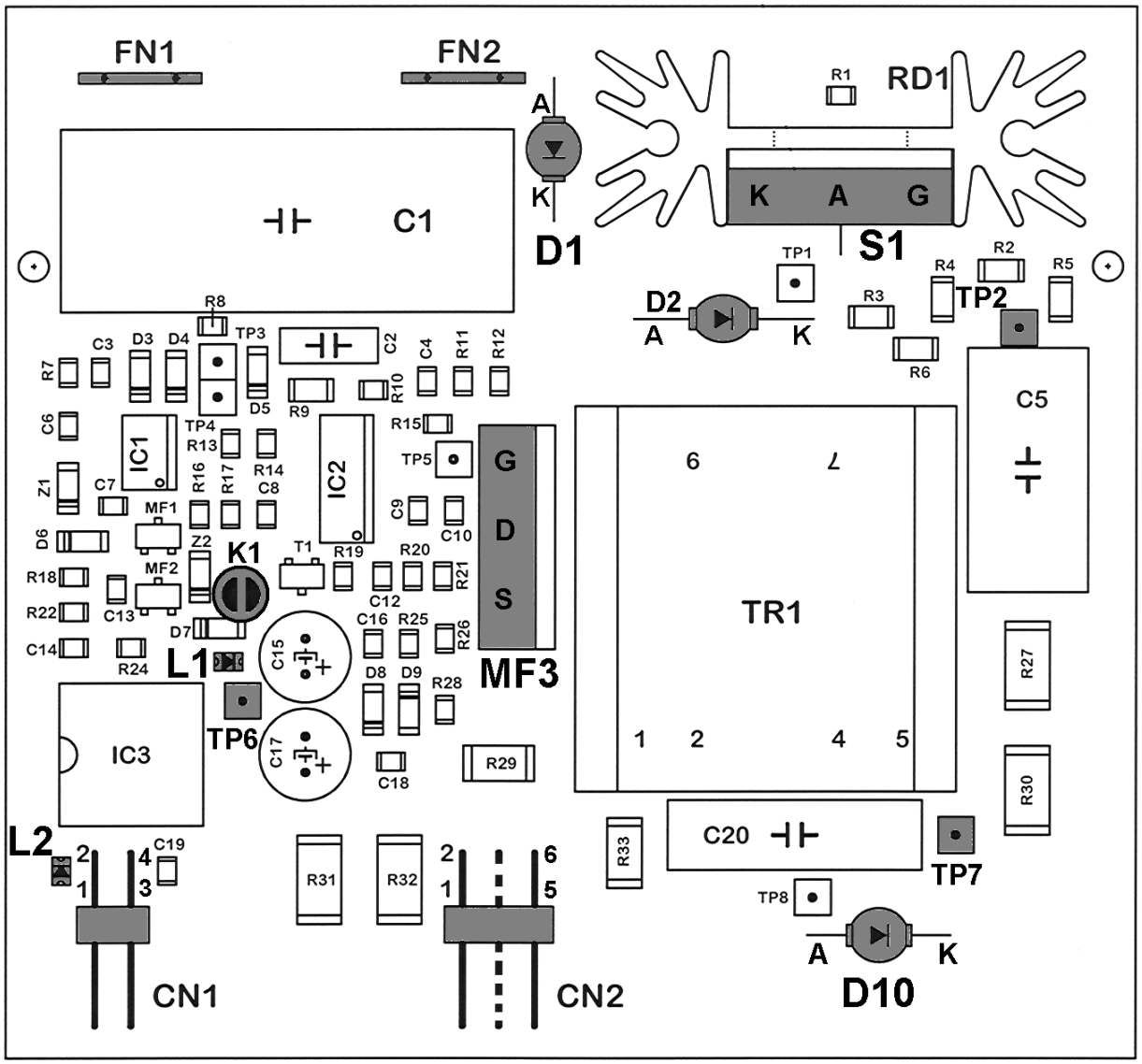
Power supply	Fuse*	Related circuit
V1	-	Inverter input voltage, HF & Superimposition high voltage power supply input
V4, V5	F5, F6	Remote control
V6, V6b, V6c	F9	Main positive supply (welding & inverter control logic, Hall probe, thermal alarm, power source fan, gas solenoid valve, water unit fan WU21 & pump relay, HF & AC superimposition)
V8c	F7	Negative auxiliary power supply (welding logic, alarms, auxiliary fan, power source fans control and WU21 and water pump power supply relay)
V9, V10, V11, V12	-	Secondary inverter IGBT driver (AC stage)
V13	-	HF & Overimposition boards high voltage auxiliary power supply control
V14	-	HF & Overimposition boards command
V15	-	- (power supply not used)
V16	-	High voltage power supply for HF and Overimposition boards

* **Note:** fuses are located on Aux. Power Supply PC board 15.14.271 (see related section above).

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.8) HF PC board 15.14.286

This board generates a series of impulses in high voltage which are used to remote-spark the arc in the TIG AC and DC procedures.



Weld switching point configuration (factory setting, the switching point is located on the welding side of the board):
K1 = OPEN

N.B.: in the machines produced prior to 2003, K1 is closed.

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

Functional part	Generator / Mode	Component	Test point	Value	Notes
Aux. power supply	**OFF**	MF3	S ← D S ← G	+0.4Vdc 10kΩ	
		D10	A ← K	+0.5Vdc	
HF output	OFF	S1	G ← K	13Ω	
		D1	A ← K	+0.5Vdc	
		D2	A ← K	+0.5Vdc	
Input power	**ON**		TP7 ← TP2	+400Vdc	V16
Aux. power supply	ON	L1 = LIT	TP6 ← TP2	+19Vdc	V17
HF command*	ON/TIG DC HF 2 step	L2 = OFF	CN1/2 ← CN1/4	0Vdc	Trigger released
		L2 = LIT		+3Vdc	Lasts 2 sec. after trigger on**

* **CAUTION!** Before performing this measurement, disconnect the HF circuit (FN1 & FN2) in order to prevent injury to persons or damage to things due to HF discharges.

** **Note:** the command (+3Vdc) lasts approx. 2 sec. after the torch button has been pressed, but only if the arc is not sparked. If an output current is established during these 2 seconds, the command is immediately switched off. This test must therefore be performed without sparking, holding the torch in the air.

HINT for ease of measurement:

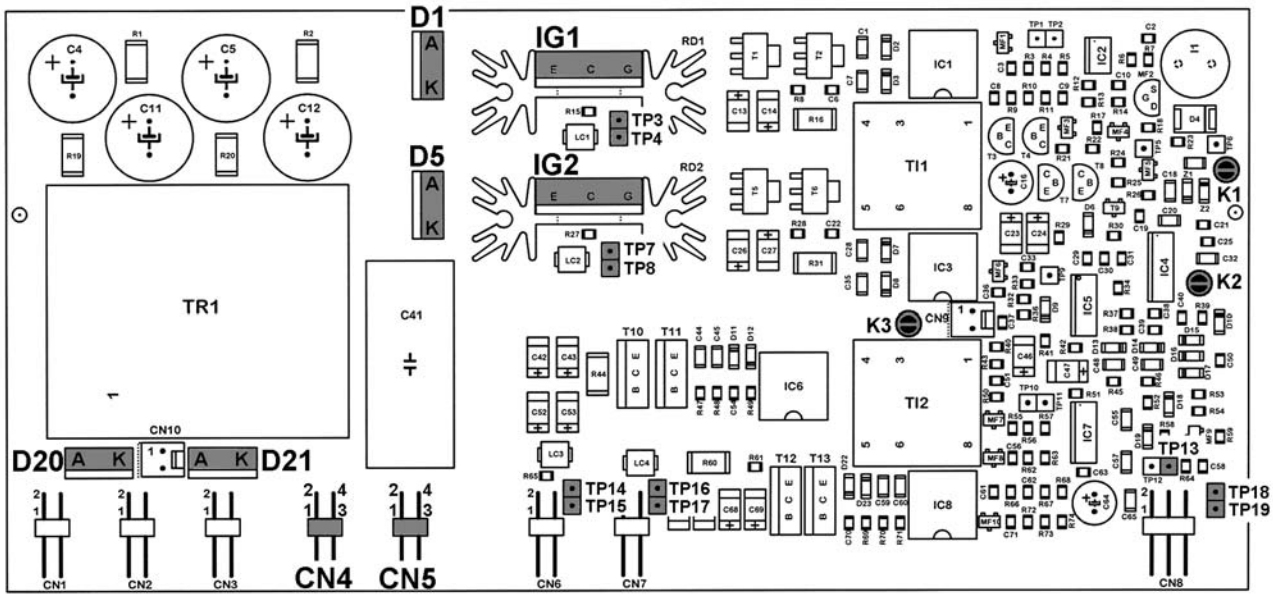
- CN1 can be reach also from solder side of pc board.

Power supply	Fuse*	Related circuit
V16	-	High voltage power supply for HF and Overimposition boards.
V17	-	HF board internal auxiliary power supply

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.9) AC driver & superimposition PC board 15.14.253

This board controls the status (on or off) of the secondary AC stage IGBTs and generates a series of impulses in high voltage (overimposition) that stabilise the arc during switching in TIG AC.



Weld switching point configuration (factory settings, all the switching points are on the welding side of the board):
K1 = CLOSED
K2 = CLOSED
K3 = CLOSED

Functional part	Generator / Mode	Component	Test point	Value	Notes
Superimposition	**OFF**	IG1	TP3 ← TP4	10kΩ Ω	
		D1	A ← K	+0.4Vdc V	
		IG2	TP7 ← TP8	10kΩ Ω	
		D5	A ← K	+0.4Vdc V	
		D20	A ← K	+0.2Vdc V	
		D21	A ← K	+0.2Vdc V	
Secondary inverter driver	OFF		TP15 ← TP14	10kΩ Ω	
			TP17 ← TP16	10kΩ Ω	
Aux. power supplies	**ON**/ STICK		CN4 ← CN5	+400Vdc V	V16
			TP19 ← TP18	+15Vdc V	V14
AC command	ON / STICK		TP13 ← TP18	+14Vdc V	
	ON / TIG AC		TP13 ← TP18	0Vdc V	Lasts 1 sec. with torch button pressed *
Secondary inverter driver	ON / STICK		TP15 ← TP14	-13Vdc V	
			TP17 ← TP16	+13Vdc V	
	ON / TIG AC		TP15 ← TP14	+13Vdc V	Lasts 1 sec. with torch button pressed *
			TP17 ← TP16	-13Vdc V	

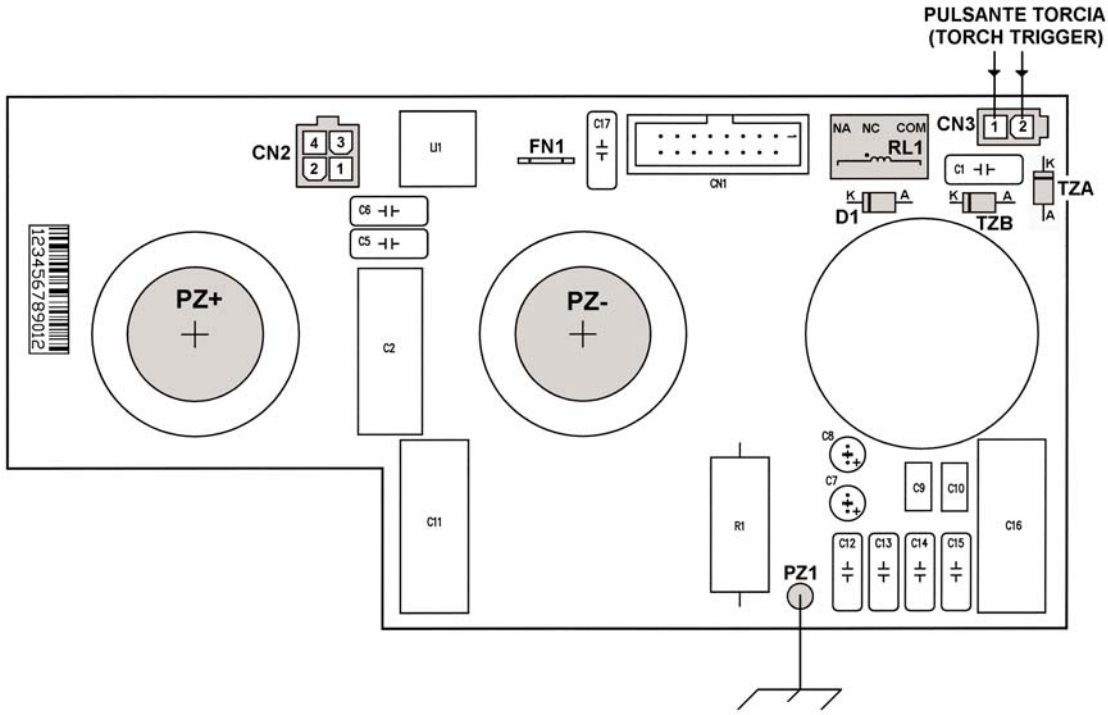
* **Note:** the command (0Vdc) lasts approximately 1 sec. after the torch button has been pressed. This test must be performed without sparking the arc, holding the torch in the air.

HINT for ease of measurement:
- CN4, CN5 can be reached also from solder side of pc board.

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.10) Output filter PC board 15.14.322

This board contains the torch button interface relay and a series of EMC and HF anti-return filters.



WARNING!
PZ1 must always be earthed!

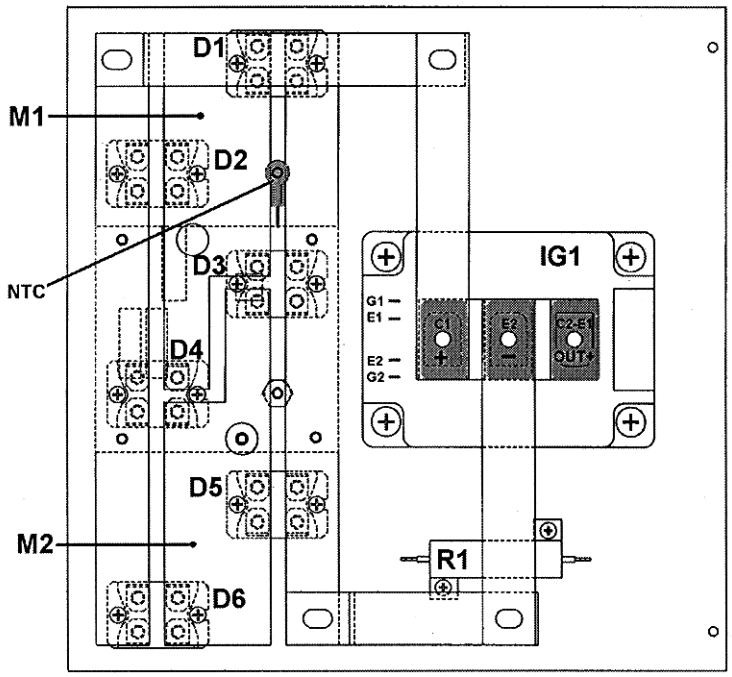
HALL EFFECT OUTPUT CURRENT PROBE CONNECTOR CN2:
pin 1 wire n° 3 output
pin 2 wire n° 4 GND
pin 3 wire n° 2 -15Vdc
pin 4 wire n° 1 +15Vdc

Functional part	Generator / Mode	Component	Test point	Value	Notes
Torch trigger	**OFF**	D1 D1	A ◄— K K ◄— A	+0.5Vdc ⏚ 1.5 kΩ Ω	
Torch trigger	**ON** (trigger released)	(RL1 coil)	CN3/2 ◄—CN3/1*	+30Vdc V	V3
Output voltage	ON/ STICK		PZ+ ◄— PZ-	+80Vdc ± 15% V	
Output current	ON/ TIG	Hall effect current probe	CN2/4 ◄— CN2/2 CN2/3 ◄— CN2/2 CN2/1 ◄— CN2/2	+15Vdc V -15Vdc V +2.3Vdc V welding to 300A	V6a V8b

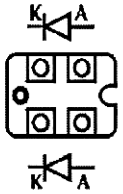
* **Note:** this measurement can also be performed directly between pins 5 ◄—3 of the central torch fitting (see previous sec. 5.4).

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

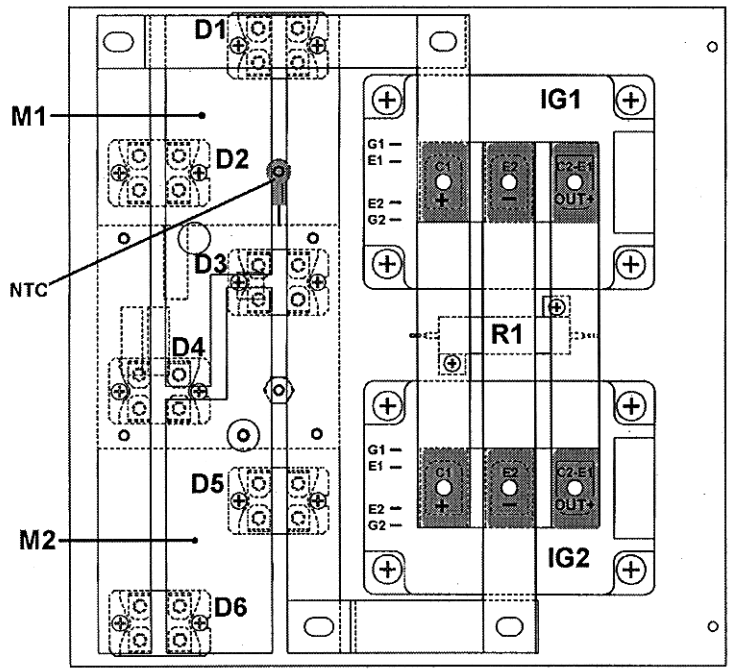
9.11) Secondary rectifier & AC inverter



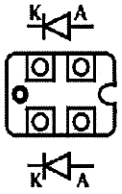
GENESIS 302 AC/DC



RIFERIMENTO
DI MONTAGGIO
LANDMARK FOR
ASSEMBLAGE



GENESIS 382 AC/DC



RIFERIMENTO
DI MONTAGGIO
LANDMARK FOR
ASSEMBLAGE

Power dioedes module replacing instructions:
- MOUNTING: use torque screw driver @ 1.7 Nxm (15 lbxin)
- TERMINALS: use torque screw driver @ 1.7 Nxm (15 lbxin)
- use thermal grease as necessary.

Power IGBT module replacing instructions:
- MOUNTING: use torque screw driver @ 3.5 Nxm (30 lbxin)
- TERMINALS: use torque screw driver @ 4.5 Nxm (40 lbxin)
- use thermal grease as necessary.

Anyway, in case of secondary rectifier/inverter failure use of replacement kit 14.60.080 (Genesis 302 AC/DC) or kit 14.60.081 (Genesis 382 AC/DC)(see also "PCBards location" section above).

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

Functional part	Generator / Mode	Component	Test point	Value	Notes
Secondary rectifier	**OFF**	D1...D6	- ← +	+0.4Vdc	
			- ← M1	+0.2Vdc	
			- ← M2	+0.2Vdc	
			M1 ← +	+0.2Vdc	
			M2 ← +	+0.2Vdc	
AC inverter	OFF	IG1, IG2	OUT+ ← +	+0.3Vdc	
			- ← OUT+	+0.3Vdc	
			G1 ← E1	10kΩ	
			G2 ← E2	10kΩ	
Clamp resistor	OFF	R1		4.7kΩ	
Secondary rectifier	**ON**/STICK	D1...D6	+ ← -	+160Vdc ± 15%	
AC inverter	ON/STICK	IG1	G1 ← E1	+18Vdc	
			G2 ← E2	-18Vdc	
		IG2	G1 ← E1	+18Vdc	
			G2 ← E2	-18Vdc	
			OUT+ ← -	+160Vdc ± 15%	

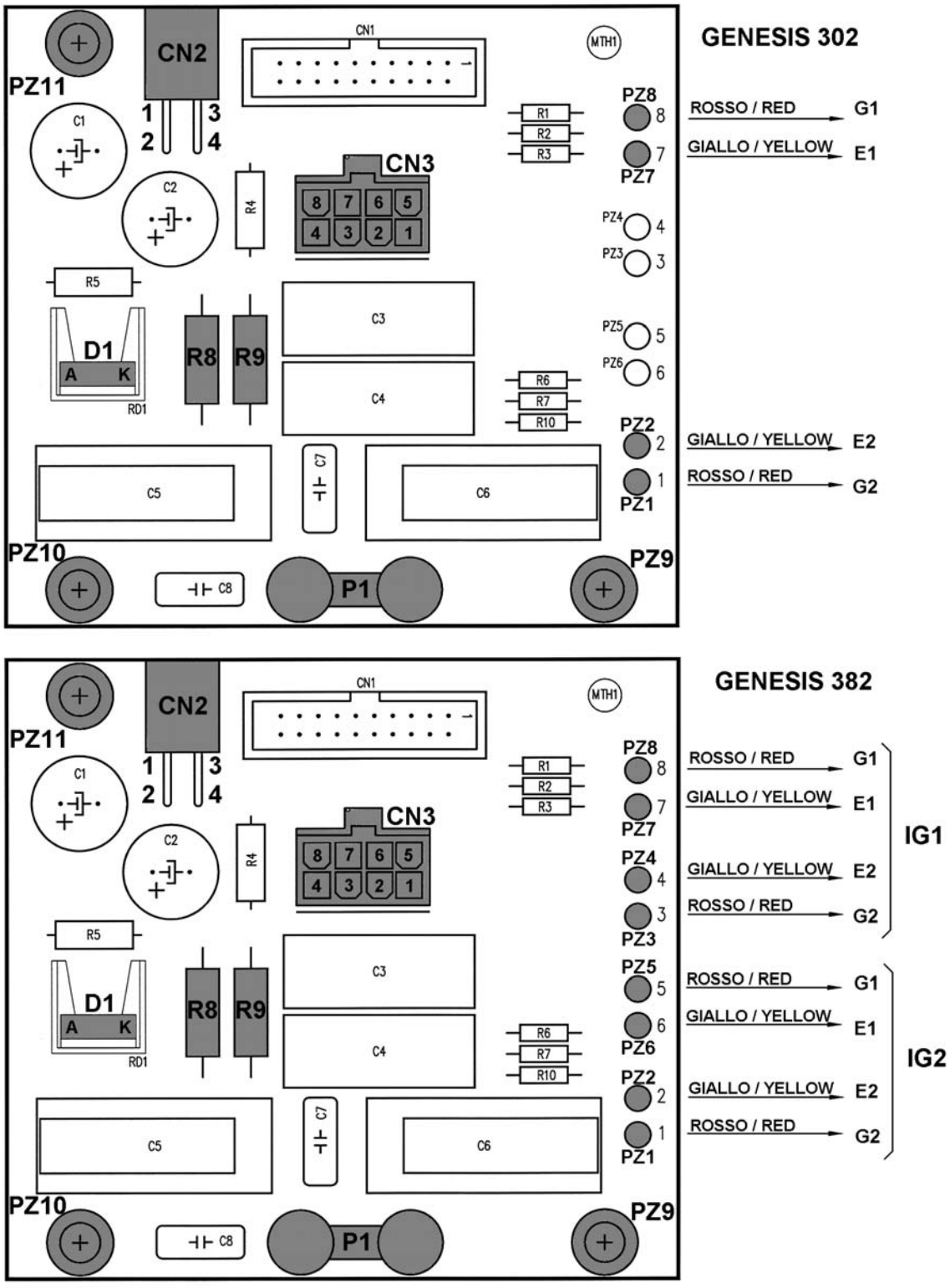
NOTE: Values below are referred to each sigle component tested alone (without any connection); any other other value in this page is referred to normal conditions (with all connections correctly made).

DIODE	D1...D6	A ← K	+0.3Vdc	
IGBT MODULE	IG1, IG2	C2-E1 ← C1	+0.4Vdc	
		E2 ← C2-E1	+0.4Vdc	
		G1 ← C2-E1	∞Ω	
		G1 ← C1	∞Ω	
		G2 ← E2	∞Ω	
		G2 ← C2-E1	∞Ω	

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.12) Clamp PC board 15.14.323

This board filters any disturbances on the rectifier and secondary AC stage.



NOTES:
- PZ9, PZ10, PZ11 are to be electrically connected to power copper bars, well tighten screws needed

WARNING!
- P1 must always be connected to the earth protection (via the metal spacer and the dissipator).
- P1 (brass jumper) must be always close

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

Functional part	Generator / Mode	Component	Test point	Value	Notes
Clipping diode	**OFF**	D1	A ◄— K	+0.4Vdc	
Limiting resistors	OFF	R8 // R9		0.5Ω	
Secondary thermal protection*	OFF		CN3/5 ◄—CN3/6	0Ω	
Secondary temp. sensing (NTC probe)	OFF		CN3/7 ◄—CN3/8	8kΩ @ 18°C T.A.	
AC drivers	OFF		PZ1 ◄—PZ2 PZ5 ◄—PZ6 PZ3 ◄—PZ4 PZ7 ◄—PZ8	10kΩ 10kΩ 10kΩ 10kΩ	
Secondary rectifier output	**ON**/STICK		CN2/1 ◄— CN2/4	+160Vdc ± 15%	
AC drivers	ON/STICK		PZ1 ◄— PZ2 PZ5 ◄— PZ6 PZ3 ◄— PZ4 PZ8 ◄— PZ7	-18Vdc +18Vdc -18Vdc +18Vdc	

*** Notes:**

- power source fan depends mainly on NTC probe located on secondary heatsink (see previous section)
- power source fan can also be activated by NC1 probe located on Pre-regulator pc board 15.14.321(see related section above)
- The WU21 cooling unit fan is activated together with the cooling fluid pump (they are activated simultaneously during TIG welding, independently of any temperature condition).
  N.B.: the cooling unit operating time after the end of welding can be set from Set-up (see parameter 16 in the previous specific section).
- The thermal alarms depend only on the primary and secondary thermal protections (they do not depend on the NTC sensors, see also previous sec. 7.3).

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

9.13) Output current calibration (delivered and displayed)

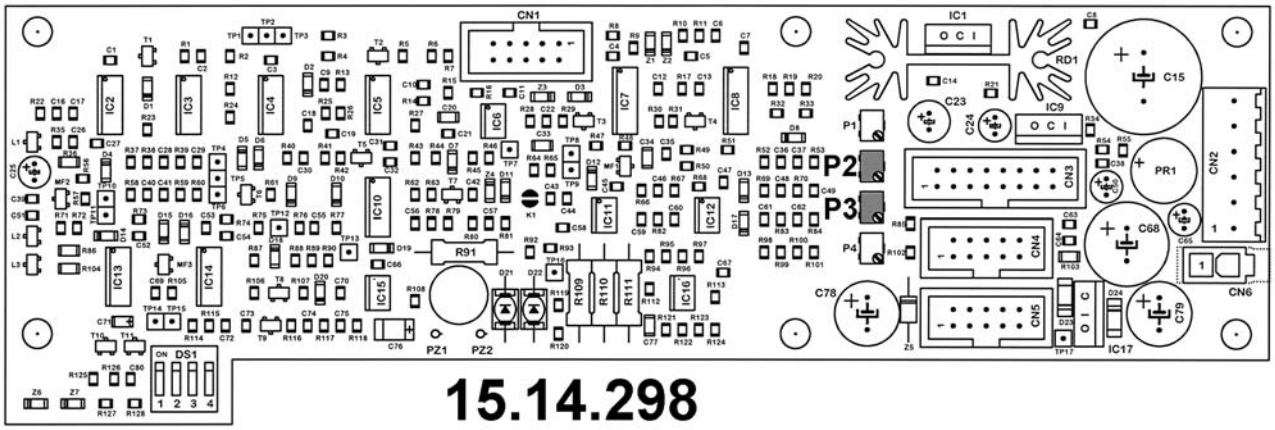
WARNING!
Use of a grid load or striking a TIG arc is required to perform calibration!
Exthernal accurate measurement of actual output current is required!
You are advised to use an ammeter clamp with class 2 minimum rating, accurately calibrated (calibration certificate issued no more than 12 months previously).
Using a grid load, output voltage measurement is required, too.

WARNING!
Output current calibration could be required only in one of the following cases:
- inverter group replacing
- front panel replacing
- pre-regulator pc board replacing
- replacement of Hall-effect current probe

Due to all spare parts being factory setted & calibrated, "calibration procedure" should be perfomed only once the failure has been removed, the power source is proven to work correctly and a deviation of more than 10A is find in delivered and/or displayed output current!

In case of incorrect calibration performing, the machine will deliver a totally wrong current during welding and damages could occur to the welding power source itself!

Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!



To perform calibration of the power source G302 [the data in brackets refer to the G382], follow the procedure below:

1. be sure to have correctly replaced the damaged part and that the unit has been correctly repaired & tested; a "Master Reset" sould also have been performed through setup parameter 99 (see related section in the following)
2. disconnect FN1/FN2 from HF pc board 15.14.286 output to prevent HF discharge damaging exthernal measuring instrument
3. connect the unit to the mains
4. switch the unit on
5. select TIG DC 4 STEP mode and set output current @ 300A (380A) by turning the knob on front panel
6. press the torch button and connect a static load of approx. 0.070 Ω 10'000W (21V@300A) [26V@380A] or spark a TIG arc with scratch start (spark on a suitably sized piece of iron, to prevent overheating, and then fix the torch to a support to keep it in position): the power source should deliver approx. 300 [380] ± 10 A and approx. "300" ["380"] should be shown on the display as the actual output current
7. measure the effective output current with an accurately calibrated ammeter clamp

   BE CAREFUL WITH CORRECT IDENTIFICATION OF THE TRIMMERS: P4 MAY NOT BE FITTED.

8. **current displayed:** in this step figures displayed on control panel will not change while real output current changes by adjusting P3 trimmer: adjust P3 trimmer on resonant inverter control PCB 15.14.298 until value showed by external clamp ammeter matches the value showed on control panel (this value is the real output current and could be different from 300 [380] value set at step 5 above)

9. **current delivered:** in this step figures displayed on control panel and those displayed on external clamp ammeter change simultaneously (they still match) and max output current is adjusted by P2 trimmer: adjust P2 trimmer on resonant inverter control PCB 15.14.298 until 300A [380A] is displayed on both control panel and external clamp ammeter.

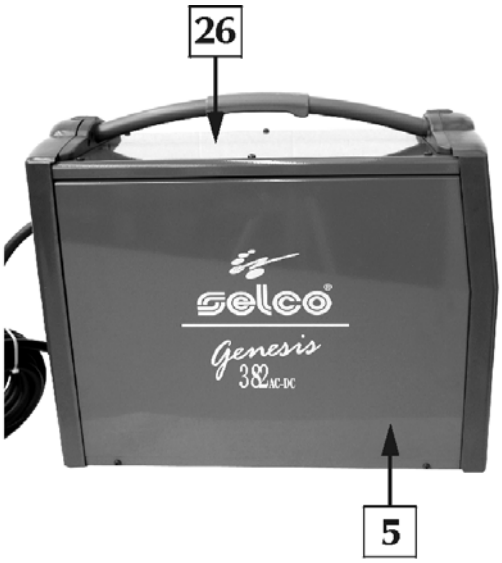
10. press the torch button again and disconnect any static load
11. switch the power source off, seal the trimmers P2 & P3, reconnect FN1 and FN2 on the HF board and re-close the power source
12. perform some TIG AC welding tests to check correct operation of the power source

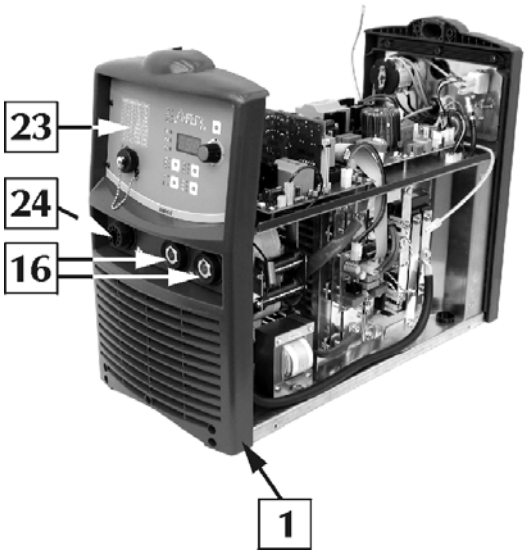
WARNING!
P2 & P3 are very sensitive trimmers, thus little adjustaments will cause large output current variations!

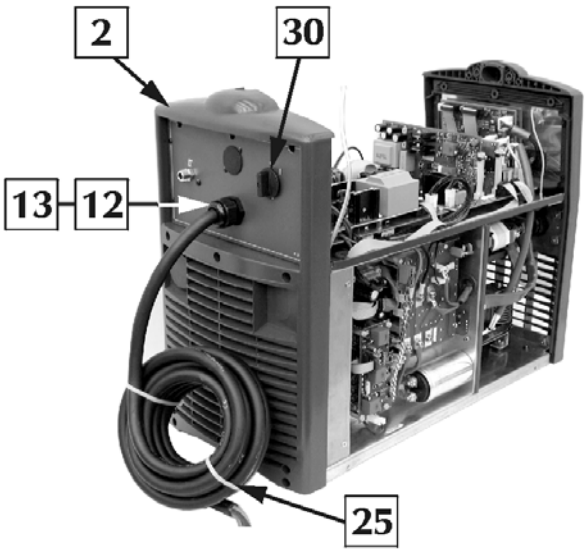
Unless specified otherwise, all the measurements must be taken with the boards fitted, together with their connections!

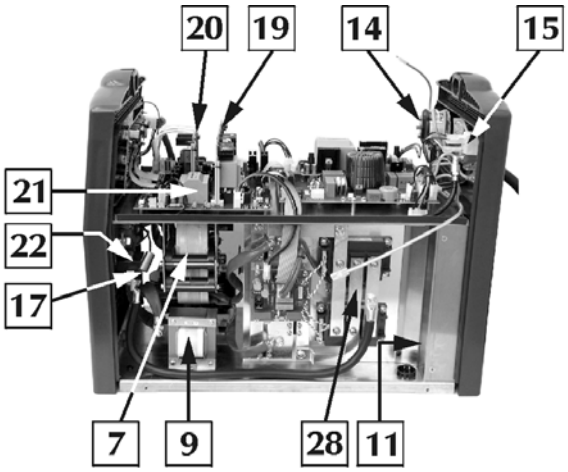
10) AVAILABLE SPARE PARTS

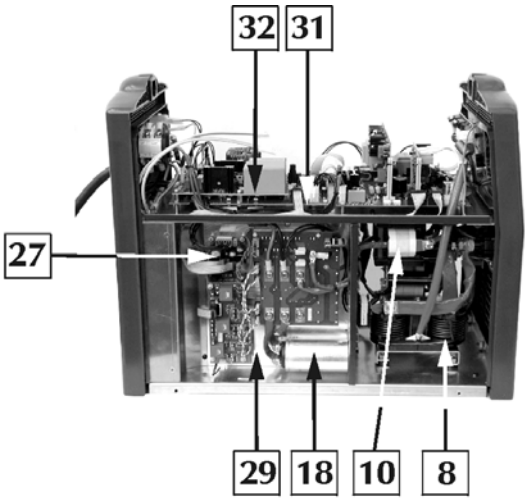
55.08.030 GENESIS 302 AC/DC
55.08.038 GENESIS 382 AC/DC

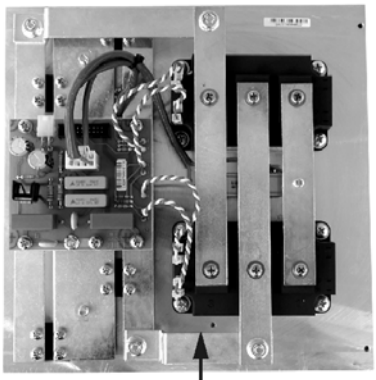


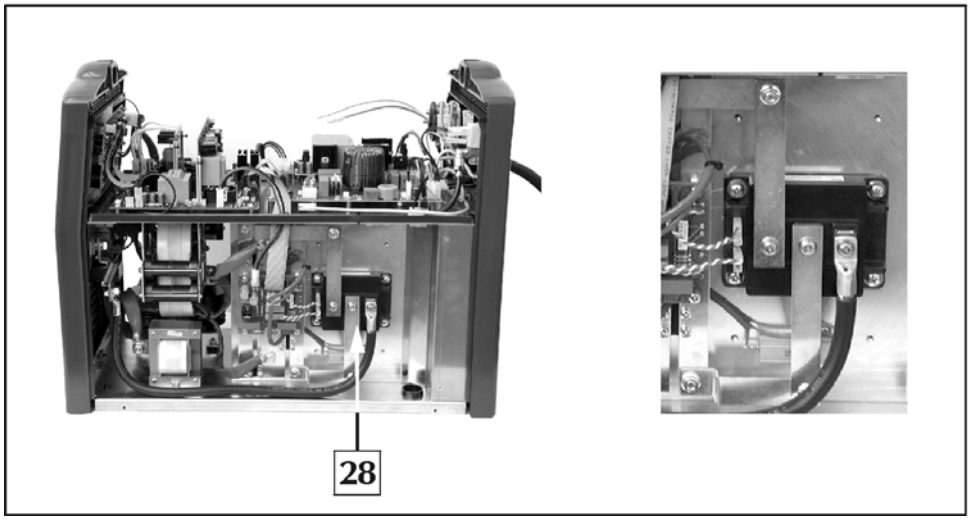












← G 302 AC/DC

ITALIANO

POS.	DESCRIZIONE	CODICE
1	Pannello plastico frontale	01.04.271
2	Pannello plastico posteriore	01.05.225
3	Manico	01.15.038
4	Chiusura manico	01.15.039
5	Pannello laterale destro serigrafato (G 302 AC/DC)	03.07.104
	Pannello laterale destro serigrafato (G 382 AC/DC)	03.07.106
6	Pannello laterale sinistro serigrafato (G 302 AC/DC)	03.07.105
	Pannello laterale sinistro serigrafato (G 382 AC/DC)	03.07.107
7	Trasformatore	05.02.028
8	Trasformatore H.F.	05.03.011
9	Induttanza di livellamento	05.04.226
10	Induttanza risonante	05.04.208
11	Ventilatore	07.11.010
12	Pressacavo	08.22.012
13	Controdado	08.22.013
14	Interruttore	09.01.011
15	Elettrovalvola	09.05.003
16	Presa fissa	10.13.020
17	Sensore Hinode	11.19.003
18	Condensatore	12.03.020
19	Scheda controllo	15.14.253
20	Scheda HF	15.14.286
21	Scheda pre-regolatore	15.14.321
22	Scheda filtro uscita	15.14.322
23	Pannello comandi FP164 (contiene scheda 15.14.324)	15.22.164
24	Adattatore	19.06.101
25	Cavo alimentazione	49.04.058
26	Cofano superiore	01.02.092
27	Scheda logica risonante	15.14.298
28	Gruppo inverter secondario (G 302 AC/DC)	14.60.080
	Gruppo inverter secondario (G 382 AC/DC) (contiene scheda 15.14.323, componenti di potenza e radiatore)	14.60.081
29	Gruppo inverter primario (G 302 AC/DC)	14.60.078
	Gruppo inverter primario (G 382 AC/DC) (contiene schede 15.14.200, 15.14.176, 15.14.298, 15.14.241, componenti di potenza e radiatore)	14.60.079
30	Manopola	09.11.009
31	Scheda filtro ingresso	15.14.269
32	Scheda alimentazione	15.14.271

ENGLISH

POS.	DESCRIPTION	CODE
1	Front plastic panel	01.04.271
2	Rear plastic panel	01.05.225
3	Handle	01.15.038
4	Fastener handle	01.15.039
5	Side panel right (G 302 AC/DC)	03.07.104
	Side panel right (G 382 AC/DC)	03.07.106
6	Side panel left (G 302 AC/DC)	03.07.105
	Side panel left (G 382 AC/DC)	03.07.107
7	Transformer	05.02.028
8	H.F. transformer	05.03.011
9	Leveling inductance	05.04.226
10	Resonant inductance	05.04.208
11	Fan	07.11.010
12	Cable clamp	08.22.012
13	Counter-nut	08.22.013
14	Switch	09.01.011
15	Solenoid valve	09.05.003
16	Fixed socket	10.13.020
17	Hinode sensor	11.19.003
18	Capacitor	12.03.020
19	Control P.C. board	15.14.253
20	HF board	15.14.286
21	Pre-adjuster board	15.14.321
22	Output filter board	15.14.322
23	Control panel FP164 (contains board 15.14.324)	15.22.164
24	Adapter	19.06.101
25	Supply cable	49.04.058
26	Upper cover	01.02.092
27	Resonant logic board	15.14.298
28	Secondary inverter unit (G 302 AC/DC)	14.60.080
	Secondary inverter unit (G 382 AC/DC) (contains board 15.14.323, power components and radiator)	14.60.081
29	Primary inverter unit (G 302 AC/DC)	14.60.078
	Primary inverter unit (G 382 AC/DC) (contains boards 15.14.200, 15.14.176, 15.14.298, 15.14.241, power components and radiator)	14.60.079
30	Turn-Knob	09.11.009
31	Input filter board	15.14.269
32	Supply board	15.14.271

DEUTSCH

POS.	BESCHREIBUNG	CODE
1	Stirnplastiktafel	01.04.271
2	Hintere Plastkatel	01.05.225
3	Griff	01.15.038
4	Griffverschluss	01.15.039
5	Seitenteil rechts (G 302 AC/DC)	03.07.104
	Seitenteil rechts (G 382 AC/DC)	03.07.106
6	Seitenteil links (G 302 AC/DC)	03.07.105
	Seitenteil links (G 382 AC/DC)	03.07.107
7	Transformator	05.02.028
8	Transformator H.F.	05.03.011
9	Drosselspule	05.04.226
10	Resonanzinduktanz	05.04.208
11	Ventilator	07.11.010
12	Kabelklemme	08.22.012
13	Gegenmutter	08.22.013
14	Schalter	09.01.011
15	Elektroventil	09.05.003
16	Feste Steckdose	10.13.020
17	Sensor Hinode	11.19.003
18	Kondensator	12.03.020
19	Steuerungsplatine	15.14.253
20	HF-Platine	15.14.286
21	Voreinstellplatine	15.14.321
22	Ausgangfilterplatine	15.14.322
23	Bedienungsfeld FP164 (enthält die platine 15.14.324)	15.22.164
24	Adapter	19.06.101
25	Speisekabel	49.04.058
26	Obere Haube	01.02.092
27	Resonanzlogikplatine	15.14.298
28	Sekundaer-invertereinheit (G 302 AC/DC)	14.60.080
	Sekundaer-invertereinheit (G 382 AC/DC) (enthält die platine 15.14.323, Leistungsteile und Kuehler)	14.60.081
29	Primaer-invertereinheit (G 302 AC/DC)	14.60.078
	Primaer-invertereinheit (G 382 AC/DC) (enthält die platinen 15.14.200, 15.14.176, 15.14.298, 15.14.241, Leistungsteile und Kuehler)	14.60.079
30	Drehknopf	09.11.009
31	Eingangsfilterplatine	15.14.269
32	Speiserplatine	15.14.271

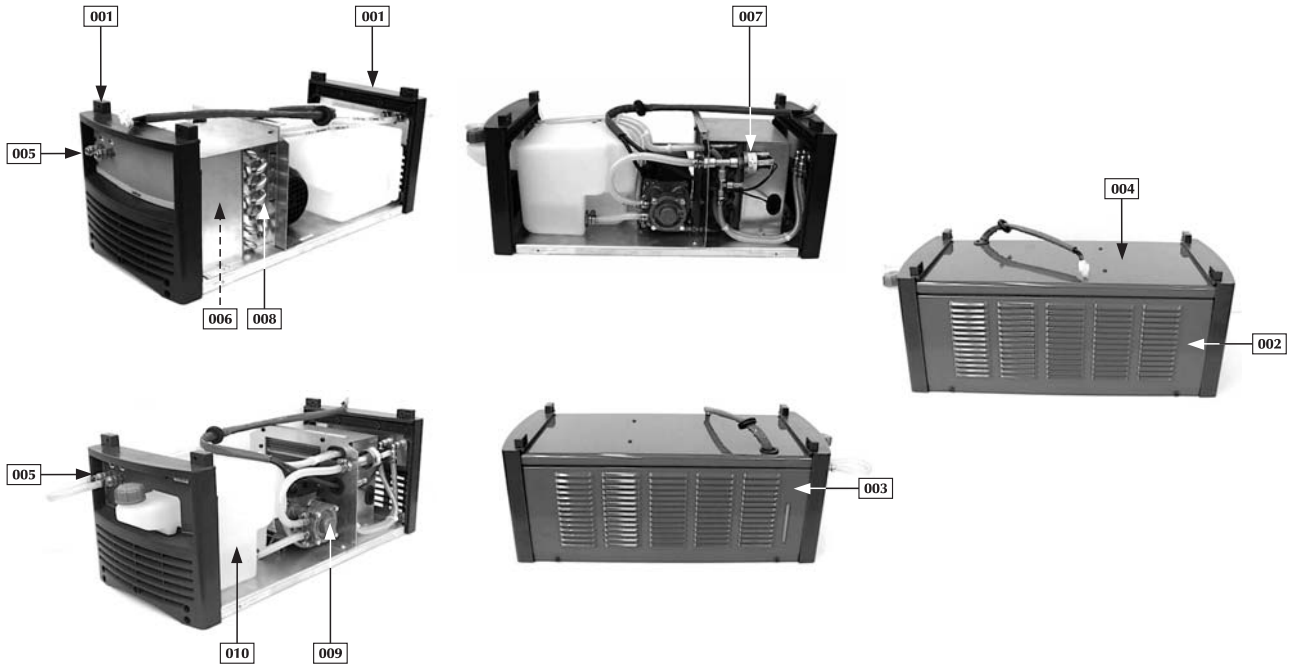
FRANÇAIS

POS.	DESCRIPTION	CODE
1	Panneau plastique antérieur	01.04.271
2	Panneau plastique postérieur	01.05.225
3	Poignee	01.15.038
4	Fermeture du poignee	01.15.039
5	Panneau lateral droite avec serigraphie (G 302 AC/DC)	03.07.104
	Panneau lateral droite avec serigraphie (G 382 AC/DC)	03.07.106
6	Panneau lateral gauche avec serigraphie (G 302 AC/DC)	03.07.105
	Panneau lateral gauche avec serigraphie (G 382 AC/DC)	03.07.107
7	Transformateur	05.02.028
8	Transformateur H.F.	05.03.011
9	Inductance d'écrêtage	05.04.226
10	Inductance resonnante	05.04.208
11	Ventilateur	07.11.010
12	Serre-cable	08.22.012
13	Ecrou de blocage	08.22.013
14	Disjoncteur	09.01.011
15	Soupape electrique	09.05.003
16	Prise fixe	10.13.020
17	Capteur Hinode	11.19.003
18	Condensateur	12.03.020
19	Platine de control	15.14.253
20	Platine H.F.	15.14.286
21	Platine pré-régulateur	15.14.321
22	Platine filtre sortie	15.14.322
23	Panneau de reglage FP164 (il contient la platine 15.14.324)	15.22.164
24	Adaptateur	19.06.101
25	Câble d'alimentation	49.04.058
26	Capot supérieur	01.02.092
27	Platine logique resonance	15.14.298
28	Groupe onduleur secondaire (G 302 AC/DC)	14.60.080
	Groupe onduleur secondaire (G 382 AC/DC) (il contient la platine 15.14.323, composants de puissance et radiateur)	14.60.081
29	Groupe onduleur primaire (G 302 AC/DC)	14.60.078
	Groupe onduleur primaire (G 382 AC/DC) (il contient la platines 15.14.200, 15.14.176, 15.14.298, 15.14.241, composants de puissance et radiateur)	14.60.079
30	Bouton	09.11.009
31	Platine filtre d'entrée	15.14.269
32	Platine alimentateur	15.14.271

ESPAÑOL

POS.	DESCRIPCION	CODIGO
1	Panel plástico anterior	01.04.271
2	Panel plástico posterior	01.05.225
3	Mango	01.15.038
4	Cierre mango	01.15.039
5	Panel lateral derecho con serigrafia (G 302 AC/DC)	03.07.104
	Panel lateral derecho con serigrafia (G 382 AC/DC)	03.07.106
6	Panel lateral izquierdo con serigrafia (G 302 AC/DC)	03.07.105
	Panel lateral izquierdo con serigrafia (G 382 AC/DC)	03.07.107
7	Transformador	05.02.028
8	Transformador H.F.	05.03.011
9	Bobina de inductancia stabilizadora de corriente	05.04.226
10	Inductancia resonante	05.04.208
11	Ventilador	07.11.010
12	Abrazadera	08.22.012
13	Contratuerca	08.22.013
14	Interruptor	09.01.011
15	Electroválvula	09.05.003
16	Enchufe fija	10.13.020
17	Captador Hinode	11.19.003
18	Condensador	12.03.020
19	Tarjeta de control	15.14.253
20	Tarjeta H.F.	15.14.286
21	Tarjeta pre-regulador	15.14.321
22	Tarjeta filtro salida	15.14.322
23	Panel de control FP164 (contiene la tarjeta 15.14.324)	15.22.164
24	Adaptador	19.06.101
25	Cable de alimentación	49.04.058
26	Cofre superior	01.02.092
27	Tarjeta logica resonancia	15.14.298
28	Grupo inverter secundario (G 302 AC/DC)	14.60.080
	Grupo inverter secundario (G 382 AC/DC) (contiene la tarjeta 15.14.323, componentes de potencia y radiador)	14.60.081
29	Grupo inverter primario (G 302 AC/DC)	14.60.078
	Grupo inverter primario (G 382 AC/DC) (contiene la tarjetas 15.14.200, 15.14.176, 15.14.298, 15.14.241, componentes de potencia y radiador)	14.60.079
30	Boton	09.11.009
31	Tarjeta filtro entrada	15.14.269
32	Tarjeta alimentacion	15.14.271

71.03.021 WU 21



ITALIANO

POS.	DESCRIZIONE	CODICE
001	Pannello plastico frontale e posteriore	01.04.273
002	Pannello laterale DX	01.03.034
003	Pannello laterale SX	01.03.035
004	Cofano superiore	01.02.090
005	Attacco rapido acqua	19.50.043
006	Ventilatore	07.10.020
007	Pressostato	09.08.002
008	Radiatore	18.81.002
009	Pompa	07.23.004
010	Serbatoio	20.04.039

ENGLISH

POS.	DESCRIPTION	CODE
001	Plastic front/rear panel	01.04.273
002	Side panel right	01.03.034
003	Side panel left	01.03.035
004	Upper cover	01.02.090
005	Water rapid connector	19.50.043
006	Fan	07.10.020
007	Pressure switch	09.08.002
008	Condensator	18.81.002
009	Pump	07.23.004
010	Reservoir	20.04.039

DEUTSCH

POS.	BESCHREIBUNG	CODE
001	Stirnplastiktafel, Hintereplastiktafel	01.04.273
002	Seitenteil rechte	01.03.034
003	Seitenteil links	01.03.035
004	Obere Haube	01.02.090
005	Wasserschnellanschluss	19.50.043
006	Ventilator	07.10.020
007	Druckschalter	09.08.002
008	Kueler	18.81.002
009	Pumpe	07.23.004
010	Tank	20.04.039

FRANÇAIS

POS.	DESCRIPTION	CODE
001	Panneau plastique antérieur/postérieur	01.04.273
002	Panneau lateral droite	01.03.034
003	Panneau lateral gauche	01.03.035
004	Capot supérieur	01.02.090
005	Connecteur rapide eau	19.50.043
006	Ventilateur	07.10.020
007	Pressostat	09.08.002
008	Radiateur	18.81.002
009	Pompe	07.23.004
010	Réservoir	20.04.039

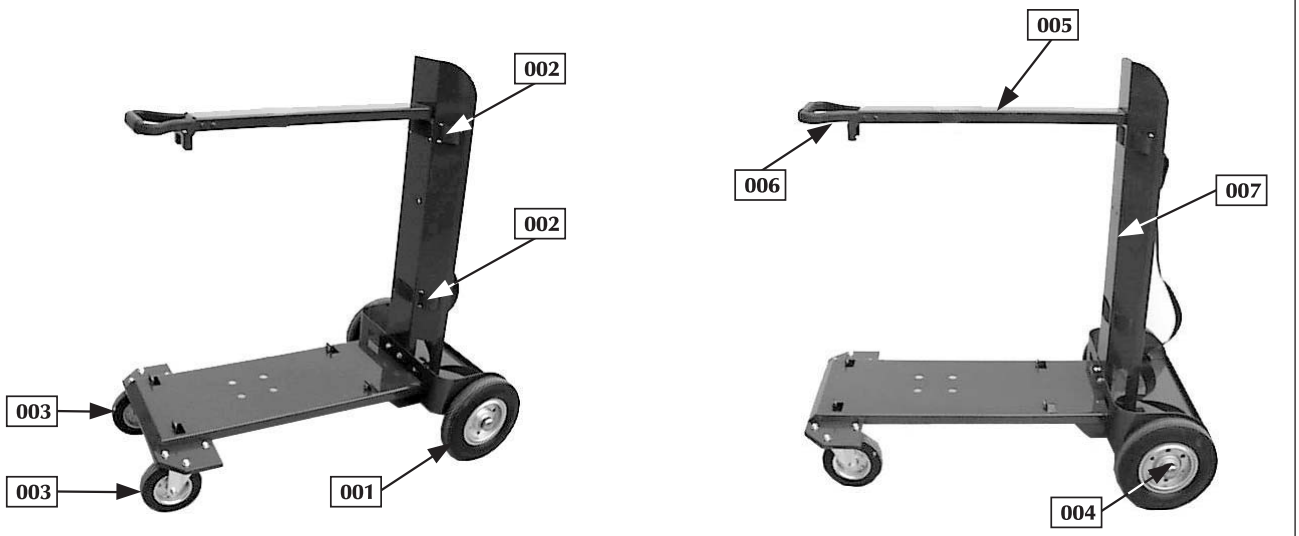
ESPAÑOL

POS.	DESCRIPCION	CODIGO
001	Panel plastico frontal y posterior	01.04.273
002	Panel lateral derecho	01.03.034
003	Panel lateral izquierdo	01.03.035
004	Cofre superior	01.02.090
005	Enchufe rapido agua	19.50.043
006	Ventilador	07.10.020
007	Presostato	09.08.002
008	Radiador	18.81.002
009	Bomba	07.23.004
010	Tanque	20.04.039

18.91.001 COOLING FLUID

Note on cooling fluid:
- mixture ready for use - do not dilute
- do not mix or replace with other products or additives

71.03.02301 **Generator trolley GT23 TLH**



ITALIANO

POS.	DESCRIZIONE	CODICE
001	Ruota posteriore fissa	04.02.003
002	Cinghia	21.06.007
003	Ruota anteriore girevole	04.03.002
004	Cappuccio bloccaggio rapido	18.77.201
005	Base di ancoraggio	02.07.053
006	Maniglia	01.15.040
007	Supporto bombola	01.11.080

ENGLISH

POS.	DESCRIPTION	CODE
001	Fixed rear wheel	04.02.003
002	Belt	21.06.007
003	Swiveling front wheel	04.03.002
004	Rapid locking cap	18.77.201
005	Anchorage base	02.07.053
006	Handle	01.15.040
007	Cylinder support	01.11.080

DEUTSCH

POS.	BESCHREIBUNG	CODE
001	Hinteres Fixrad	04.02.003
002	Riemen	21.06.007
003	Vorderes Drehrad	04.03.002
004	Schnellsperrkappe	18.77.201
005	Verankerungsbasis	02.07.053
006	Griff	01.15.040
007	Flaschenhalter	01.11.080

FRANÇAIS

POS.	DESCRIPTION	CODE
001	Roue arriére fixe	04.02.003
002	Courroie	21.06.007
003	Roue avant pivotante	04.03.002
004	Couvercle à blocage rapide	18.77.201
005	Base d'ancrage	02.07.053
006	Poigneé	01.15.040
007	Support bouteille	01.11.080

ESPAÑOL

POS.	DESCRIPCION	CODIGO
001	Rueda trasera fija	04.02.003
002	Correa	21.06.007
003	Rueda delantera giratoria	04.03.002
004	Capuchón de bloqueo rápido	18.77.201
005	Base de anclaje	02.07.053
006	Mango	01.15.040
007	Soporte bombona	01.11.080