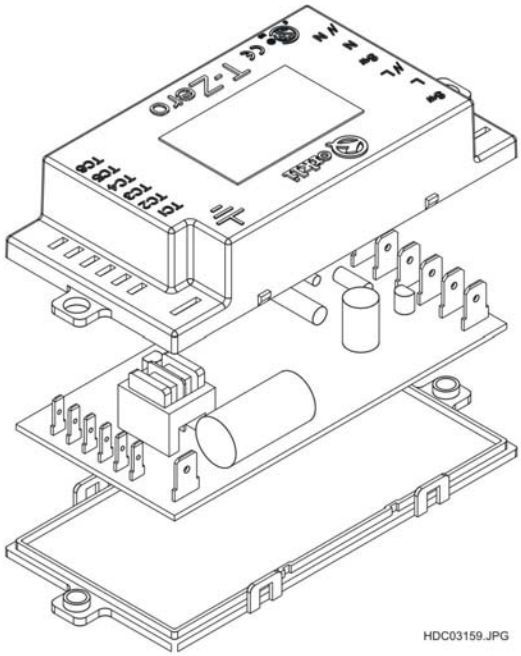
SERVICE MANUAL

COOKING



Built-in cooking hobs

T-ZERO
ELECTRONIC CONTROL

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CONTENTS

1 - INTRODUCTION

1.1 - PURPOSE OF THIS MANUAL

The purpose of this manual is to provide basic information about the T-Zero electronic control applied to cooking hobs.

1.2 - ESD - ELECTROSTATIC DISCHARGE AND ITS EFFECT ON THE COMPONENTS

The interface for the control unit is not fitted with an internal device to protect against electrostatic discharge. When effecting repairs, therefore, the service engineer must check for stabilization of the potential on the oven casing (i.e. discharge any static electricity by touching the oven casing) in order to prevent the possibility of overload, which might damage the circuit boards.
The same care is necessary when handling circuit boards supplied as spare parts (i.e. not yet fitted to the appliance), which must be removed from the protective bag in ESD only after stabilizing the potential (i.e. discharging any static electricity) and only then installed in the appliance.
Important: The theory behind the process of electrostatic charge and discharge is not discussed in this Manual, since the tangible effects are considered to be more important. However, the effects are felt frequently when touching a metal handle and feeling the electrostatic discharge in the form of a minor shock.
But what happens when stabilization of the potential takes place with semi-conductor components (i.e. components on a circuit board, such as integrated circuits, microprocessors etc.)?
Stabilization of the potential takes place across the internal structure of the semi-conductor component. This does not necessarily lead to the immediate destruction of the component; subsequent malfunctions across damaged internal connections may be more harmful, and these occur only as a result of overheating or current overloads.
It is true that almost all sensitive semi-conductor components (such as MOS circuits) have been improved by the addition of protective measures, but the internal structures of these components are today smaller than, for example, ten years ago, which tends to increase their sensitivity to the previous levels.

Important!

Which components are susceptible to damage by static electricity during repairs?
All circuit boards with control and command accesses (door switches, food probes etc.), exposed connections and microprocessors, and other circuits with that can be freely accessed.

Examples:

- Programming units connected to the food probe and the door switch
- Programming units whose processors are accessible (due to their high costs, the protective systems are only partially effective).
- W.O.E.C. control units
- S.O.E.C. control units
- C.H.E.C. control units
- KRONOS control units
- R.H.E.A. control units
- SOEC power board
- HOC2000 power board
- OVC1000 power board
- LEOC interface board

2 - WHAT IS THE T-ZERO ELECTRONIC CONTROL

2.1 - INTRODUCTION

The T-Zero electronic control has the function of reducing the control time for the switching on of the burners of a cooking hob. This system consists of an electronic board, controlled by microswitches, which controls the ignition generator and the tap magnets at the switching on of the burner.

2.2 - DESCRIPTION

This electronic holding-helper device has been specifically designed for providing gas cookers and ovens that use thermoelectric safety (thermocouples) with an instant lighting feature. The use of this T-Zero control allows one-push activation of burners, making the ignition instantaneous.

2.3 - MAIN FEATURES

The T-Zero system allows to ignite a gas burner with a simple “push-rotate and leave” action on the burner control knob. Traditional gas hobs burners needs a “push-rotate and keep on pushing” action on the burner control knob.
This means that with the Time Zero system, the thermocouple excitation time shall be “instantaneous”.
The magnet of the tap is still manually engaged, but the T-Zero system detecting, through the switch, the request to ignite the selected burner, sends to the magnet unit of the selected tap a temporized current signal for a fixed period of time, in order to keep the magnet unit engaged without waiting the thermocouple excitation time.

- One-push actuation (less than 600 milliseconds).
- Provides the gas safety valve with a holding current for 4,3 ± 15% seconds.
- Actuates the spark generator for 1,75 ± 20% seconds.
- Controls from 1 to 6 magnets.
- Maintains thermo-electrical safety feature.
- To be used for standard magnets and thermocouples.
- External ignition device control.
- In compliance with EN 298 (European standard for automatic gas burner control systems and flame detectors for gas burners).
- The T-Zero system will not work without power supply, but thermoelectric safety will be maintained and the application can be used with external ignition.
- Safety system: switch failure detection time: 6,75 ± 20% seconds.

2.4 - OPERATION CYCLE

This description relates to systems having standard operating cycle: this cycle begins when (almost) one of the micro of the catenary switches on.
When almost one of the catenary micro is closed (flame demand), the operating cycle begins.
While the switch is closed, all connected magnets are powered with a holding current and the spark generator is activated. In this way, **only the pushed magnet is hold**.
During this pushing time, the energy source will get charged, that is why this pushing time must be at least 600 milliseconds. The power supplied to the magnets is provided by an inherently limited source, thus improving the safety of the system.
Once the micro is released, the T-Zero system will continue to feed the magnet for 4,3 seconds and the spark generator for 1,75 seconds. When the 4,3 second temporization finishes, the safety source is completely discharged waiting for another operation cycle.
In order to avoid continuous activation failures another safety feature has been implemented. This feature blocks the system if continuous switch activation is detected during 6,75 seconds.

2.5 - TIMING DIAGRAM

The diagrams below show the timing for normal operation sequence and switch failure mode operation sequence respectively.

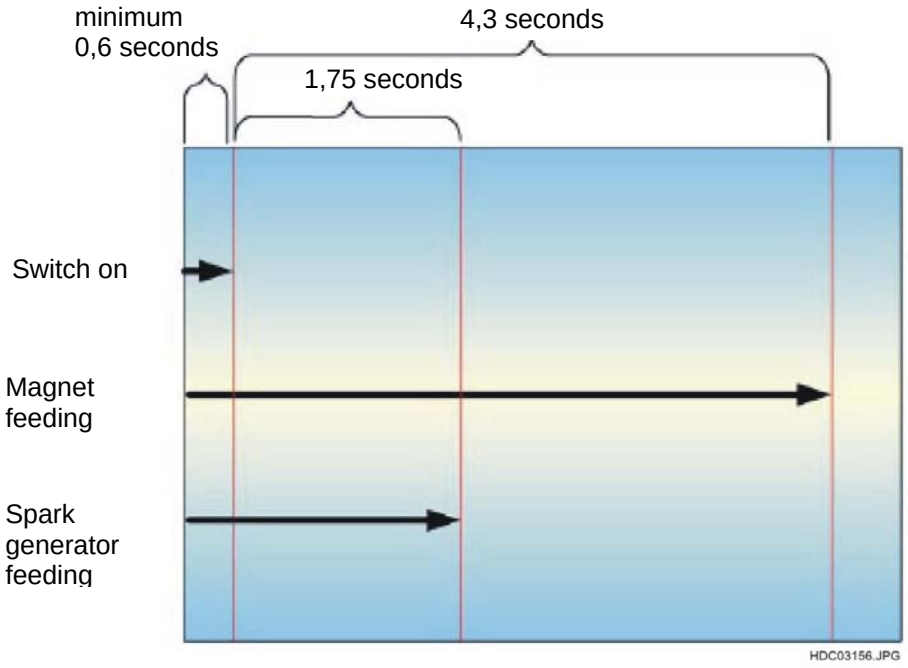

Fig. 1: Operating cycle diagram

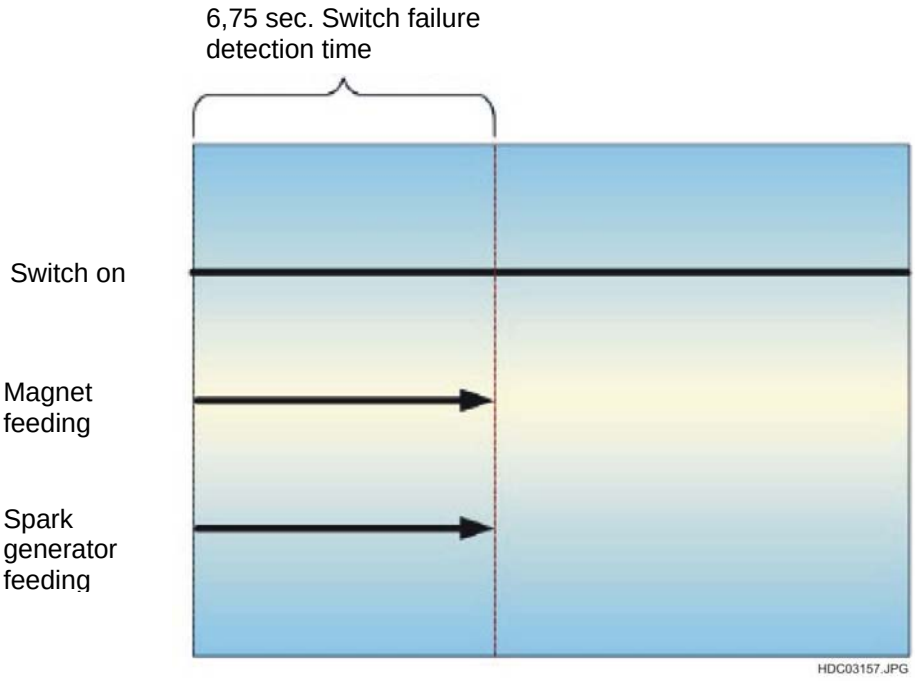

Fig. 2: Operating cycle diagram with continuous switch activation failure

2.6 - SAFETY FEATURES

The electronic device for quick ignition of cooking appliances provides a positive safety feature by supplying energy to the magnets from a limited energy source.
This source is not able to provide energy to magnets for more than few seconds.
In any case, any failure in the electronic control involving a discharge of the source would imply a limited feeding of the magnet.
The source is charged while any of the catenary switches is closet; therefore the magnet would be fed only during the time the switch is pressed and the mentioned limited time.
In order to protect the electronic control from short circuit failure of the switch, two preventing circuits have been implemented, which actuate when more than 6,75 seconds activations times are detected. In this way, the electronic circuit is protected from double failure of the components.

2.7 - BASIC CIRCUIT DIAGRAM

The system consists of various components and is represented in Fig. 3.

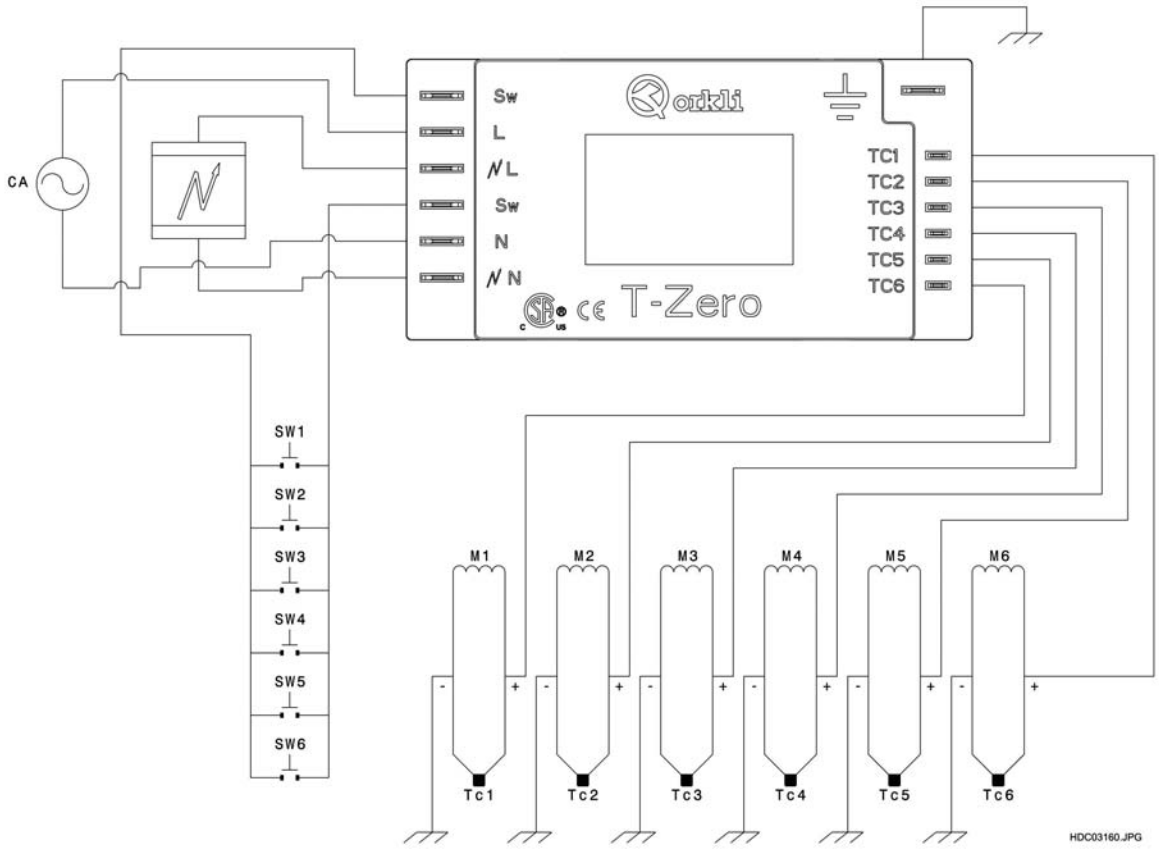

Fig.3

N	- SPARK GENERATOR	M4	- MAGNET OF THERMOCOUPLE 4
CA	- MAINS SUPPLY AT 230 V	M5	- MAGNET OF THERMOCOUPLE 5
Sw	- IGNITION CATENARY	M6	- MAGNET OF THERMOCOUPLE 6
L	- LINE, PHASE	SW1÷SW6	- MICRO CATENARY
N_L	- SPARK GENERATOR, PHASE	TC1	- THERMOCOUPLE 1
N	- LINE, NEUTRAL	TC2	- THERMOCOUPLE 2
N_N	- SPARK GENERATOR, NEUTRAL	TC3	- THERMOCOUPLE 3
⏚	- GROUND	TC4	- THERMOCOUPLE 4
M1	- MAGNET OF THERMOCOUPLE 1	TC5	- THERMOCOUPLE 5
M2	- MAGNET OF THERMOCOUPLE 2	TC6	- THERMOCOUPLE 6
M3	- MAGNET OF THERMOCOUPLE 3		

3 - TECHNICAL CHARACTERISTICS

3.1 - ELECTRIC CHARACTERISTICS

Power supply : 230V
Frequency : 50Hz
Protection class : IP00
Protection class : IP00
Working temperature : 0 - 120°C
Total power : 0,6 W (6W activating the ignition micro)

3.2 - TIMING

Magnet time : 4,3 ± 15% seconds
Ignition time : 1,75 ± 20% seconds
Micro failure detection time : 6,75 ± 20% seconds

3.3 - ELECTRIC CONNECTIONS OF THE SYSTEM

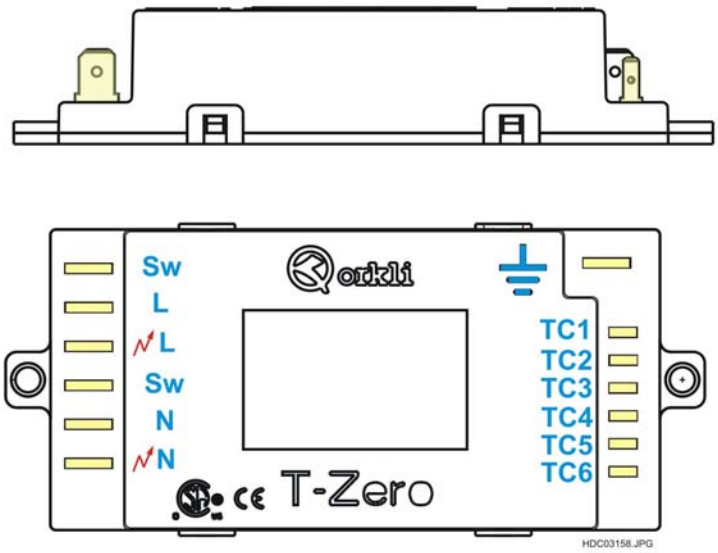

Fig. 4

Sw	- IGNITION CATENARY	TC1	- MAGNET OF THERMOCOUPLE 1
L	- LINE, PHASE	TC2	- MAGNET OF THERMOCOUPLE 2
$\mathcal{N}_L$	- SPARK GENERATOR, PHASE	TC3	- MAGNET OF THERMOCOUPLE 3
N	- LINE, NEUTRAL	TC4	- MAGNET OF THERMOCOUPLE 4
$\mathcal{N}_N$	- SPARK GENERATOR, NEUTRAL	TC5	- MAGNET OF THERMOCOUPLE 5
⏚	- GROUND	TC6	- MAGNET OF THERMOCOUPLE 6

4 - IGNITION TIME OF THE BURNER

The ignition of the burners through the spark generator occurs for 2 seconds from the closure of the ignition micro (catenary) as indicated in chapter 2.5 – TIMING DIAGRAM.

5 - CONTROL OF THE TAP MAGNETS

When one of the ignition micro is activated, the magnets of the gas taps are supplied from the T-Zero system for 4,3 seconds.

5.1 - BASIC DIAGRAM OF THE MAGNET CONTROL

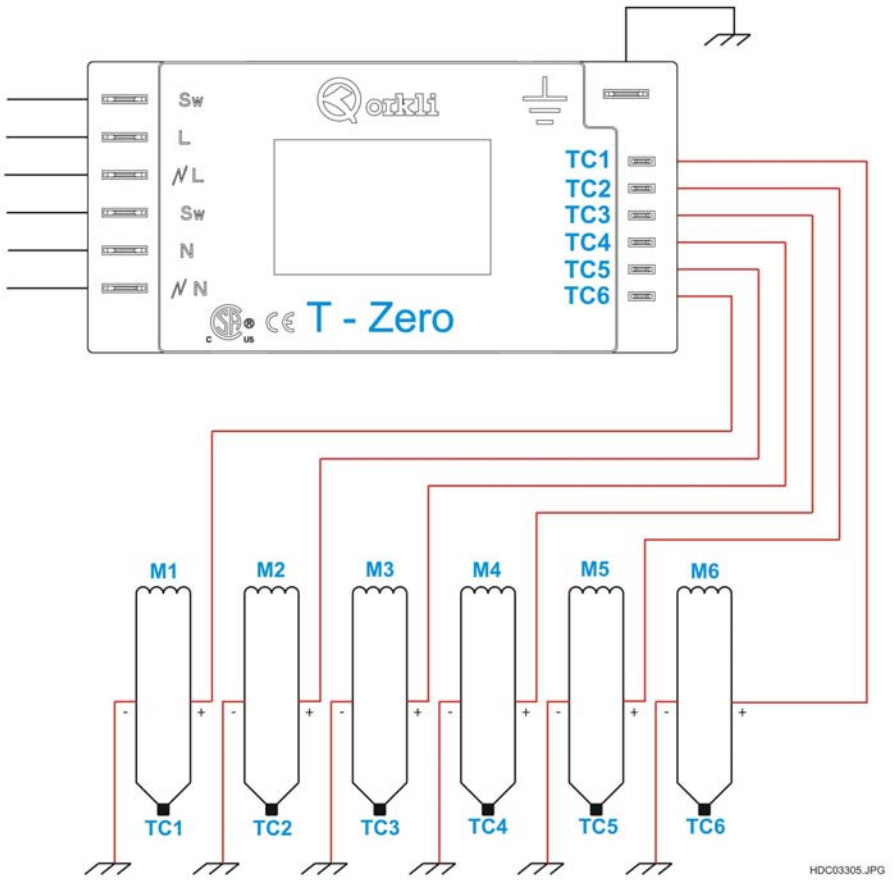

Fig. 5

⏚	- GROUND
M1	- MAGNET OF BURNER TAP 1
M2	- MAGNET OF BURNER TAP 2
M3	- MAGNET OF BURNER TAP 3
M4	- MAGNET OF BURNER TAP 4
M5	- MAGNET OF BURNER TAP 5
M6	- MAGNET OF BURNER TAP 6
TC1	- THERMOCOUPLE OF BURNER 1
TC2	- THERMOCOUPLE OF BURNER 2
TC3	- THERMOCOUPLE OF BURNER 3
TC4	- THERMOCOUPLE OF BURNER 4
TC5	- THERMOCOUPLE OF BURNER 5
TC6	- THERMOCOUPLE OF BURNER 6

5.2 - THERMOCOUPLES FOR TIME-ZERO CONTROL

The thermocouples used with the Time-Zero control are provided with a connection cable for the control of the tap magnet performed by the electronic control (see Fig. 6).

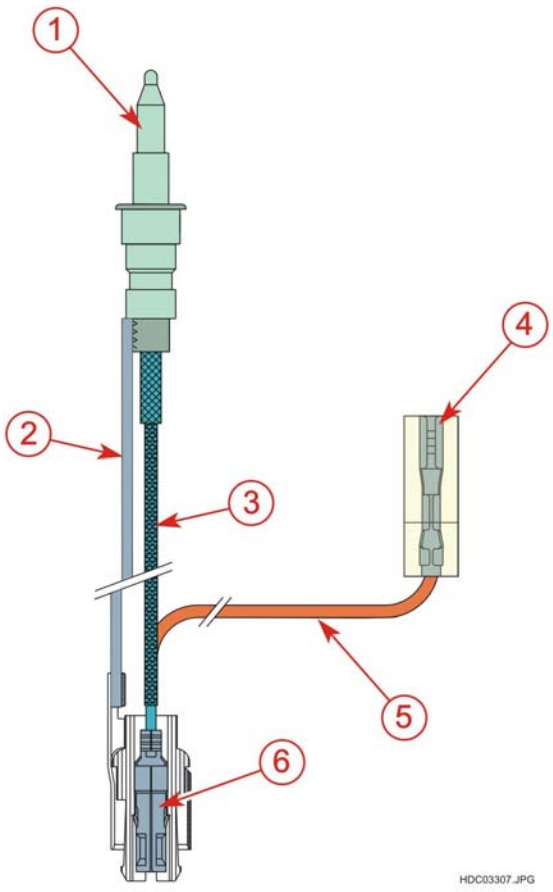

Fig. 6

1	- THERMOCOUPLE
2	- GROUND CONNECTION CABLE FROM THERMOCOUPLE TO TAP BURNER
3	- CONNECTION CABLE FROM THERMOCOUPLE TO TAP MAGNET
4	- CONNECTION AMP TAG OF MAGNET CONTROL THROUGH THE ELECTRONIC CONTROL
5	- CONNECTION CABLE OF MAGNET CONTROL THROUGH THE ELECTRONIC CONTROL
6	- CONNECTION THERMOCOUPLE AND ELECTRONIC CONTROL TO THE TAP

6 - CONTROL OF SPARK GENERATOR

The Time-Zero board controls also the spark generator.
The supply of the spark generator occurs for 2 seconds from the closure of the ignition micro (catenary) as indicated in chapter 2.5 – TIMING DIAGRAM.

6.1 - BASIC DIAGRAM OF GENERATOR CONTROL

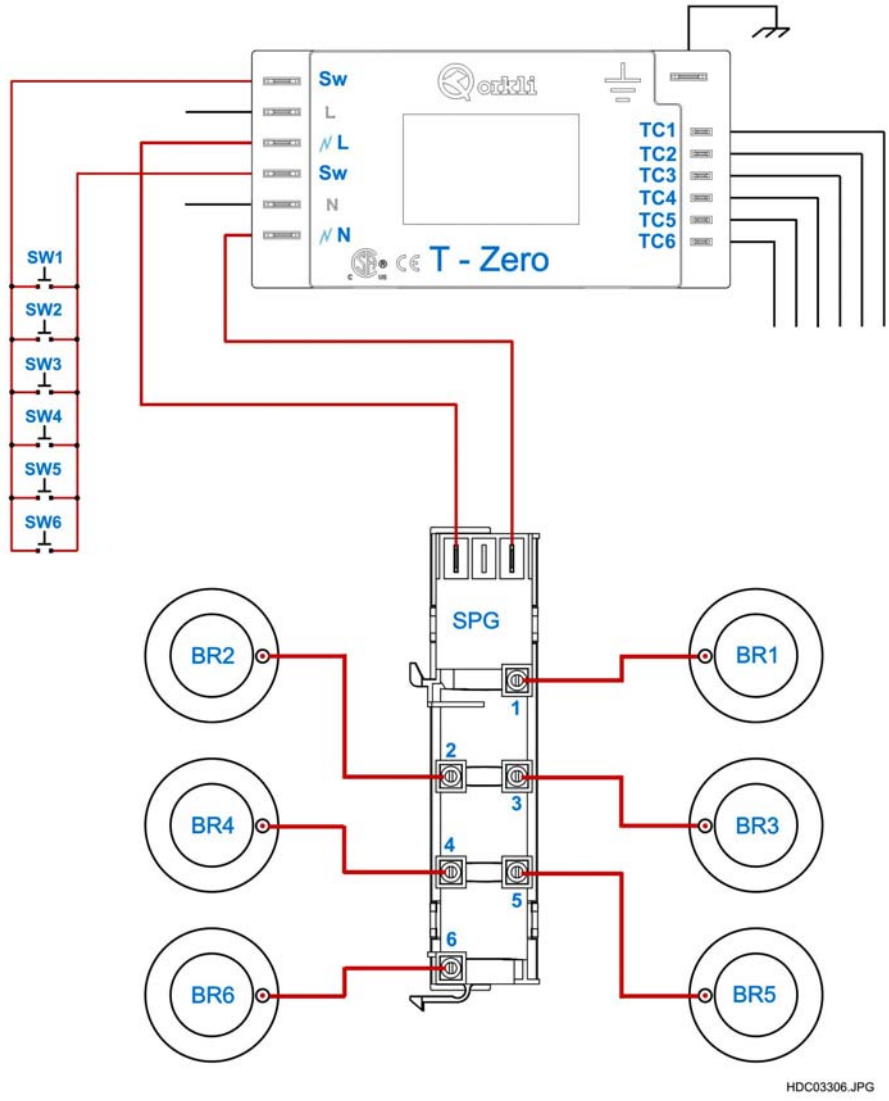

Fig. 7

BR1 ÷ BR6	- GAS BURNERS
SPG	- IGNITION GENERATOR
SW1 ÷ SW6	- IGNITION MICRO CATENARY
TC1 ÷ TC6	- THERMOCOUPLES BURNERS 1 - 6
T - Zero	- TIME – ZERO ELECTRONIC CONTROL

NOTE: Refer to the wiring diagrams specific for the various models.

7 - TROUBLESHOOTING

During the troubleshooting in the hobs, the Time-Zero electronic control leads to different considerations compared to a normal hob with taps and thermocouples.
You can find some considerations and examples which can help you during the diagnostics of a failure in appliances with Time Zero control.
Considering that the Time Zero control actuates only during the ignition phase, possible problems that should arise during the normal operation do not involve the Time Zero control.
The possible failures of the Time Zero system are connected with the ignition and can be divided into two groups:

The hob does not switch on due to missing ignition discharges on all spark plugs.
(If the spark is missing only in one or some spark plugs, this case refers to the traditional failures not to the Time Zero).

If none of the spark plugs sparks, the possible causes may be:

1. Generator
2. Time Zero board
3. Catenary with closed contacts for more than 6,75 sec, due to a failure or also because a button is blocked.

A burner sparks regularly, but it does not remain lit.
In this case, if the burner is not able to ignite "instantaneously", like Time Zero is expected to do, but operates acting on the knob in the traditional way (push-rotate and keep on pushing) so the failure could be due to:

1. Time Zero board
2. Thermocouple-board connection cable

If the burner does not remain on in any case, then it is necessary to consider the failures of the traditional hobs (thermocouple, magnet, etc.).

8 - POSITION OF THE ELECTRONIC CONTROL IN VARIOUS MODELS

Consider the example of the position of the Time-Zero control board in some hobs with different dimensions.

8.1 - POSITION IN MODELS WITH 60cm WIDTH

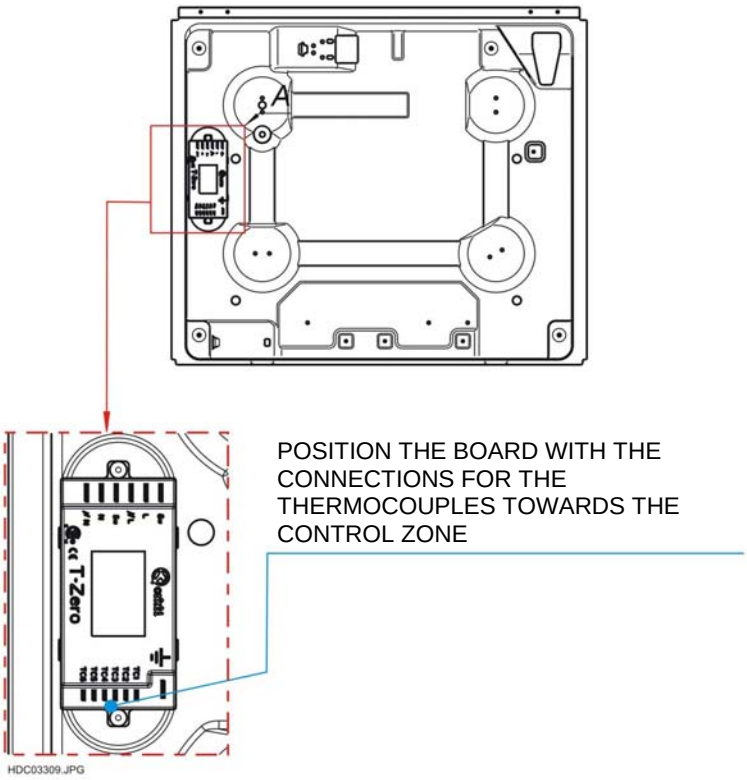

Fig. 8

8.2 - POSITION IN MODELS WITH 75cm WIDTH

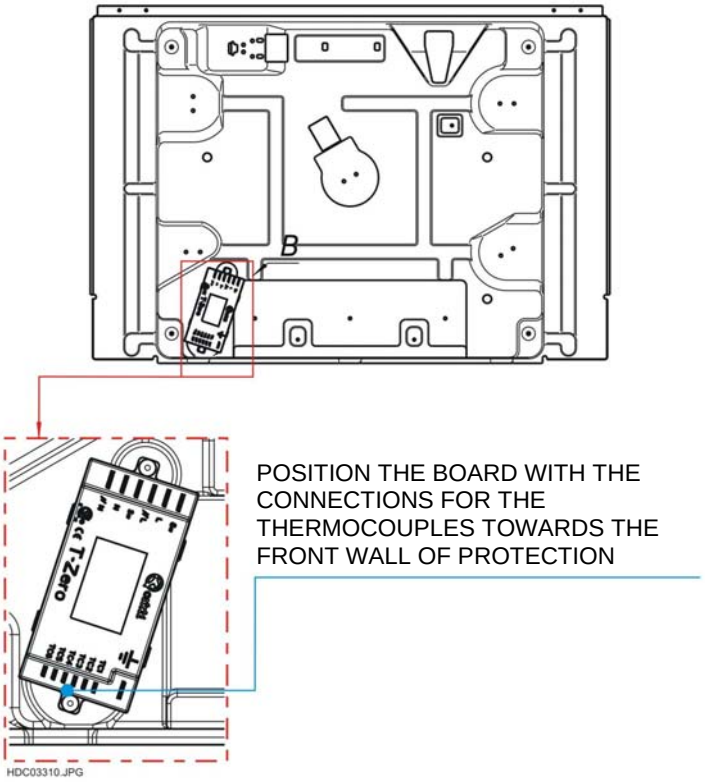

Fig. 9

8.3 - POSITION IN MODELS WITH 90cm WIDTH

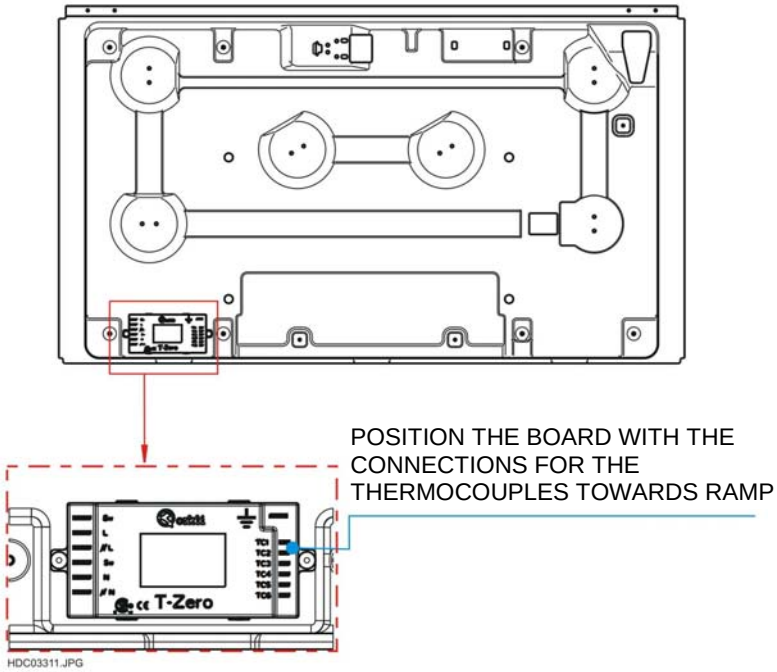

Fig. 10

8.4 - FIXING SYSTEM OF THE TIME-ZERO BOARD

The Time-Zero board is fitted to the lower protection of the hob with rivets. Fig. 10 shows an example.

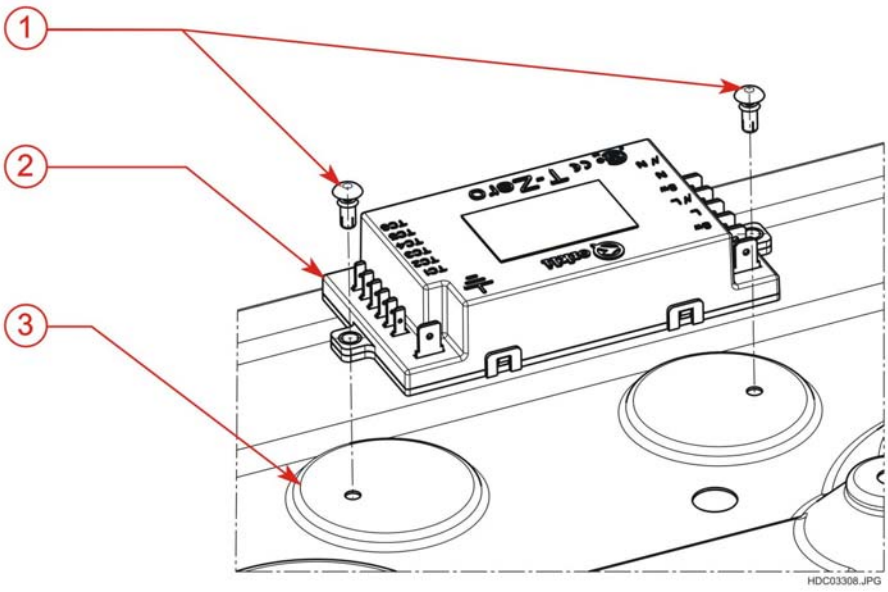

Fig. 11

1	- RIVETS
2	- TIME-ZERO BOARD
3	- LOWER PROTECTION