

**After-Sales Service**

**Hot & Cold**



## **SERVICE MANUAL**

# **"Zenith"**

## **BASIC TECHNICAL MANUAL**

**THE CONTENTS OF THIS DOCUMENT ARE INTENDED FOR NECTA'S AFTER SALES PERSONNEL**

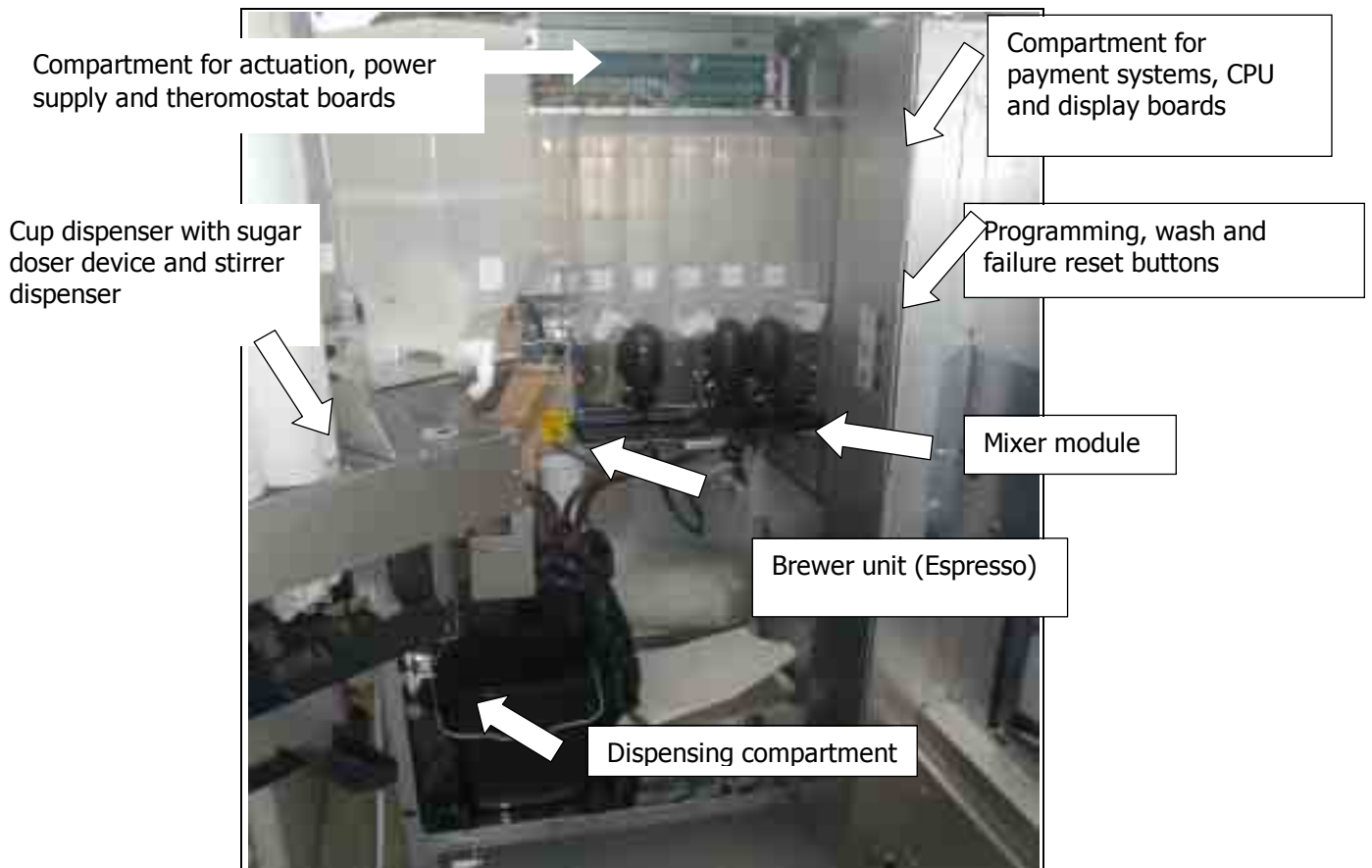
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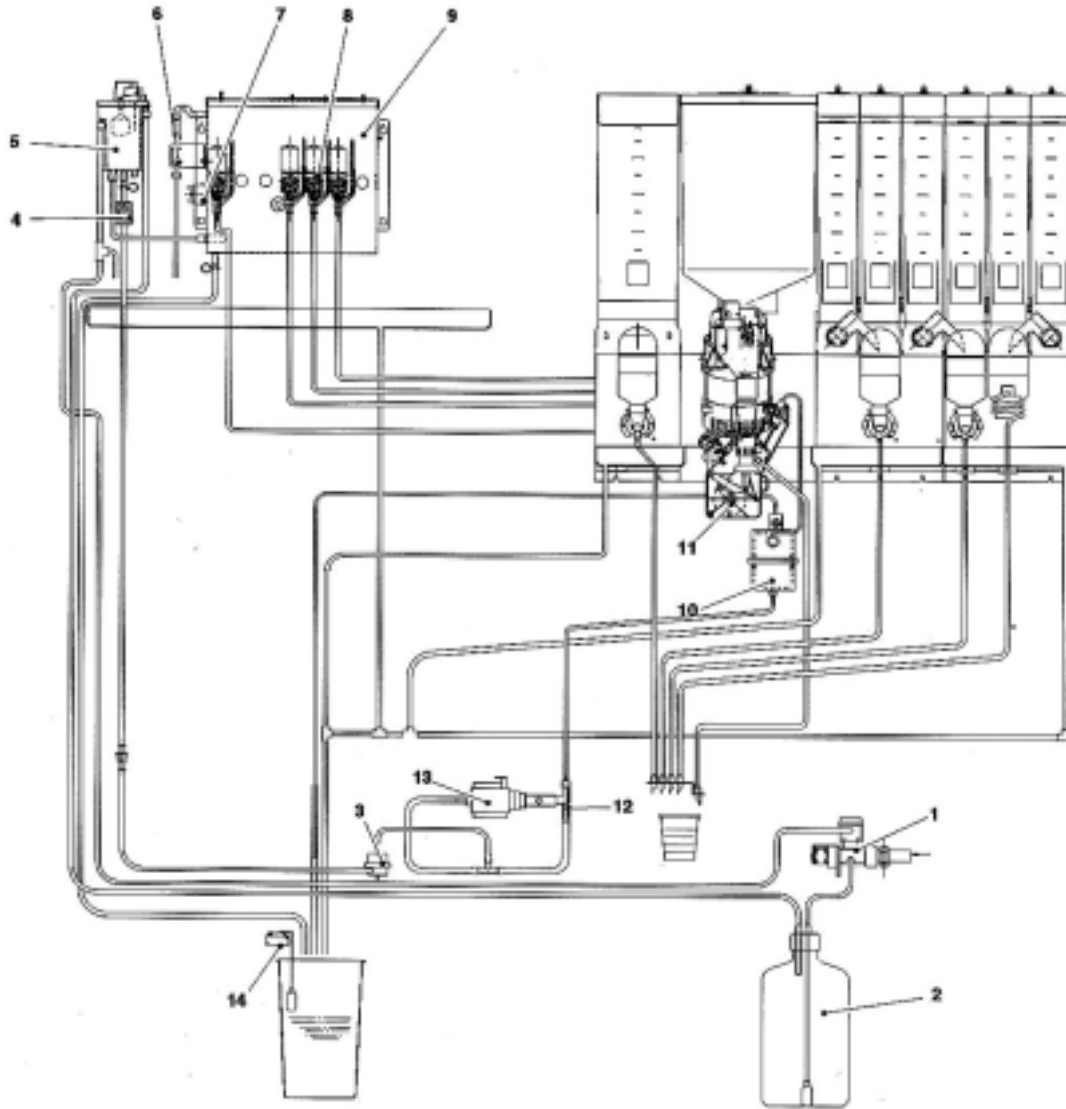
### **NOTE**

The above systems and functional units are specific to this machine.

All functional units installed but not listed in this document, are also used in other machines in the same range; therefore they will be described in a separate manual for machines belonging to the same range, where all base functional units will be described more in detail.

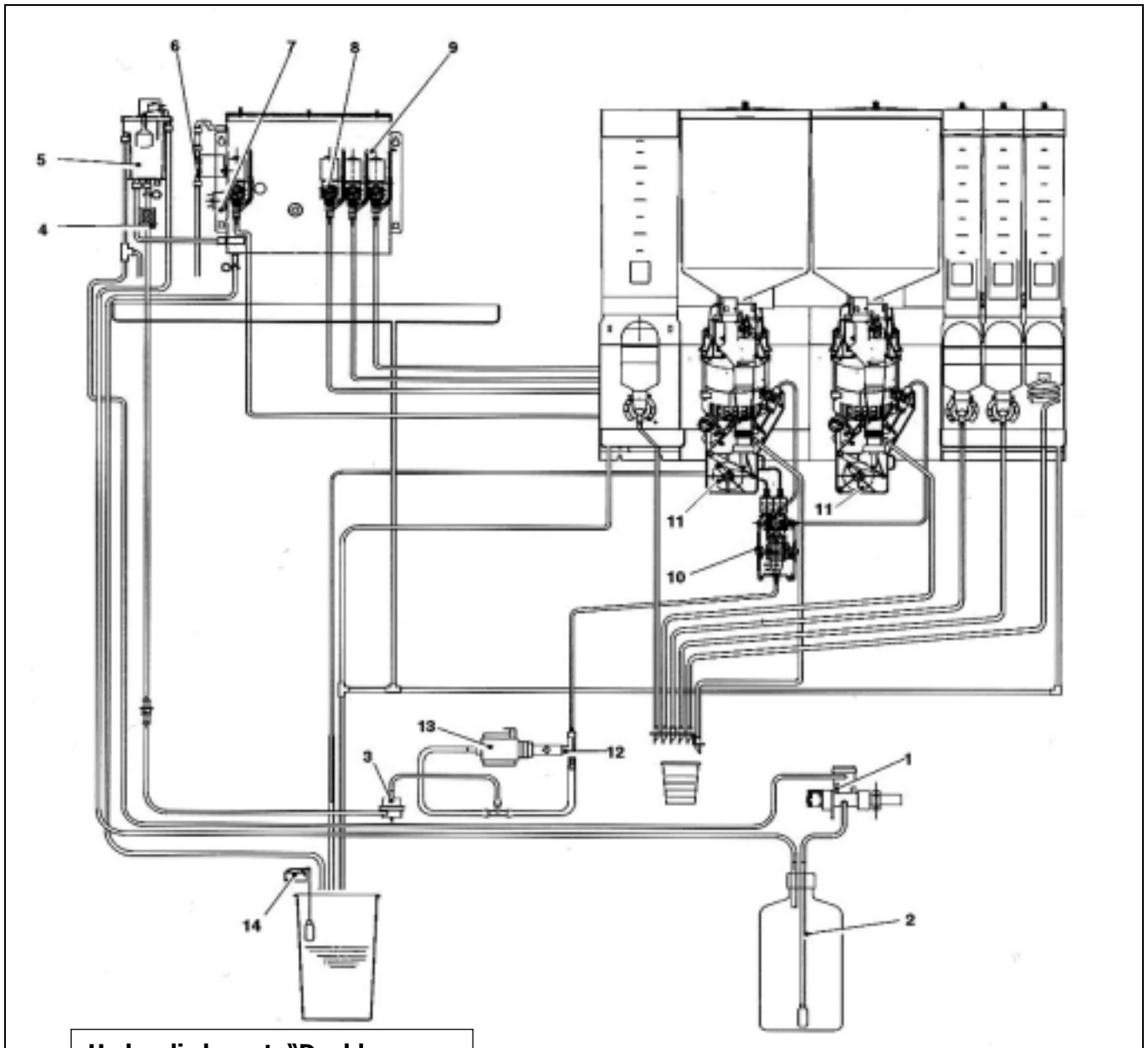


# 1 - Hydraulic layout



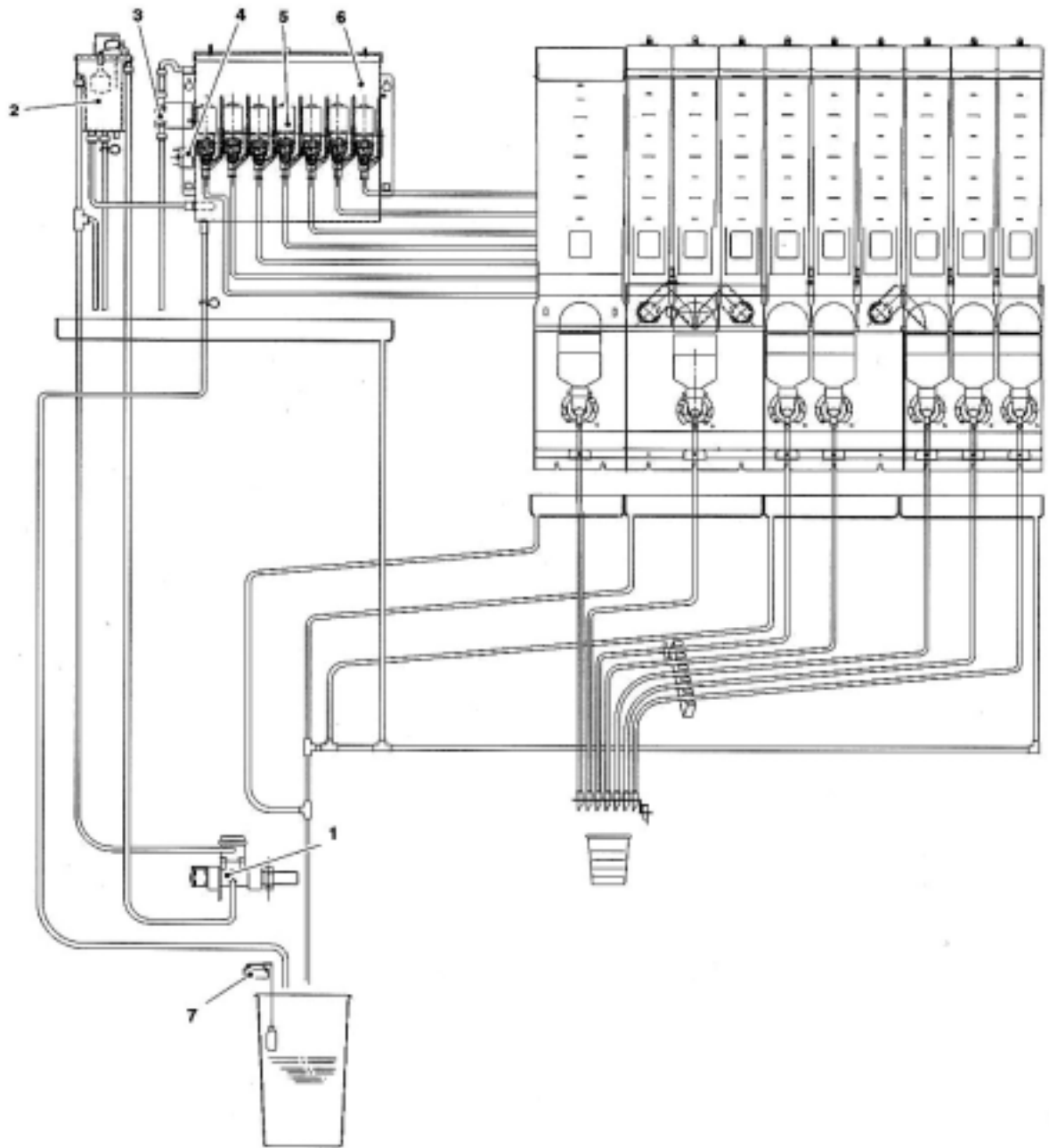
## ESPRESSO VERSION

Ref	DESCRIPTION	Ref	DESCRIPTION	Ref	DESCRIPTION	Ref	DESCRIPTION
1	Water inlet solenoid valve	5	Air-break	9	Instant boiler	13	Vibration pump
2	Water softener (optional)	6	Anti-boiling thermostat	10	Coffee boiler	14	Float
3	Volumetric counter	7	Dry operation thermostat	11	Coffee unit		
4	Water filter	8	Instant solenoid valve	12	By-pass		



**Hydraulic layout: "Double espresso" version**

Ref	DESCRIPTION	Ref	DESCRIPTION	Ref	DESCRIPTION	Ref	DESCRIPTION
1	Water inlet solenoid valve	5	Air-break	9	Instant boiler	13	Vibration pump
2	Water softener (optional)	6	Anti-boiling thermostat	10	Coffee boiler	14	Float
3	Volumetric counter	7	Dry operation thermostat	11	Coffee unit		
4	Water filter	8	Instant solenoid valve	12	By-pass		



**INSTANT & FRESH-BREW VERSION**

Ref	DESCRIPTION	Ref	DESCRIPTION
1	Water inlet solenoid valve	5	Instant solenoid valves
2	Air-break	6	Instant boiler
3	Anti-boiling thermostat	7	Float
4	Dry operation thermostat	8	Dispensing spouts

## 2 - Electrical systems - Connections - Configurations

The machine is designed to operate under a single-phase voltage of 230 V AC (+5-10V)

It is protected with two delayed type 15 A fuses on both phases.

With regard to the transformer:

the primary winding is protected with a 2 A fuse, the secondary winding is protected with a 6.3 A fuse. The power supply card is protected with a 6.3 A fuse.

Its is fitted with a door opening safety switch disconnecting both phases.

The power cable can be supplied as standard feature and chosen among the following types:

HO5 R N - F

HO5 V V - F

HO7 R N - F

All cables above have a 3 x 1.5 mm<sup>2</sup> wire section + a Schuko plug permanently fixed to the cable.

In the event of replacement cables of exactly the same characteristics must be used.

Since the "Zenith" vending machine is approved by an electrical safety certification institute (IMQ), replacements with non-original components are not permitted.

Otherwise the electrical safety certificate and the warranty will be void.

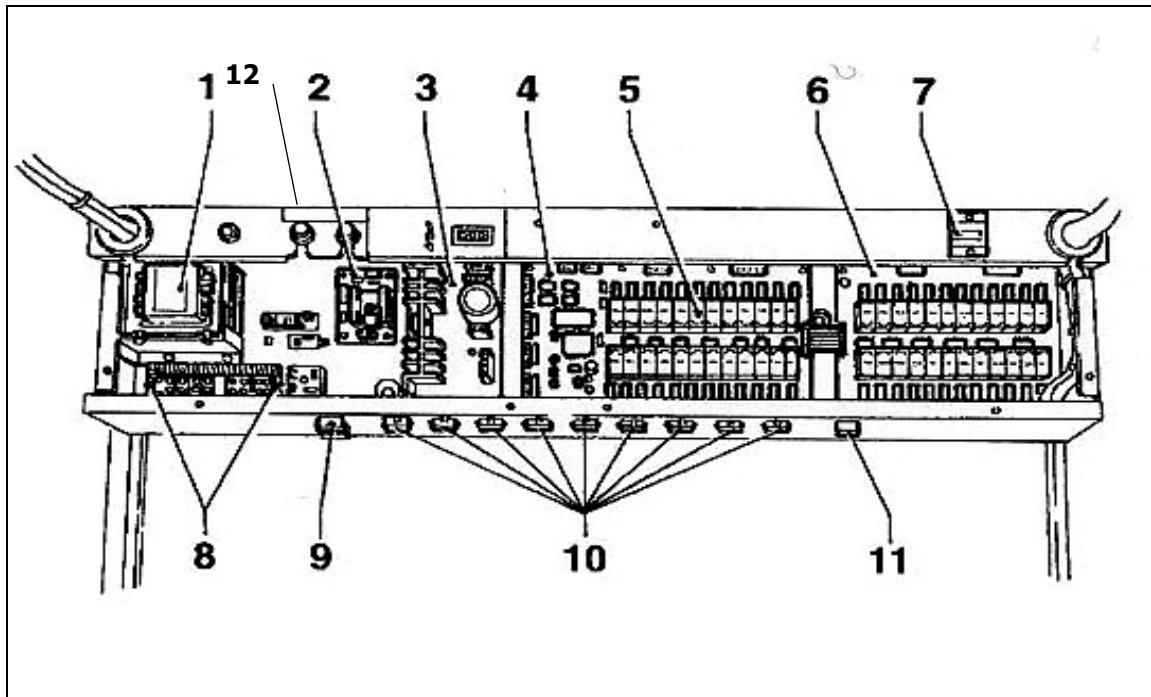
### 2.1 - Electronic boards connections

The following electronic boards are installed:

CPU board, machine control board 1, machine control board 2 (expansion)

Power supply card, boiler control board 1, boiler control board 2

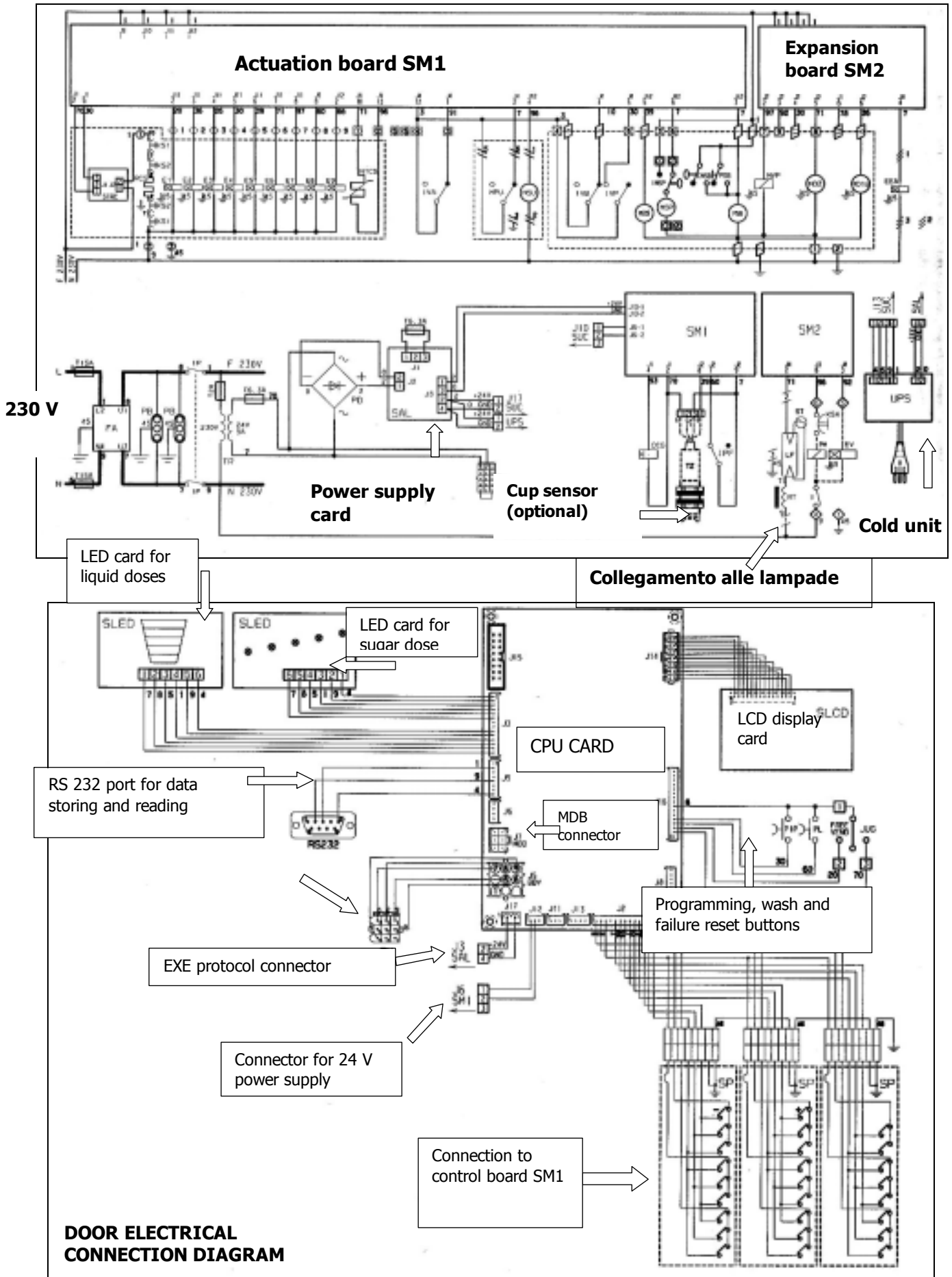
Push-button board, display board



#### COMPARTMENT FOR POWER SUPPLY BOARD, THERMOSTAT AND ACTUATION WITHOUT CASING

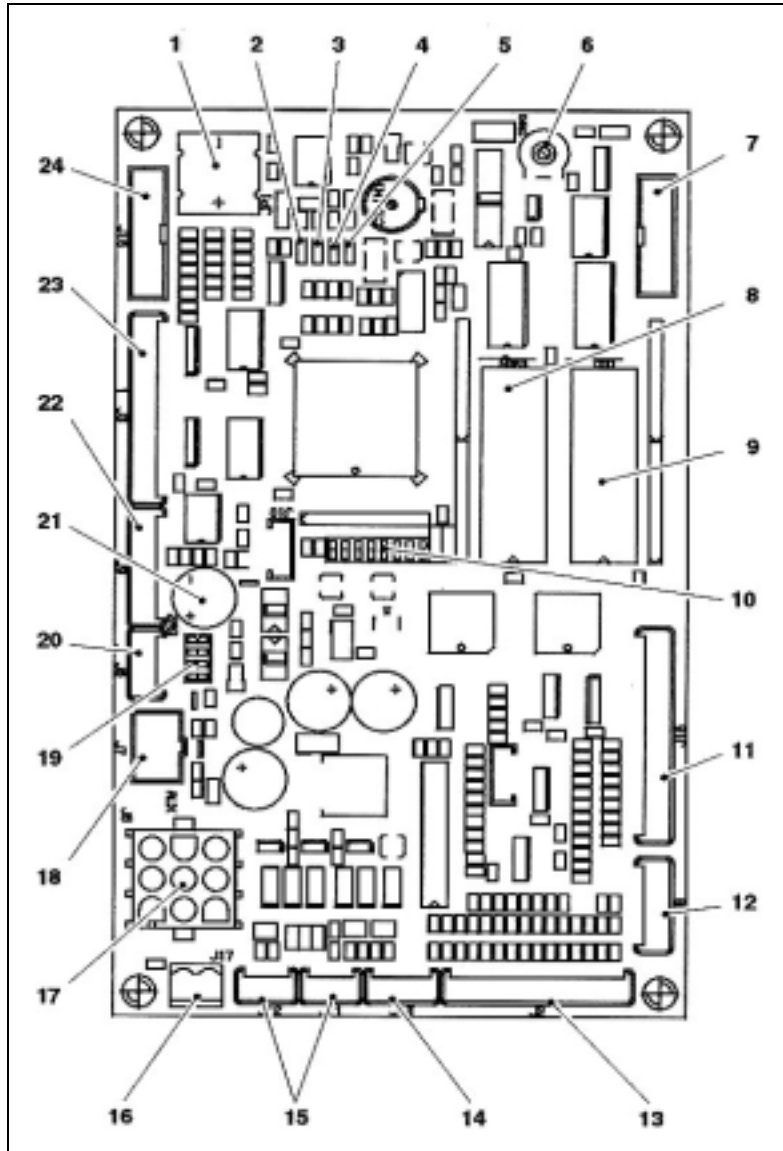
Ref	DESCRIPTION	Ref	DESCRIPTION	Ref	DESCRIPTION
1	Transformer	5	Relay	9	Instant boiler connector
2	Boiler control board	6	Expansion board	10	Solenoid valve connectors
3	Power supply card	7	Mechanical counter	11	Sanitising kit connector
4	Actuation board	8	Transformer fuses	12	Grid fuses

# Functional wiring diagram



## 2.1.1 - CPU control board

The **CPU** board (located in the coin mechanism compartment) is the one that communicates with the actuation boards and controls and processes the input signals from the push-button panel and from the payment systems; it also controls the functions of the display board, which processes data transforming it into readable signals. It also processes output signals to the actuation boards. This board also contains the **EPROMs**, on which the software program is written. Two **MINIDIPS** (10 - 19) are located on the board and must be set according to the indications at the foot of this page.



CPU BOARD COMPONENT LEGEND	
Ref	DESCRIPTION
1	Lithium battery
2	Green LED - RUN
3	Yellow LED - 5 V DC
4	Red LED - program error
5	Red LED - board reset
6	Display contrast adjustment trimmer
7	LCD display connector
8	EPROM - EVEN
9	EPROM - ODD
10	Machine configuration minidips
11	Service buttons connector
12	Connector not used
13	Push-button panel connector
14	Cooling unit connector
15	Output connectors to actuation board
16	24 Volt power supply connector
17	BDV connector
18	MDB connector
19	Protocol setting minidips
20	Connector not used
21	Buzzer
22	RS232 programmer device connector
23	Cup dispenser board connector
24	Validator connector



**Setting of minidip 10** - Machine configuration

<b>Specific to country:</b> <b>ITALY</b>			<b>Specific to machine configuration:</b> <b>C version - ESPRESSO</b>				
<b>DIP 8</b>	<b>DIP 7</b>	<b>DIP 6</b>	<b>DIP 5</b>	<b>DIP 4</b>	<b>DIP 3</b>	<b>DIP 2</b>	<b>DIP 1</b>
<b>OFF</b>	<b>OFF</b>	<b>OFF</b>	OFF	<b>OFF</b>	<b>OFF</b>	<b>OFF</b>	<b>OFF</b>

NOTE: see specific layouts for all other configurations

There are also four coloured LEDs to indicate the operating status of the machine:

- GREEN LED (2)** - ON and blinking during normal operation
- Yellow LED (3)** - ON when there is a 5 V DC power supply to the board
- Red LED (4)** - ON in the event of software errors
- Red LED (5)** - ON during the board reset phase

**Setting of minidip 19**

Communication protocol configuration

PROTOCOL	DIP 1	DIP 2	DIP 3	DIP 4
<b>EXECUTIVE</b>	<b>OFF</b>	<b>OFF</b>	<b>OFF</b>	<b>OFF</b>
<b>MDB</b>	<b>ON</b>	<b>ON</b>	<b>ON</b>	<b>ON</b>
<b>BDV</b>	-	-	-	-

## 2.1.2 - ACTUATION BOARD SM1

The actuation board (located inside the power supply unit above the containers) is actually composed of two separate boards, SM1 and SM2, connected to each other with a flat cable.

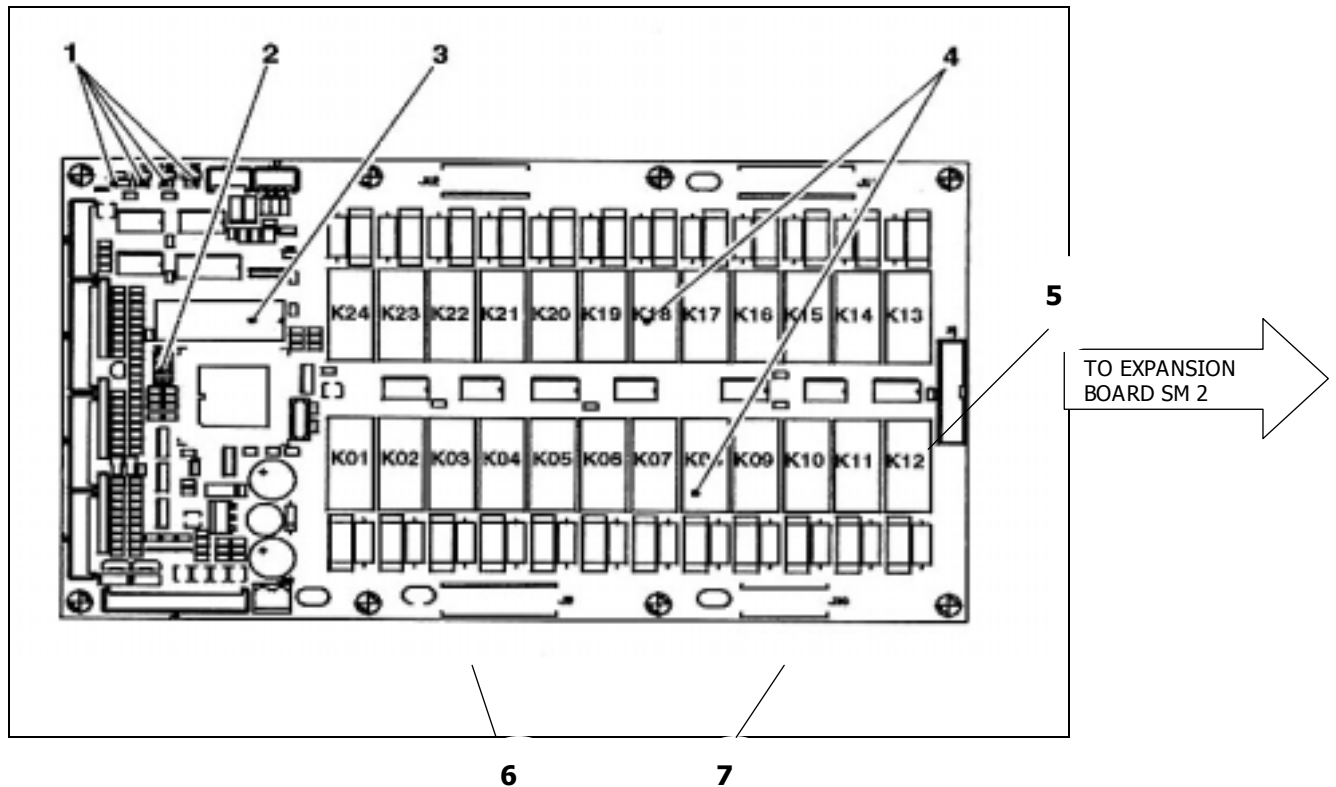
By means of relays, it activates the **230 V AC** users, except for the boiler heating elements for which a specific power supply card with power TRIAC is provided.

The board is powered with 24 V DC.

This board houses the control board EPROM

There are four coloured LEDs to indicate the operation of the following functions

There is also a factory pre-set minidip (MINIDIP 2) with four sections that **MUST NOT** be modified.



### SM 1 COMPONENT LEGEND

Ref	DESCRIPTION	Ref	DESCRIPTION
1	Coloured indicator LEDs	5	SM1 board connector
2	Default setting minidip	6	230 V AC output connector 1
3	Machine Eprom	7	230 V AC output connector 2
4	Actuation relay	8	

### Default Minidip settings: Not to be modified!!

Mini DIP 1	Mini DIP 2	Mini DIP 3	Mini DIP 4
OFF	ON	ON	OFF

### Actuation board default configuration

#### Indicator LED functions

**GREEN** - Blinking at one second intervals, indicating correct functioning

Faster blinking indicates failed communication with CPU board

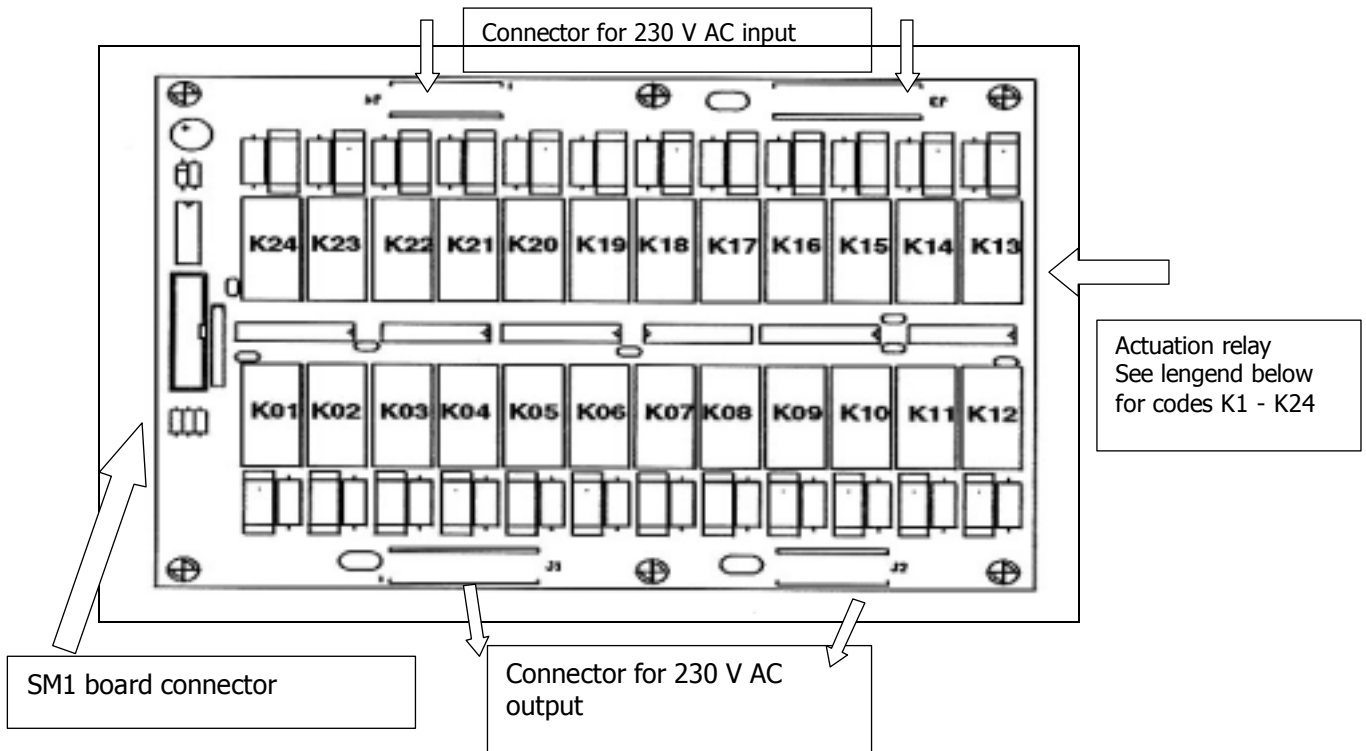
**RED 1** – Indicating the functioning status of the espresso boiler

**RED 2** – Indicating the functioning status of the second espresso boiler (if installed)

**RED 3** – Indicating the functioning status of the instant boiler

## 2.1.3 - ACTUATION EXPANSION BOARD SM2

The **SM2** board has the purpose of expanding the available actuations, bringing them to a total of **48** relays, and is connected to the main **SM1** board with a flat cable using connector **3**.



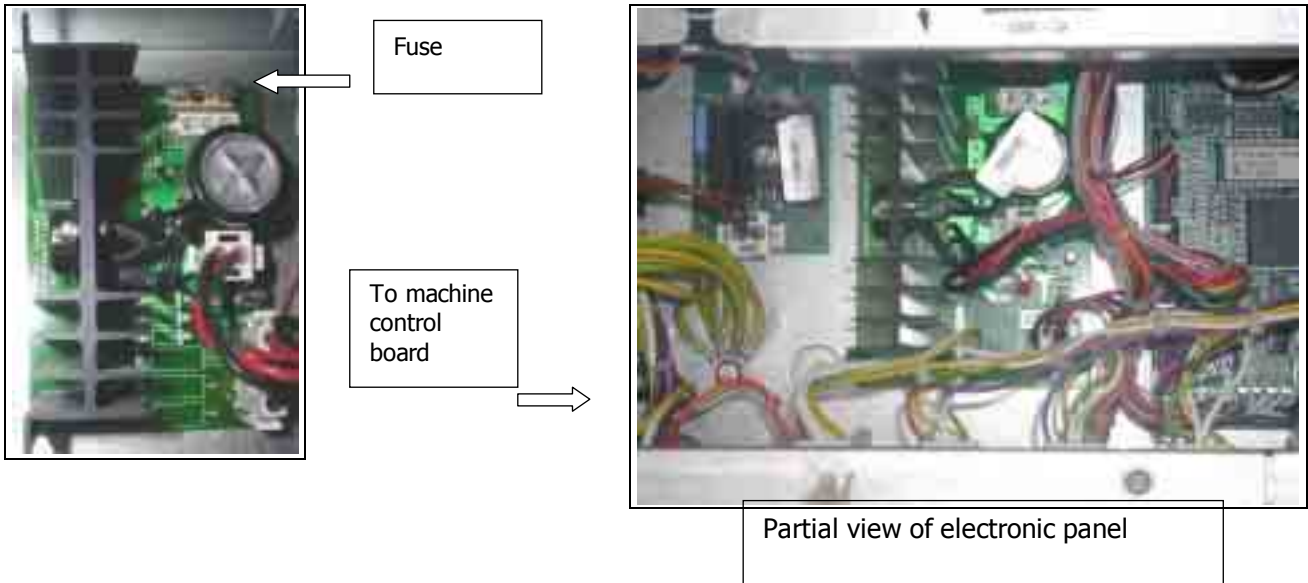
### Relay code legend

Actuation board SM1		Actuation board SM2	
RELAY CODE	Application	RELAY CODE	Application
K01	Pump	K01	Whipper <b>6</b>
K02	Coffee release magnet <b>1</b> / <b>FB</b> motor	K02	<b>FB</b> piston motor
<b>K03</b>	Coffee solenoid valve <b>1</b> / Whipper <b>5</b>	<b>K03</b>	Espresso coffee brewer motor <b>2</b>
<b>K04</b>	Espresso coffee brewer motor <b>1</b>	<b>K04</b>	Whipper <b>3</b>
<b>K05</b>	Coffee solenoid valve <b>2</b>	<b>K05</b>	Coffee grinder <b>2</b>
<b>K06</b>	Coffee grinder <b>1</b>	<b>K06</b>	Coffee release magnet <b>2</b>
<b>K07</b>	<b>Solenoid 8</b>	<b>K07</b>	Not used
<b>K08</b>	Doser device <b>1</b>	<b>K08</b>	No-stirrers motor (actuator)
<b>K09</b>	Whipper <b>1</b>	<b>K09</b>	Not used
<b>K10</b>	Doser device <b>2</b>	<b>K10</b>	Not used
<b>K11</b>	Whipper <b>2</b>	<b>K11</b>	Sugar doser device
<b>K12</b>	Steam exhauster	<b>K12</b>	Doser device <b>12</b>
<b>K13</b>	<b>Solenoid 1</b>	<b>K13</b>	Doser device <b>9</b>
<b>K14</b>	<b>Solenoid 2</b>	<b>K14</b>	Whipper <b>9</b>
<b>K15</b>	<b>Solenoid 3</b>	<b>K15</b>	Doser device <b>15</b>
<b>K16</b>	<b>Solenoid 4</b>	<b>K16</b>	Whipper <b>10</b>
<b>K17</b>	<b>Solenoid 5</b>	<b>K17</b>	Doser device <b>11</b>
<b>K18</b>	<b>Solenoid 6</b>	<b>K18</b>	Whipper <b>11</b>
<b>K19</b>	<b>Solenoid 7</b>	<b>K19</b>	Sanitising pump (Optional)
<b>K20</b>	<b>Solenoid 9</b>	<b>K20</b>	Lamp
<b>K21</b>	Cup release ratiomotor	<b>K21</b>	Sanitising solenoid valve
<b>K22</b>	Dispensing spouts ratiomotor	<b>K22</b>	Mains water inlet solenoid valve
<b>K23</b>	Cup column shift ratiomotor	<b>K23</b>	Not used
<b>K24</b>	Stirrer release ratiomotor	<b>K24</b>	Not used

### 2.1.3 - POWER SUPPLY CARD

The power supply card rectifies and stabilises the voltage necessary for the electronic components operation and for all 24 V DC functions. It is located in the electronics panel and is powered with 24 V AC coming from the transformer.

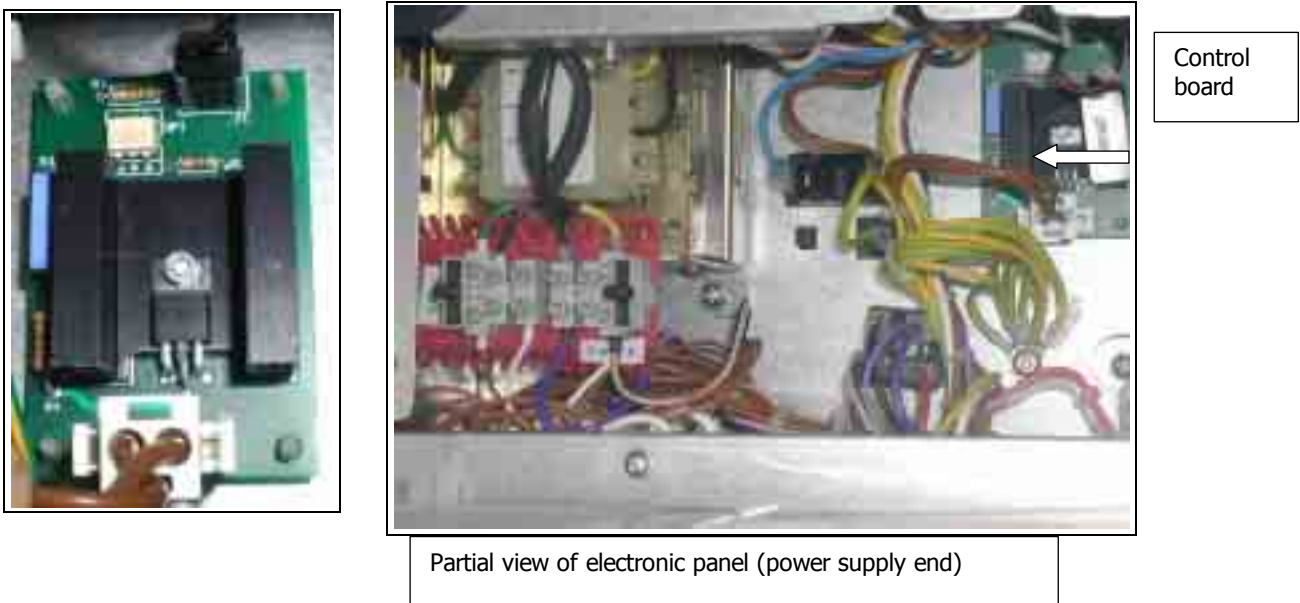
It is protected with a type T 6.3 A fuse



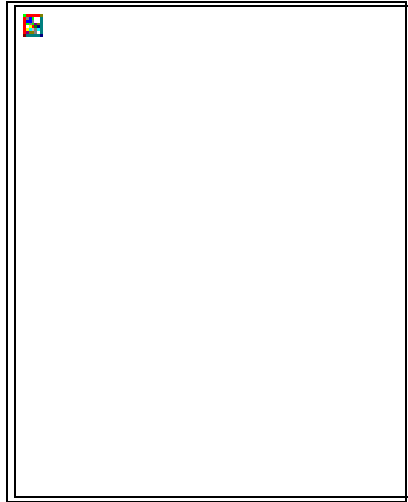
### 2.1.4 - INSTANT BOILER CONTROL BOARD

This board controls the instant boiler power supply with a power TRIAC according to the signals from the NTC probe processed by the program.

it is located inside the power supply unit above the containers



## 2.1.5 - ESPRESSO BOILER CONTROL BOARD



This board controls the espresso boiler power supply with a power TRIAC according to the signals from the specific NTC probe and processed by the program. It is practically identical to the one used for the instant boiler, but it is located next to the espresso boiler (behind the coffee brewer). The espresso boiler has always heating priority over the instant boiler.

## 2.1.6 - PUSH-BUTTON BOARD

This board is composed of three separate boards connected to the CPU board with "flat cables", converting the pressure on the buttons into signals recognised by the software.

## 2.1.7 - DISPLAY CARD

The **display** board processes the information from the board and converts it into readable signals.

### 3 - Air-break / Boilers

It is the same functional unit used in the Gran Mattino and Colibrì vending machines, therefore with established characteristics and reliability.

It is a functional unit that permits various functions:

Its main function is to keep the water level constant and to signal a water flow interruption from the mains; in the event of such water failure the current selection can be completed.

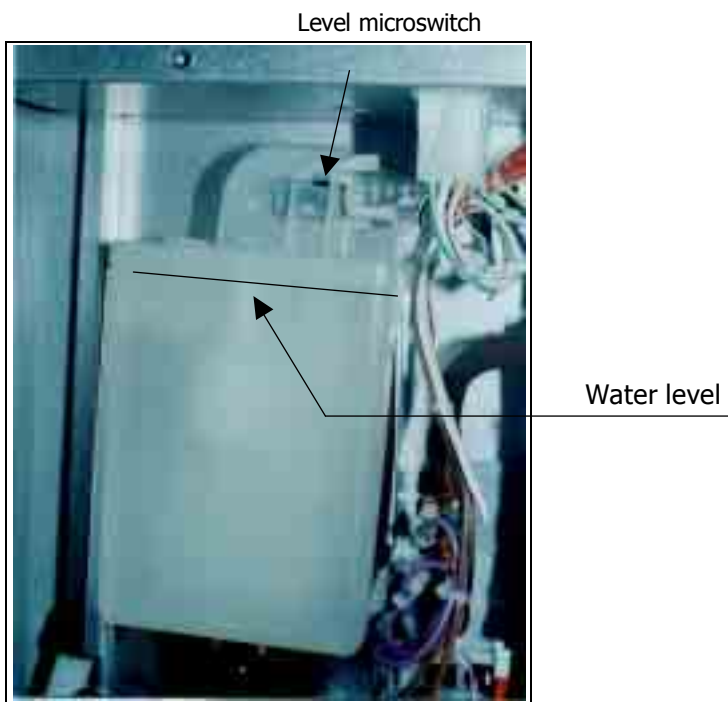
In addition, it serves the purpose of holding a reservoir of water at normal atmospheric pressure, so that the pump can draw the correct water dose for the selection and deliver it to the Espresso boiler without changes in pressure that may affect the volumetric counter reading.

The dose is measured by means of the volumetric counter (N. of pulses per turn).

The water level is ensured by a float that triggers a microswitch, keeping the level between a factory set minimum and maximum (it very important not to replace the microswitch with any one of different mechanical characteristics, as a variety of malfunctions may occur). The air-break is connected to the instant boiler using the communicating vessels principle and therefore is kept at the same level.

In the event of failure to the maximum level microswitch, an overflow hole allows the water to be conveyed through a tube and to the safety device fitted on the water inlet solenoid valve, thus causing its mechanical lock (such safety device is triggered also in the event of a power failure).

The air-break also causes a signal to be sent the machine control board necessary for the initial installation and for filling with water. If, upon switching the machine on. the float does not trigger the maximum level microswitch within a set time (e.g. 60 sec) the vending machine locks due to a water failure.



## 3.1 - Boilers

The **Zenith Espresso** model is fitted with two boilers: One pressure boiler specific to espresso coffee selections, and one "open-top" for instant drinks.

The **Zenith Instant/ FB** model is fitted only with one "open-top" boiler.

**Espresso boiler:** This boiler is made of special food-safe brass alloy, composed of two shells forged in the shape of half-spheres, joined together by means of special screws and seals, with a total capacity of 600 c.c. Water is kept at a 100 °C temperature (set via SW between 90° C and 100° C); lower or higher temperatures would not produce acceptable dispensed drinks.

The internal heating element is of the armoured type, certified for 1400 W, and the internal pressure is kept at **12 bar** by means of a check valve and the by-pass located on the pump.

During stand-by a SW program holds the pressure at specified levels through the intervention of the pump. Different SW modes for heating activation are possible: Initial, stand-by and dispensing. All of the different activation conditions are designed to prevent the emission of electromagnetic interference.

Starting from a temperature of 20° C it takes approximately 5 min to reach an operating temperature of 95° C. Temperature control is by means of a **PTC** type submersed probe, having the characteristic of changing internal resistance with heating. Such feature is monitored by the SW that according to specified parameters is able to keep the temperature at required values with very high accuracy. When installed together with the open-top boiler it always has heating priority.

Temperature	Value in $\Omega$ of probe resistance	Max. allowed tolerance
<b>0° C</b>	<b>35800</b>	<b><math>\pm 7 \Omega</math></b>
<b>20° C</b>	<b>12000</b>	<b><math>\pm 4 \Omega</math></b>
<b>90° C</b>	<b>1260</b>	<b><math>\pm 4 \Omega</math></b>
<b>100° C</b>	<b>963</b>	<b><math>\pm 4 \Omega</math></b>

Reference values for probe operation (they apply also to open-top boiler).

**Safety devices:** Overheating protection by means of a bipolar thermostat set to **125° C** and manually resettable with a button on the thermostat body.

Overpressure protection by means of programmed failure of the pump by-pass (**12 bar**) programmed failure of the solenoid valves (**17-18 bar**).

The boiler passed a test with a pressure of **25 bar**.

**Open-top boiler:** For open-top is intended a boiler with an internal pressure equal to the atmospheric pressure, and in order to ensure such condition an opening of at least 20 mm<sup>2</sup> is necessary.

It is normally used for dispensing instant product drinks and **FB** coffee.

Installed power **2000 W** - Capacity of **4200 c.c.**

Default solenoid valve flow 12 c.c./sec.

Number of solenoid valves, 4 minimum and up to 7 max according to required configuration.

The operating temperature (90 - 95° C), starting with the boiler at ambient temperature (20° C), is reached in approximately 14 min (this time can increase in the case where also the espresso boiler is installed, as this has heating priority).

The water level is maintained by the air-break through a communicating vessels connection.

Both boilers are controlled by specific boards with separate operating temperature settings.

As already mentioned, during the heating phase the espresso boiler has priority, and once the set temperature is set the instant boiler is started.

Temperature maintenance is alternated between the two, with priority always to the espresso boiler.

This logic was determined to avoid the possibility of electromagnetic interference in the event of the two boilers operating simultaneously.



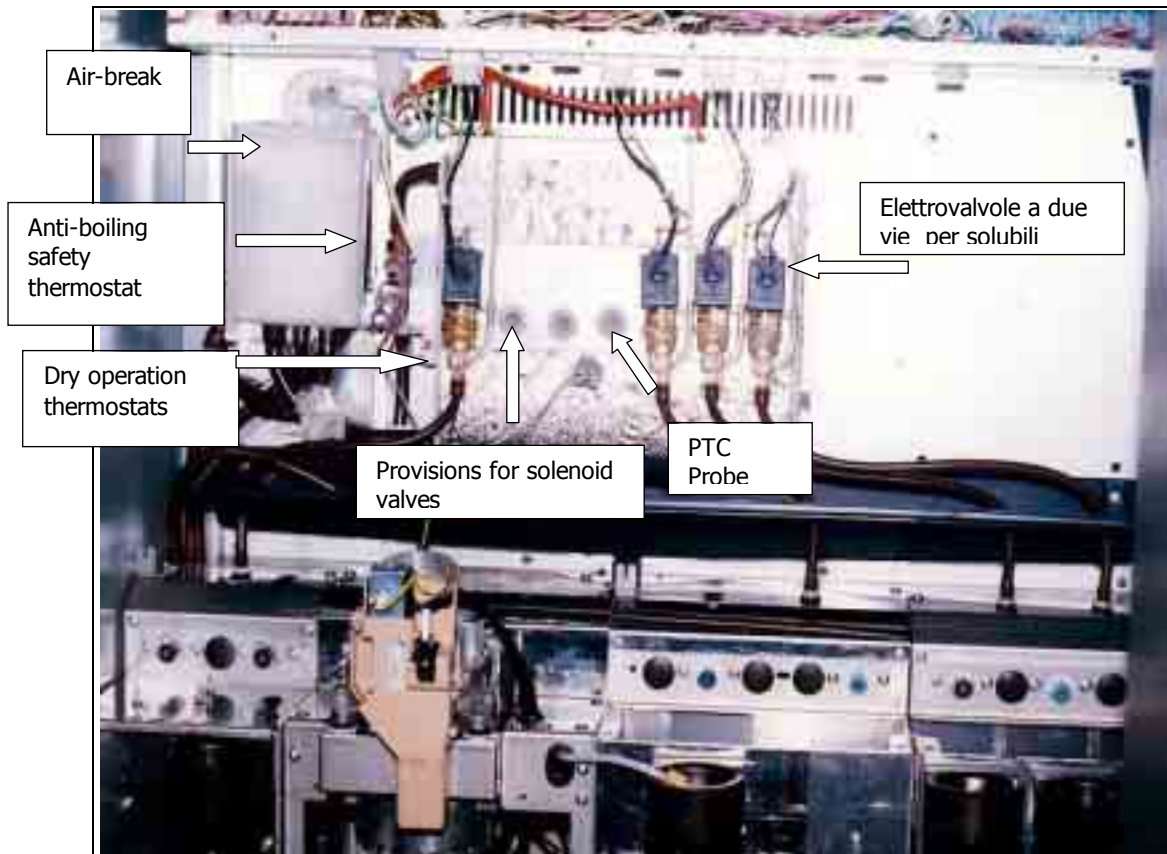
## Safety devices:

Dry overheating protection by means of a bipolar thermostat set to  $82^{\circ}\text{C} (\pm 3^{\circ}\text{C})$  and manually resettable with a button on the left-hand side of the boiler.

Overheating protection with the boiler full (therefore anti-boiling) is by means of a double bipolar thermostat set to  $82^{\circ}\text{C} (\pm 3^{\circ}\text{C})$ , located on a copper pipe exiting the side of the boiler.

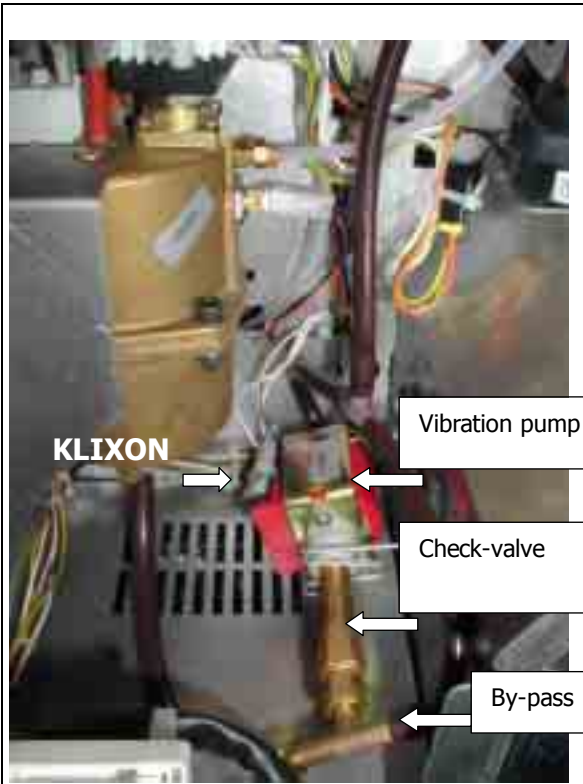
Water overflow protection by means of an overflow drain conveying the water to the liquid waste container.

## Zenith open-top boiler





## 4 - Pumps and by-pass



**The same pump used in the Brio / Venezia / Spazio models is used to supply the boiler. Brio / Venezia / Spazio**

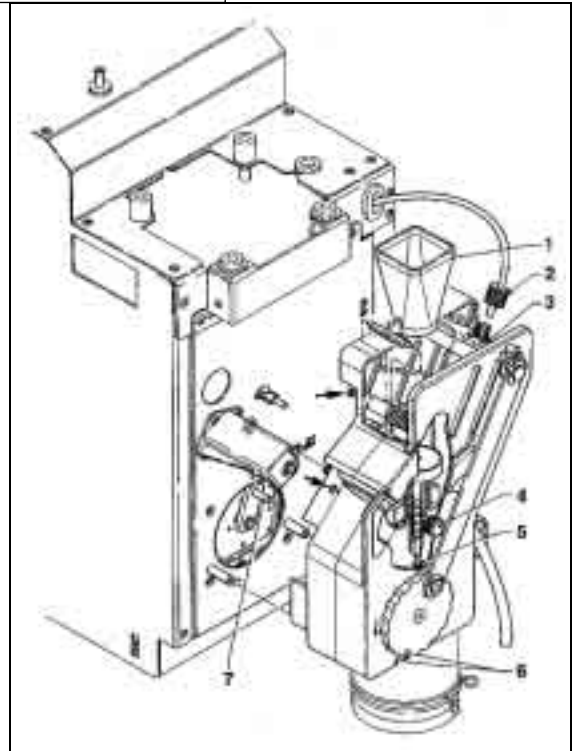
**The pump has overheating protection in case of continuous or dry operation by means of a 90° C self-reset klixon. The by-pass is factory pre-set at 12 bar. There is also check-valve in addition to the check-valve located on the boiler. The pump is activated by relay K14.**

## 5 - Espresso coffee brewer unit

The well known and reliable **Z 2000 M** unit is used, but with some changes to make it more suitable and with simpler operation, to take into account the high range characteristics of the Zenith vending machines.



Brewing unit detail  
In position "PMI"  
During the brewing phase



Detail of espresso unit being removed for maintenance

View without unit

The unit is factory fitted for a patented "first coffee" KIT, based on the use of a low consumption PTC type heating element, and "incorporating" a thermostat (see separate description).

The kit ensures optimum brewing chamber temperature, without creating the defects that are typical of the systems currently sold by competitors.

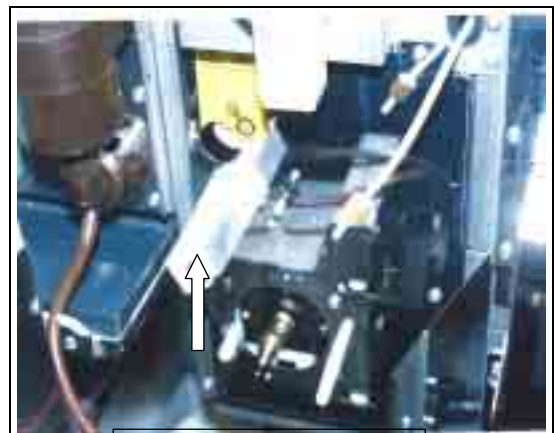
### **ESPRESSO**

The well known and reliable **Z 2000 M** coffee unit is used, but with some important changes to improve the quality of the dispensed coffee, making more similar to the coffee dispensed by the machines used in bars.

Inside, the brewing chamber was changed to further improve the already optimum extraction.

Furthermore, a system was added to heat the brewing chamber during the stand-by phase for the purpose of increasing the temperature to optimum values when dispensing the "first coffees" (detail 7 )

The modern plastic made espresso coffee brewers are not able to ensure a suitable temperature for the "first coffees" as that plastic material of which they are made does not maintain an adequate temperature during stand-by, because of its tendency to cool down quickly.



Heating system with PTC

The newly introduced heating device (patented) is very simple and ensures the unit correct temperature even during stand-by, contributing to increase the already optimum quality of the dispensed coffee. The system is based on the use of a PTC type heater powered with 230 V AC, with an absorption of 25 W when cold and 5 W when hot (the PTC system permits optimum and automatic thermostat control). The power supply to the device begins when the machine is started and it is permanently on. The brewing chamber is kept at an optimum temperature of 75-80° C. While the heating element (PTC) is stable at 100° C, reached after 40 minutes.

**SEE THE SPECIFIC SECTION IN THE FUNCTIONAL UNIT MANUAL FOR A DESCRIPTION ON THE OPERATION OF THE Z 2000 UNIT**

To be reminded that to achieve an "ideal" espresso coffee, the following objective parameters must be kept constant:

- Coffee quantity and quality**
- Grade of grinding**
- Boiler temperature**
- Brewing and dispensing time**
- Water amount**

**Coffee quantity and quality:** it must be between 6 and 7.5 grams, with smaller amounts water would filter unevenly through the coffee compress not allowing its optimum use, while with larger amounts the dispensing time would become excessive with the resulting effect of burnt taste.

Coffee quality is very important and for an espresso coffee special blends, suitably balanced between "Strong" and Arabic, need to be used.

A poor quality coffee will never permit to achieve an optimum espresso, not even with the excellent Z 2000 unit.

**Grade of grinding:** an optimum grade of grinding is factory pre-set, therefore it is not advisable to change it; in any case because of the grinding wheels wear, after 10-15,000 coffee selections some adjustments need to be made to restore the original conditions

(such condition can be tested using special equipment or in an empirical manner checking the brewing time, which must be between 15 and 18 seconds).

**Boiler temperature:** factory adjusted to optimum settings; in any case under specific climatic conditions or distance above sea level, adjustments can be made using the trimmer on the machine control board, keeping in mind that tightening will increase the temperature and loosening will decrease it.

The default setting is about **90° C**, and every two turns correspond to approximately a 1° C change.

It is advisable to test the temperature after it stabilises, achieved after two on/off cycles.

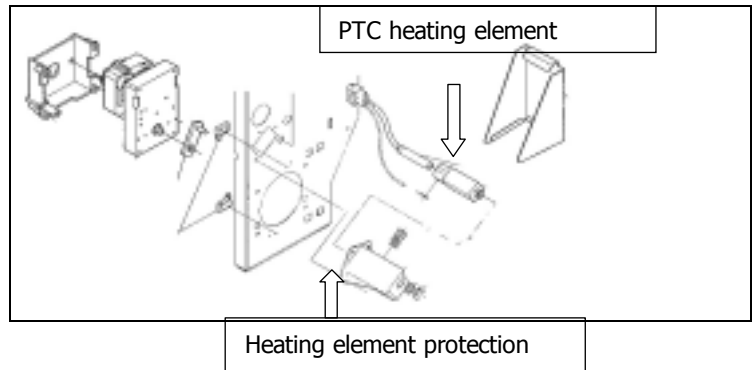
**Brewing and dispensing time:** dispensing time depends on the water amount settings, the coffee dose and the grade of grinding.

As already mentioned, the optimum time is between 15 and 18 seconds, which is a consequence and not a direct setting.

Brewing or pre-brewing time are set by default to 1 second, and refers to the time between opening the solenoid valve and the pump starting.

**Water amount:** For an Italian style "Espresso" coffee 40 c.c. must be set with a total amount in the cup of about 35 c.c., doses can vary for long coffee selections in other countries, but in this case the coffee **DOES NOT** have the characteristics of a typical "Espresso" coffee.

For northern Europe versions, there are models with a brewing unit to obtain Fresh-brew coffee. See the specific functional unit manual for a description on this unit.



## 6 - Stirrer dispensing unit

It is a specific and **innovative** functional unit, with double the capacity of stirrers, although having the same height, using two parallel guides side by side. **C** (patented)

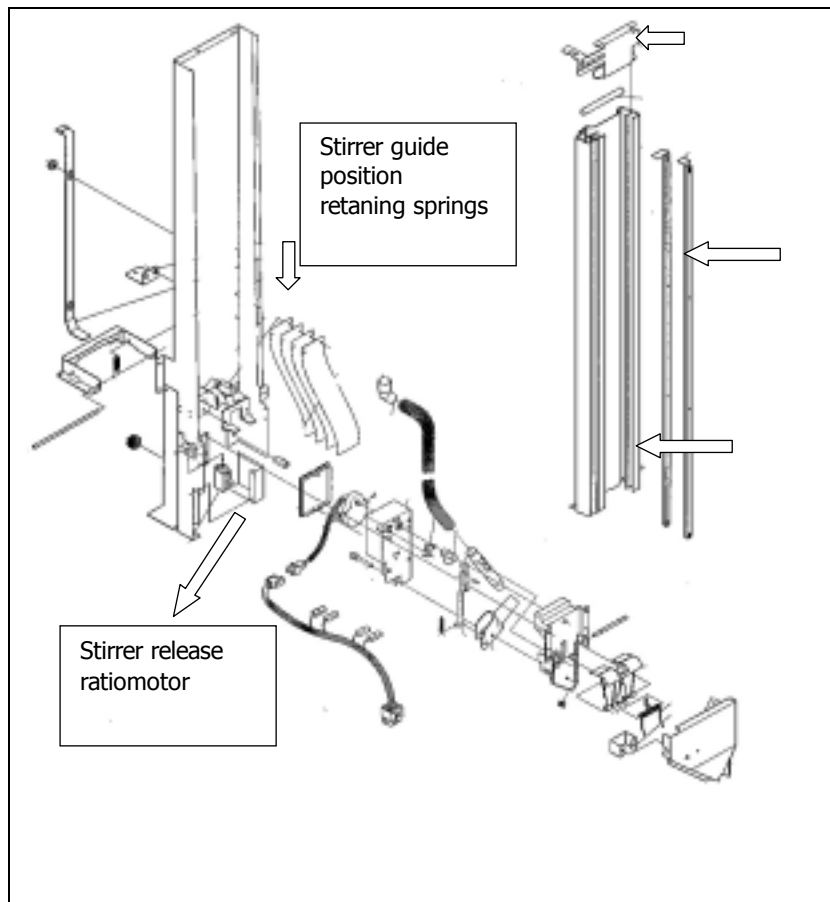
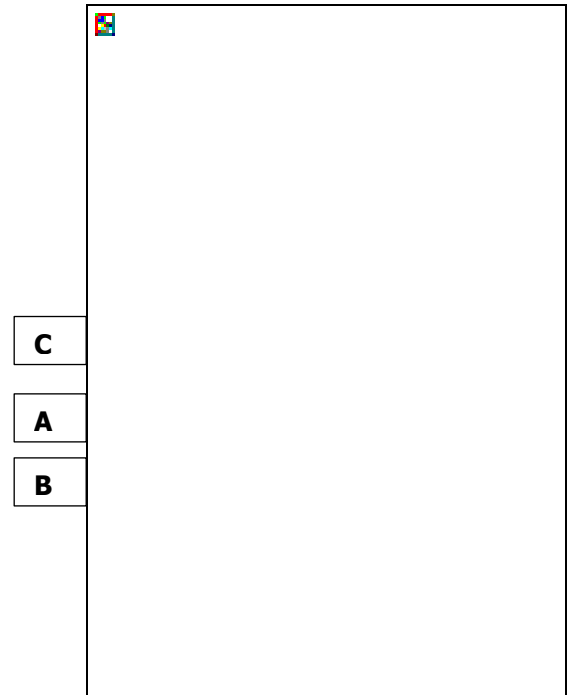
Compared to all units on the market manufactured by the competition, this is the only one with a capacity of about 1000 stirrers.

It is also possible to use **90, 105** and **115** mm stirrers, moving or eliminating the adapter profiles inside the guide. (**A**)

Operation: The ratiomotor, activated by relay **K24**, releases a stirrer and the sugar at the same time, as in the normal system already adopted with the simple standard stacker. The novelty is the double holding guide (**C**) and the guide shift activated by a microswitch that triggers the thermo expander

(**5**). As the special shape "weight" (**B**) moves forward (per contenimento palette), durante la fine delle stesse viene azionato un microswitch che a sua volta attiva il solenoide termico (**5**) Durante la sua corsa, viene azionato un cinematismo che permette lo scambio delle guide, A questo punto è possibile sganciare le palette della seconda colonna nel modo classico.

Alla fine delle palette della seconda colonna, il sistema si deve ripristinare manualmente nella posizione iniziale tirando la leva di riarmo (**4**)

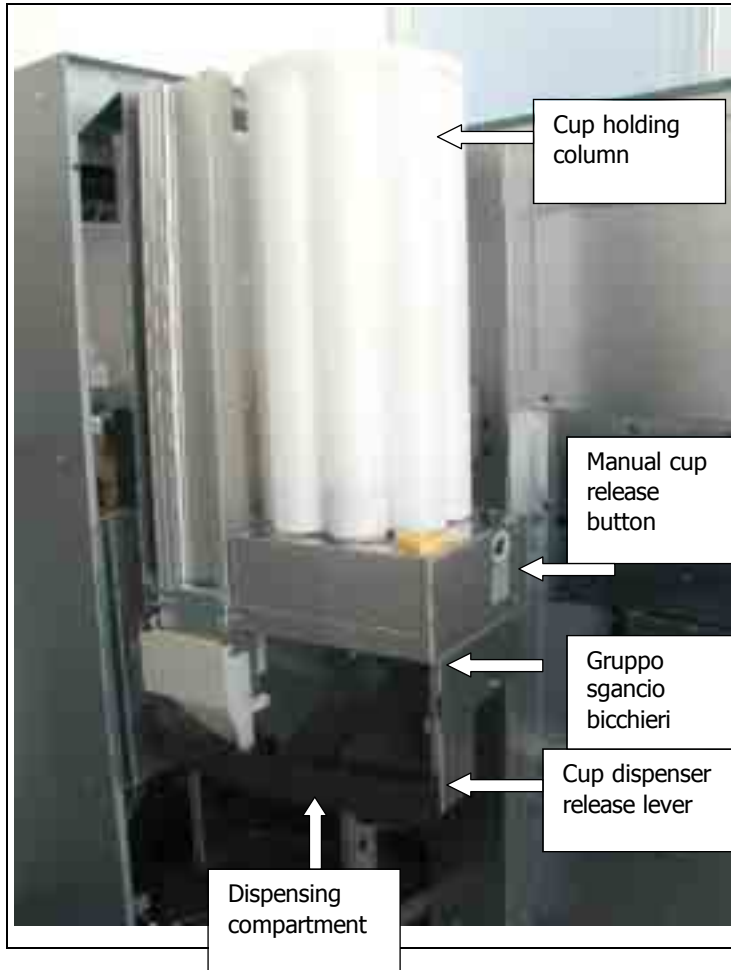


Weight (**B**) for compacting stirrers and triggering actuator

Spacers (**A**)

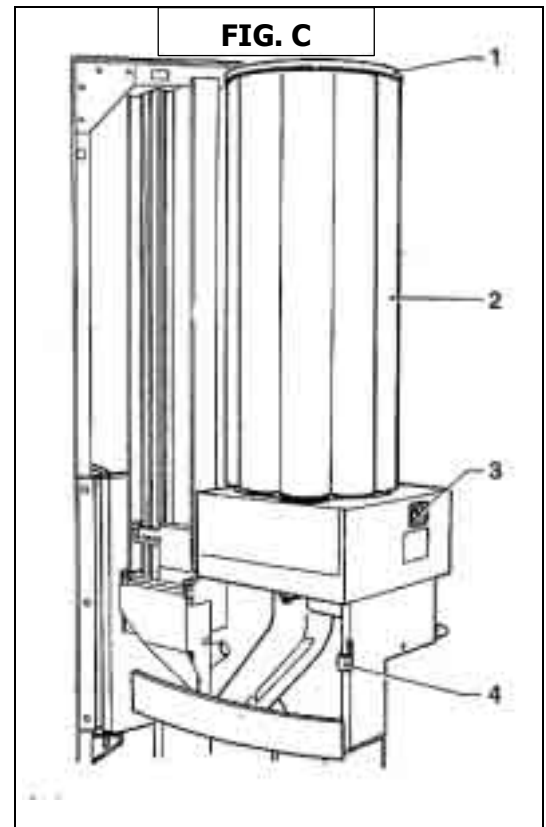
Double stirrer guide (**C**)

## 7 - Cup dispenser assembly



The new cup dispenser has a greater cup capacity (up to 1000 pieces, according to the model). Dispensing 71 mm diameter cups and 73 mm cups using a specific release unit.

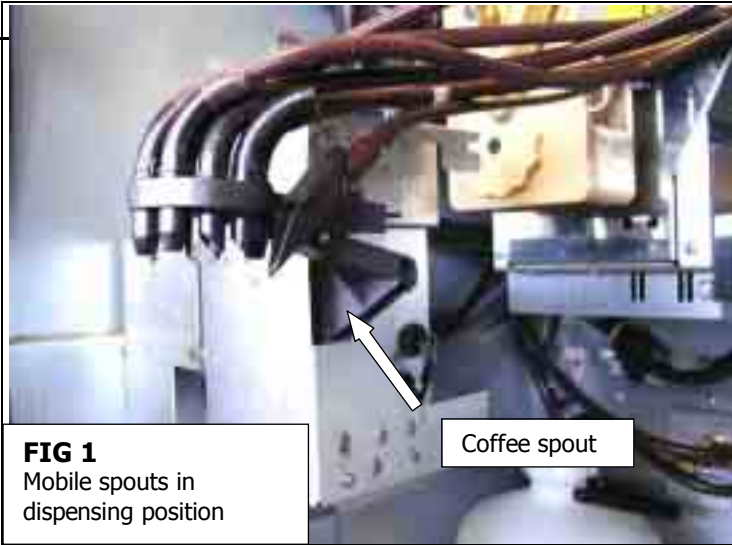
When first loading the cup dispenser completely empty do as follow:  
 Disconnect the power.  
 Load all cups except the ones for the column corresponding to the release channel.  
 Reconnect the power and insert the safety key, the device will automatically rotate the column until finding the channel with cups which will then fall into the release channel.  
 Load the column still empty.  
 The cups must all be of the same type, and in the event of using a new type replace completely.  
 Release a few cups using the manual release button.  
 Close.



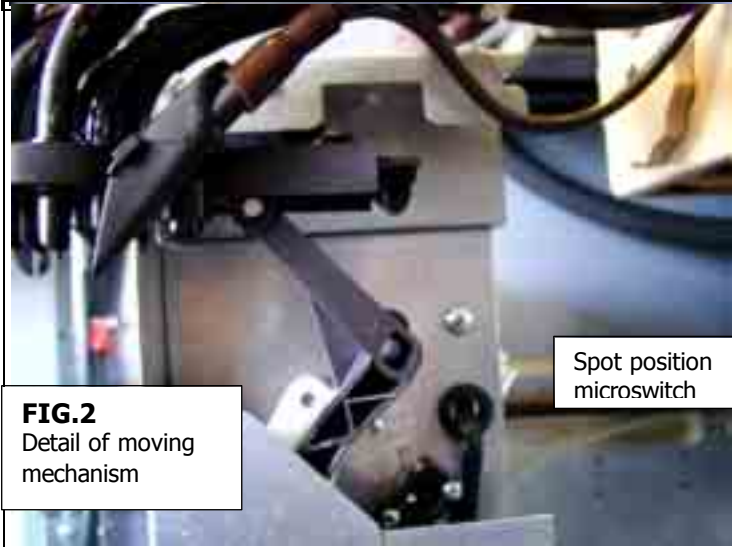
- 1- Cover
- 2- Stacker
- 3- Manual release button
- 4- Shelf release lever



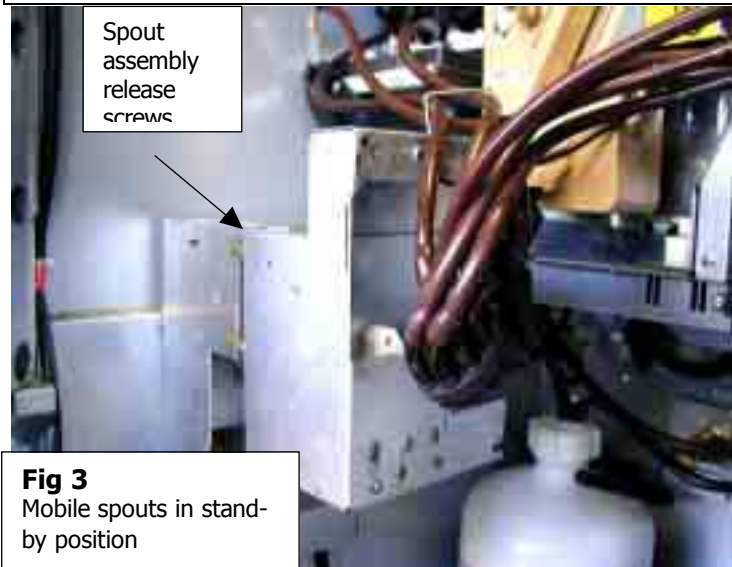
## 8 - Mobile spouts assembly



**FIG 1**  
Mobile spouts in  
dispensing position



**FIG.2**  
Detail of moving  
mechanism



**Fig 3**  
Mobile spouts in stand-  
by position

It is a new device used to move the dispensing spouts

The special mechanisms permit the spouts to be in position outside the dispensing compartment and tilted (Figure 3) during the machine stand-by. This way there are two advantages:

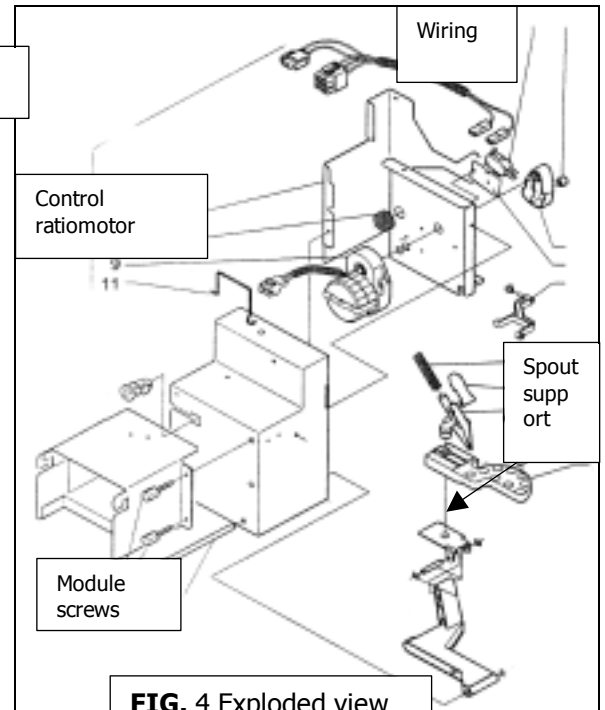
- 1) The spouts are not accessible from the outside (for greater hygiene).
- 2) The tilted position allows complete drainage of any liquid residue.

Both situations ensure UACP conformity.

During the dispensing phase, the cup is released first and then if required the stirrer and sugar. Then, before the product is dispensed, the spouts are lifted and moved forward to the centre of the cup, very close to the rim. (Figure 1) Thus achieving optimum appearance of the drink without splashes.

The dispensing and stand-by positions are ensured by the microswitch shown in Fig. 2.

The unit is a modular type, and easy to remove by loosening 2 screws and disconnecting the wiring.



**FIG. 4** Exploded view  
of mechanisms

## 9 - Doser grinder unit

### GRINDER MOTOR DETAIL

Considering the range of the Zenith vending machine, a new coffee grinder had to be designed, to be installed next to the standard doser device. The coffee grinder is a professional type, and composed as follows:

Induction motor with double polar torque, powered with grid voltage and fitted with a McFarad pick-up condenser...

The motor loadless speed is 1500 RPM and approximately 800-900 RPM when grinding.

The motor axis is connected directly to the grinder wheels without any reduction for improved reliability and strength. The grinder unit is fitted with a pair of 63.5 mm dia wheels. \* 63.5 mm

Compared to the conical ones the flat wheels have the advantage of being able to grind at a higher speed, and coupled to the motor used the result is an extremely reduced grinding time. A 6.5 g coffee dose is ground in approximately 2 seconds.

The motor used does not need any maintenance, and in the event of sudden blockage due to hard foreign matter in the coffee, no damage at all is caused.

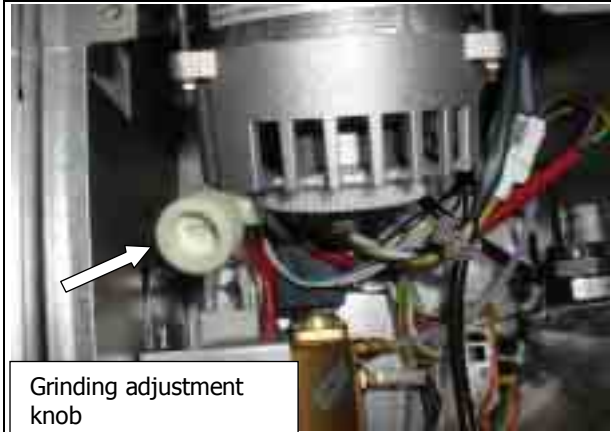
In addition, the motor is protected from overheating by means of an auto-reset Klaxon.

The grade of grinding is adjusted with a knurled knob located under the motor, and this solution permits the compensation of any play due to normal wear, improving the degree of accuracy.

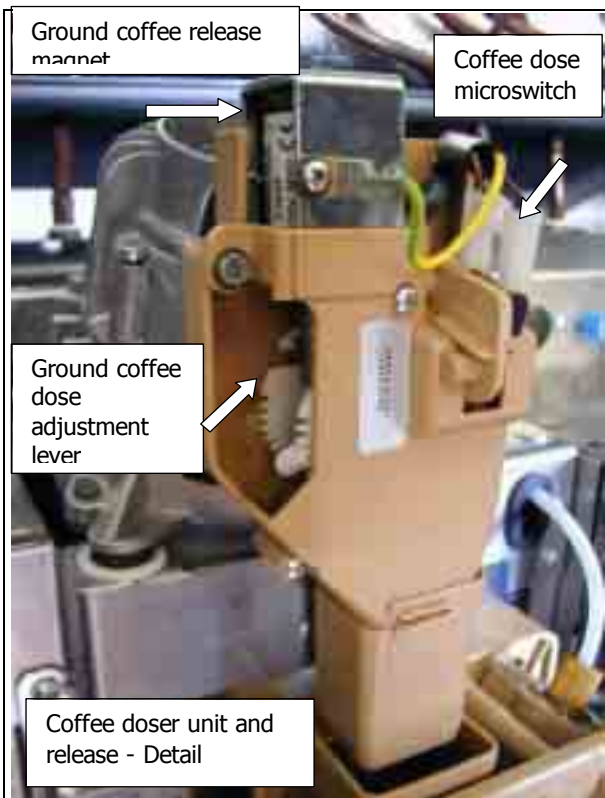
The special assembly slightly tilted reduces the amount of coffee present in the doser device conduit, ensuring freshly ground coffee for each selection.

The grinder is coupled to the volumetric doser device already used in other machines (Venezia , Brio, Spazio) but with better accuracy characteristics and other improvements needed because of the high grinding speed.

Refer to the specific chapter in the functional unit manual for all adjustment and maintenance operations.



Grinding adjustment knob



Ground coffee release magnet

Coffee dose microswitch

Ground coffee dose adjustment lever

Coffee doser unit and release - Detail



Detail view of grinder doser unit without coffee

## 10 - Mixer and steam suction assembly

### **The NECTA mixers:**

they are the state of the art for a traditional solution with mixing wheel, axial seal is achieved with the use of "self-positioning" technologically advanced materials, unique in its kind. The high rotation speed permits complete mixing, with a drink appearance and quality that can compete with the products served at bars.

For further information see the relevant chapter in the functional unit manual.

### **IL gruppo aspirazione:**

vapori ha la seguente funzione :

To remove the steam formed during mixing, and at the same time eliminate the powder that is unintentionally sucked in.

It is necessary to create an equilibrium allowing maximum steam suction with minimum soluble powder suction. Furthermore, considering that soluble powders are a contamination hazard (especially milk and soup) such fine powders must be removed into special compartments without being introduced in the suction circuits, and such compartments must be easily accessible for routine cleaning and sanitising.

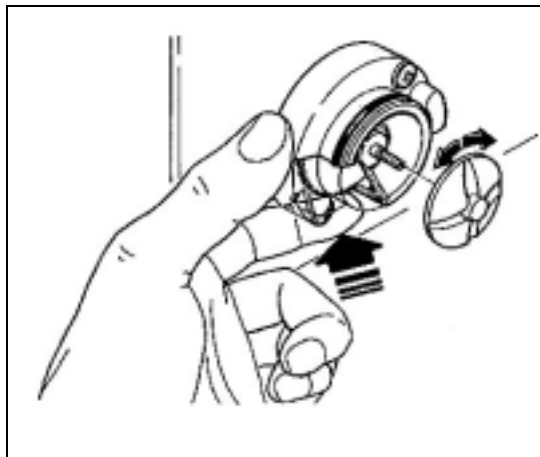
### **The unit comprises:**

An exhauster with cross-flow fan fitted with an induction motor powered with 230 V AC sucks air into compartment A by means of a spiral tube, a depression is created inside such compartment causing the steam to be sucked in through the drawer that is integrated in the mixer funnel. When the steam flows through such drawer it eliminates almost all of the powder sucked in with the steam. As already mentioned in the mixer paragraph, when removing the funnel also the drawer is removed, permitting easy and thorough cleaning.

### **Safety devices:**

The motor is an induction type with rotation velocity about 1500 RPM, provided with overheating protection due to its own impedance, which means also with the motor locked; the temperature in the windings will never exceed the maximum allowed by the relevant standards.

For more extensive maintenance remove the lid from the suction compartment supporting the containers, undoing the two quick fasteners and thus gaining complete access to the internal compartment for easy and thorough cleaning.



### **Dettaglio mixer:**

Detail of wheel and bush support





Removing the powder drawer incorporated in the liquid and soluble powder funnel.

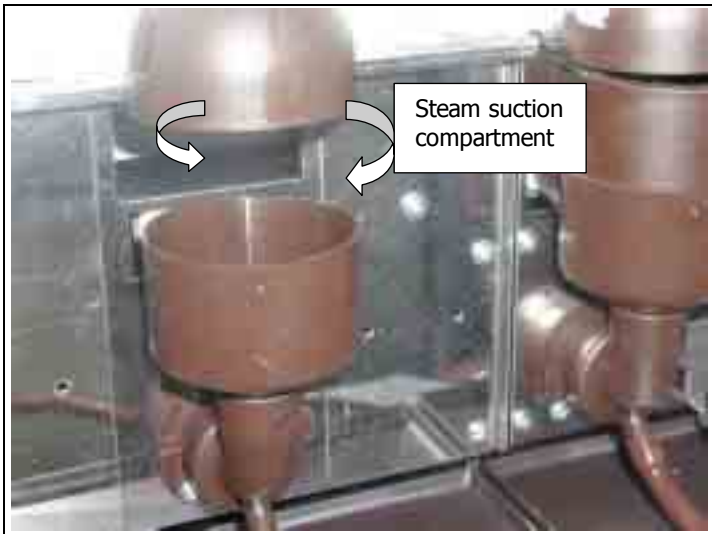
Mixer with instant tea coil



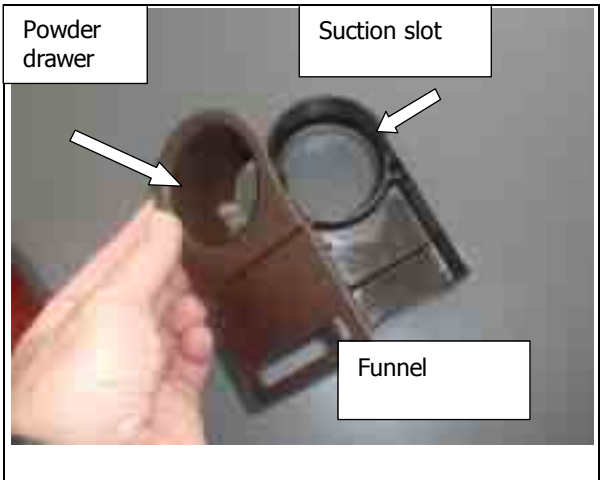
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**Description of operation**  
 Exhauster (D), with continuous operation also during stand-by, creates a slight vacuum in compartment (A), such vacuum forces the steam (formed during an instant drink selection) to enter drawers (B), and the special labyrinth contained in them separate the powder from the steam. (The suction of powder is inevitable although undesirable) the steam continues its flow through the exhaust union (C), to be expelled free of any impurity from the grille on the back panel  
 Very innovative is the removal system, integrated in the mixer funnel, permitting easy inspection and continuous and automatic cleaning at each inspection, eliminating the risk of overlooking such operation

Opening funnel lid



View without drawer and funnel



# 11 - Powder and liquid dose tables

## Dose table: Espresso versions - Italy

Selection	Water doses	Powder doses	Sugar doses
<b>Espresso coffee</b>	<b>Espresso coffee</b> 60 c.d.v. (40 cc)	7 g of ground coffee	7.5 g - central position
<b>Long coffee</b>	<b>Espresso coffee</b> 95 c.d.v. (60 cc)	7 g of ground coffee	7.5 g - central position
<b>Coffee with milk</b>	Milk - 30 cc Espresso coffee - 60 c.d.v. (tot 40+30 = 70 cc )	3 g of milk 7 g of ground coffee	7.5 g - central position
<b>Coffe with chocolate</b>	Espresso coffee 60 c.d.v. (40 cc) Chocolate - 25 cc (tot 40+25 = 65 cc )	7 g of ground coffee 3.5 g - chocolate	7.5 g - central position
<b>Cappuccino</b>	Milk - 55 cc Espresso coffee - 60 c.d.v. (tot 40+55 = 95 cc )	4.5 g - milk 7 g of ground coffee	7.5 g - central position
<b>Cappuccino with chocolate</b>	Milk - 50 cc Espresso coffee - 60 c.d.v. Chocolate - 25 cc (tot 50+40 +25= 115 cc)	3.5 g - milk 7 g of ground coffee 4.0 g - chocolate	7.5 g - central position
<b>Latte macchiato (milk with coffee added)</b>	Milk - 60 cc Espresso coffee - 60 c.d.v. (tot 40+60 = 100 cc )	8.0 g - milk 7 g of ground coffee	7.5 g - central position
<b>Milk</b>	Milk - 100 cc	10.0 g - milk	7.5 g - central position
<b>Coffee 2 (Instant)</b>	Coffee 2 (Instant) 40 cc	Coffee 2 (Instant) 1.3 g	7.5 g - central position
<b>Long coffee 2</b>	Coffee 2 (Instant) 55 cc	Coffee 2 (Instant) 1.3 g	7.5 g - central position
<b>Coffee with milk 2</b>	Milk - 25 cc Coffee 2 - 40 cc (tot 40+25 = 65 cc )	3 g of milk Coffee 2 (Instant) 1.3 g	7.5 g - central position
<b>Coffee with chocolate 2</b>	Coffee 2 - 40 cc Chocolate - 25 cc (tot 40+25 = 65 cc )	Coffee 2 (Instant) 1.3 g 3.5 g - chocolate	7.5 g - central position
<b>Cappuccino 2</b>	Milk - 55 cc Coffee - 40 cc (Tot. 40+55= 95 cc)	4.5 g - milk Coffee 2 (Instant) 1.3 g	7.5 g - central position
<b>Cappuccino with chocolate 2</b>	Milk - 50 cc Espresso coffee - 30 cc Chocolate - 25 cc (tot 50+30 +25= 105 cc)	3.5 g - milk Coffee 2 (Instant) 1.3 g 4.0 g - chocolate	7.5 g - central position
<b>Lemon tea</b>	Tea - 100 cc	12.5 g - tea	-----
<b>Peach tea</b>	Tea - 100 cc	12.5 g - tea	-----
<b>Decaf coffee</b>	Coffee 2 (Instant) 40 cc	Coffee 2 (Instant) 1.3 g	7.5 g - central position
<b>Decaf coffee with milk</b>	Milk - 25 cc Coffee 2 - 40 cc (tot 40+25 = 65 cc )	3 g of milk Coffee 2 (Instant) 1.3 g	7.5 g - central position
<b>Decaf cappuccino</b>	Milk - 55 cc Coffee - 40 cc (Tot. 40+55= 95 cc)	4.5 g - milk Coffee 2 (Instant) 1.3 g	7.5 g - central position
<b>Chocolate</b>	Chocolate - 90 cc	23.0 g - chocolate	-----
<b>Strong chocolate</b>	Chocolate - 90 cc	27.0 g - chocolate	-----
<b>Chocolate with milk</b>	Chocolate - 70 cc Milk - 25 cc (tot 70+25 = 95 cc )	19.0 g - chocolate 4.0 g - milk	-----

**NOTE: c.d.v.** = wheel pulses (for espresso selections only)

For instant drinks a time calculation is made on the rated solenoid valve flow

### NOTE 1

The water flow in the mixers is approximately 12 c.c. per second and it is given as an indication, as there are many variables that can affect the accuracy.

The liquid dose for espresso coffee is determined by the pulse counting of the wheel.

(volumetric counter) while for instant selections it is measured in tenths of a second, and according to the solenoid valve flow the amount in c.c. is determined.

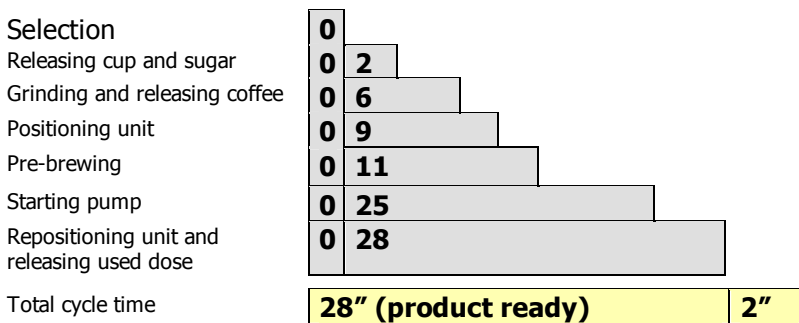
**NOTE 2**

To be noted that the number of pulses does not change in a linear maner (i.e. double the amount of water does not correspond to double the number of pulses), however the counter varies the accuracy according to the water flow velocity, and namely:

For espresso coffee it is reduced considerably because of the coffee compress reaction that slows down the water flow, while it is accelerated in the instant drinks selections, since there are no obstructions to the water flow. Therefore, in the event of changing the doses set at the factory, some measurements must be made using measuring containers.

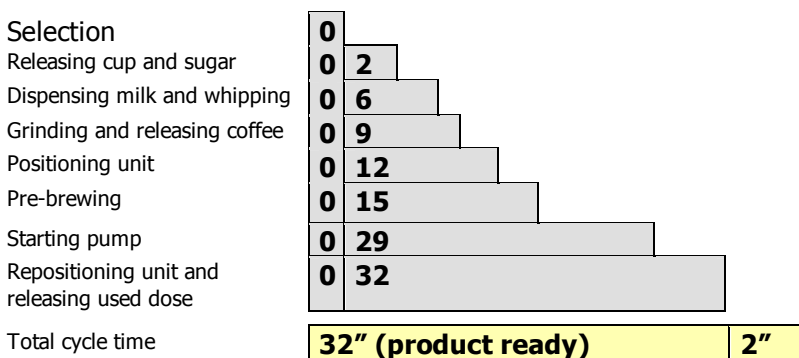
## 11.1 - Product dispensing cycle time

**Cycle time for dispensing drinks in the Zenith espresso Espresso coffee**



(The total cycle time is referred to the time until the drink is ready, for a second selection 2 more seconds are necessary)

**Cycle time for dispensing drinks in the Zenith espresso Espresso coffee with milk**



The total cycle time is referred to the time until the drink is ready, 2 more seconds are necessary to activate the system to accept a new selection.

## 12 - Trouble-shooting

<b>Problem</b> (and/or indication on the display)	<b>Possible cause</b>	<b>Solution</b>
<b>The machine does not go into the boiler heating phase, remaining in the installation phase</b>	<p>No water flow from the mains or insufficient pressure (5-85 N/cm<sup>2</sup>)</p> <p>The air-break microswitch is faulty</p> <p>Water inlet solenoid valve locked by the overflow tube and activated by the relevant relay</p> <p>The float microswitch is faulty, or the liquid waste container is full</p>	<p>Check the presence of one or more of situations indicated and once identified the cause do as follows:</p> <p>Short-circuit the microswitch to check it functioning</p> <p>Unlock the water inlet valve, undoing the threaded ring and emptying the overflow tube</p> <p>Check for 230 V AC voltage at the solenoid valve power supply ends</p> <p>Check the activation of relay <b>K22</b></p>
<b>The display indicates the message "No coffee"</b>	<p>The grinder motor is locked because the pick-up capacitor is faulty</p> <p>There is no coffee</p> <p>The grinder wheels are locked because of foreign matter in the coffee</p> <p>Grinder motor overheating device triggered</p> <p>The coffee container shutter was not opened</p>	<p>When an espresso coffee selection is made the grinder is activated conveying coffee to the doser device, the motor lock is activated by the microswitch which is triggered when the set dose is reached. If such microswitch is not triggered within a set time, the system disables all espresso coffee selections, indicating the message "No coffee" on the display, once identified the cause:</p> <p>In the event of blockage, free the grinder wheels with the utmost care, as blocked wheels would have triggered the overheating protection, which is resettable. Open the shutter, add coffee, replace pick-up capacitor.</p>
<b>The display indicates the message "Coffee release failure"</b>	<p>Failure to the release magnet</p> <p>Failure to the coffee dose microswitch</p> <p>Failure to relay K02</p>	<p>After grinding and during the attempt of releasing the ground coffee, the doser device plate triggers a microswitch that signals the coffee release</p> <p>If such microswitch is not triggered, there could have been two causes:</p> <p>Failure to the release magnet or overheating protection triggered (resetting is automatic, and after approximately 5 minutes it is reactivated, but the cause of such trigger must be identified).</p> <p>Failure to the microswitch: replace with an identical one designed for the Colibri, in the event of using a microswitch with different characteristics considerable discrepancies in the ground coffee doses may occur, and also SW malfunctions.</p>
<b>The display indicates the message "Mobile spouts"</b>	<p>Faulty positioning microswitch</p> <p>Interference from objects preventing free movement (tubes, cups etc.)</p> <p>Failure to the ratiomotor</p>	<p>Check the functioning of the microswitch and if necessary replace with an identical one.</p> <p>Check that the motor is able to move the spout assembly without any interferences (to prevent any possible injury the motor was designed to stop even with the slightest obstruction)</p> <p>The reducer mechanism of the motor is damaged because of tampering during its movements, replace.</p>
<b>The display indicates the message "Instant Boiler"</b>	<p>The boiler does not heat</p> <p>Dry operation protection system triggered.</p> <p>Anti-boiling protection system triggered.</p> <p>NOTE: The espresso boiler has always heating priority, therefore check that there is no such condition.</p>	<p>The machine is locked if after 10 minutes heating the set temperature is not reached.</p> <p>Check the correct operation of the heating element, the dry operation thermostat, the anti-boiling thermostat, the probe and of the actuation triac on the instant boiler control board.</p> <p>In the event of triggered safety thermostat, before resetting (manually) the cause <b>MUST BE</b> identified and corrected.</p>

<b>Problem</b> (and/or indication on the display)	<b>Possible cause</b>	<b>Solution</b>
<b>The display indicates the message "Espresso Boiler"</b>	The boiler does not heat Dry operation protection system triggered.	The machine is locked if after 10 minutes heating the set temperature is not reached. The espresso boiler has heating priority. Check the correct operation of the heating element, the dry operation thermostat, the probe and of the actuation triac on the espresso boiler control board (located next to the boiler). In the event of triggered safety thermostat, before resetting (manually) the cause <b>MUST BE</b> identified and corrected.
<b>The display indicates the message "No cups"</b>	No cups in the dispenser Microswitch failure The cup column does not rotate Faulty ratiomotors	If no cups were loaded when starting the machine, the column rotation ratiomotor is activated to search for a full column and if no cups are found within a 60 sec "time-out", indicated by the specific microswitch, the machine is locked. Excluding the fact of a real lack of cups, the correct microswitch functioning must be checked and in the event of failure they must be replaced with identical characteristic microswitches. In the event of locked ratiomotor, check for the correct actuation of relays K21 and K23 or for the correct operation of the ratiomotors.
<b>The display indicates the message "Espresso unit"</b>	The espresso unit failed to reposition. Faulty positioning microswitches Ratiomotor overheating device triggered Failure to relay K04 Faulty unit detection microswitch	Check that the unit is positioned correctly. Check the functioning of the positioning microswitch and for correct connections. Check if due to possible interferences the overheating protection was not triggered (self-resetting type) and check the functioning of relay K04 Check that the unit is free to rotate completely and without interferences.
<b>The display indicates the message "Espresso unit 2"</b>	The espresso unit failed to reposition. Faulty positioning microswitches Ratiomotor overheating device triggered Failure to relay K04 Faulty unit detection microswitch	Check that the unit is positioned correctly. Check the functioning of the positioning microswitch and for correct connections. Check if due to possible interferences the overheating protection was not triggered (self-resetting type) and check the functioning of relay K04 Check that the unit is free to rotate completely and without interferences.
<b>The display indicates the message "Volumetric counter" (Wheel)</b>	This failure can occur only in espresso selections, since the counter computes only the water for espresso selections. The water dose for coffee is not reached within 60 sec.	The water amount for both espresso coffee and instant drink selections is ensured by a volumetric counter; with the water flow a wheel rotates and through a sensor sends a number of pulses corresponding to the water dose programmed in the SW. If such dose is not reached within 60 sec it means that there is a problem: Check for the correct functioning of the volumetric counter; there must be 5 V AC on the terminals during the counter operation. Check that coffee is not ground too fine and the dose excessive. Check for clogging in the coffee filters.

<b>Problem</b> (and/or indication on the display)	<b>Solution</b>	<b>Possible cause</b>
<b>The display indicates the message "Air-break failure"</b>	No water from the mains. Faulty air-break microswitch Failure to the float actuation system.	If in the period taken to make 6 selections with any dose the microswitch controlled by the air-break float is not triggered (i.e. the correct level is not restored) the vending machine is locked for air-break failure. The malfunction could occur for lack of water from the mains, or because of a failure to float microswitch system. Replace the microswitch with one having the same characteristics, otherwise other malfunctions may occur.
<b>The display indicates the message "Coin mech failure"</b>	No coin mechanism installed. The coin mechanism installed is not compatible with the protocol settings. The coin mechanism does not communicate with the SW	Install a compatible coin mechanism. Set the correct communication protocol. Check to see if the the failed communication is due to a faulty coin mechanism or to a wrong connection.
<b>The display indicates the message "RAM data"</b>	Wrong RAM data which must be retrieved by initialising the Eprom.	SW problems due to intense electromagnetic interference. Initialise the Eprom Electronic failure - Replace board.
<b>The display indicates the message "Machine board"</b>	The board fails the start-up routine	Switch off the vending machine and attempt initialising. Faulty board: replace.
<b>The display indicates the message "Water failure"</b>	Models with water supply from the mains: If the air-break microswitch is closed for more than a minute.	Check the water inlet solenoid valve. Check the correct actuation of relay K 12. Check the air-break microswitch. Check the tank float microswitch.
<b>The coffee lacks body and cream and is dispensed too quickly</b>	Excessively coarse grinding. Insufficient ground coffee dose. Blocked by-pass	Inspect the grade of grinding, keeping in mind that it takes between 15 and 20 seconds to dispense optimum espresso coffee. (Pump starting time) A shorter time means that the grade of grinding is too coarse. With wear the grinding wheels must be adjusted regularly. Check the coffee dose, weighing it at least 5 consecutive doses; the average weight must be between 6.5 and 7 grams. Check the by-pass efficiency.
<b>Coffee is dispensed too slowly and it tastes burnt</b>	Excessive coffee dose. Grinding too fine. Faulty pump by-pass. Clogged coffee filters.	Inspect the grade of grinding, keeping in mind that it takes between 15 and 20 seconds to dispense optimum espresso coffee. (Pump starting time) A longer time means that the grade of grinding is too fine. Adjust the grinding wheels. Check the coffee dose, weighing it at least 5 consecutive doses; the average weight must be between 6.5 and 7 grams. The by-pass is set from the factory to trigger at 12 bar. Lower settings will lengthen the dispensing time with resulting burnt taste. Replace the coffee filters.
<b>The mixers clog up</b>	The whipper failed to rotate. Powder removal drawer full. Insufficient water to powder ratio.	Check for the motor overheat protection trigger, if necessary check the cause of such trigger. Empty the powder removal drawer. Check / adjust the water to powder ratio.

## **HACCP DIRECTIVE (EEC 93/43 and 96/3)**

### Outline and instructions for use

Notes: What is indicated by the Ec Directive

Directives **EEC 93/43 and 96/3** concern the hygiene of food products and are based on the **HACCP (Hazard Analysis Critical Control Point)**.

The purpose of this directive is to safeguard the consumer health, suggesting a series of actions to be taken by the vending company, aimed at checking, identifying and correcting any critical aspects in the foodstuff chain, from the purchase of products and machines to the dispensing of the product.

The **HACCP** is a system used to analyse any potential risks in the manufacturing and distribution cycle of food product and to identify critical points where such risks can occur; the system also highlights the actions to be undertaken and the decisions to be made with regard to such critical points, as well as the implementation of checking and monitoring procedures.

*Therefore, each vending company must develop a Company Hygiene Self-control Manual according to the provisions of the directive - and if necessary use the information and recommendations formulated by some associations in the sector. The manual must contain a programming and checking schedule for the vending machine hygiene condition*

#### **Important notes:**

For a correct use of the machine, the directives must be fully applied. **The operator is responsible for correct operations on a vending machine**

### HACCP Directives (EEC 93/43 and 96/3)

#### Guidelines for correct application

Ensure hygiene control with a special manual for correct hygiene practices.

After cleaning, do not touch the surface of any elements that may come into contact with food.

Wash your hands thoroughly, preferably using disinfectant, before starting any hygiene operations

Use disposable sterile gloves

Always use a clean cloth to wipe dry.

Keep the work area tidy.

Check that the product packages are intact and not damaged.

Keep coffee and powder products in a cool, dark and dry place.

Use products within the recommended time period (see expiry date on the package).

Always use products from the warehouse according to the principle of "first-in first-out".

Tightly close and seal any product packages not completely used.

Coffee and consumables must be kept and transported separate from the cleaning products.

The product containers must be cleaned regularly (see operation instructions).

Only fill coffee or other product containers with sufficient amount for the expected use until the next cleaning.

### **Cleaning the machine (Page 23, 24, 25)**

Carefully observe the following cleaning instructions!

Clean the machine, preferably at the end of the day or in the morning before the machine is used.

After cleaning, dispense and check a drink (see last check).

Fill in the check list log for cleaning operations.

When the display indicates an error message immediately check the trouble-shooting sheet.

Use only recommended cleaning products approved for foodstuff, preferably liquid; avoid the use of powder and abrasive products.



## Daily cleaning and hygiene

**(Expected time 5' 30")**



FIG. 1

Open the door and disconnect the machine from the power supply (FIG 1)

Empty the liquid waste container and rinse thoroughly, replace the spent grounds bag with a new one.

Remove the powder dispensing spouts and clean thoroughly using specific hygiene products (FIG. 2-3-4)

If **necessary**, remove the containers, empty them completely and clean thoroughly. Remove the drip tray under the mixers and wash with tap water.

Remove the drip tray under the dispensing compartment and wash with tap water. Remove the coffee unit, clean it and rinse with hot water. (FIG 7-8)

Remove the sugar dispensing spout and clean thoroughly (FIG. 9)

Clean the cup chute inside the dispensing compartment (FIG. 5)

Remove and clean the dispensing spout assembly (FIG 6)

Reassemble all parts, taking care not to touch with your hands any parts that come into contact with food.

Close the door and make some test selections. Carry out a mixer automatic wash cycle with hot water according to the pre-set procedures indicated in the specific use and maintenance manual.

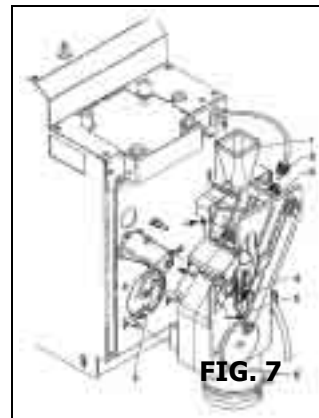


FIG. 7

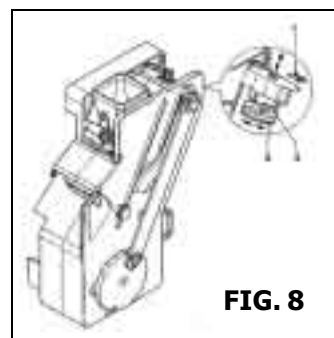


FIG. 8

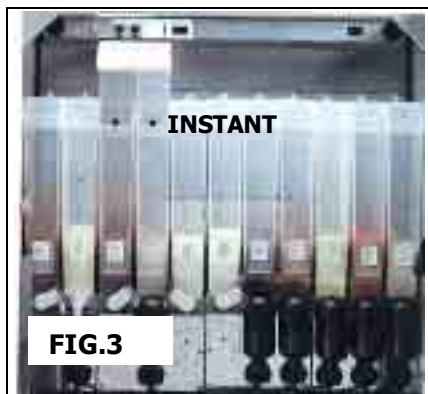


FIG. 3



FIG. 2



FIG. 4



FIG. 5

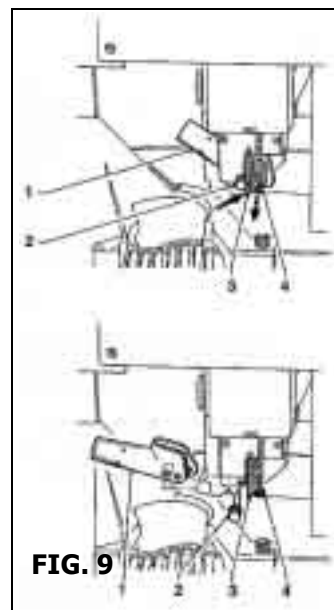


FIG. 9

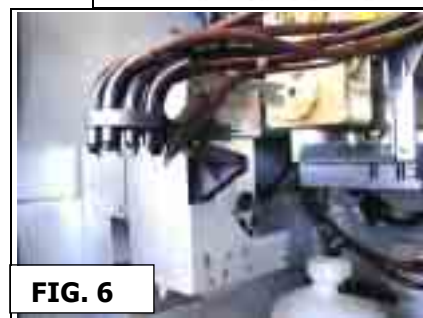
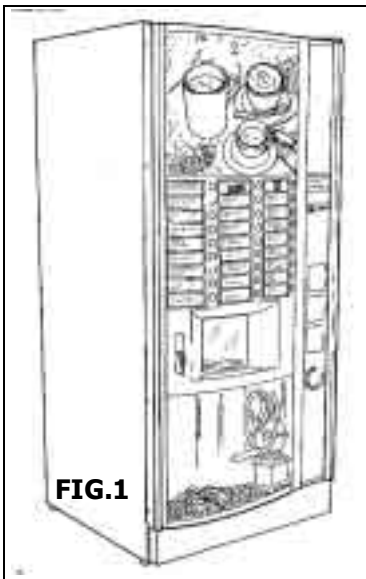


FIG. 6



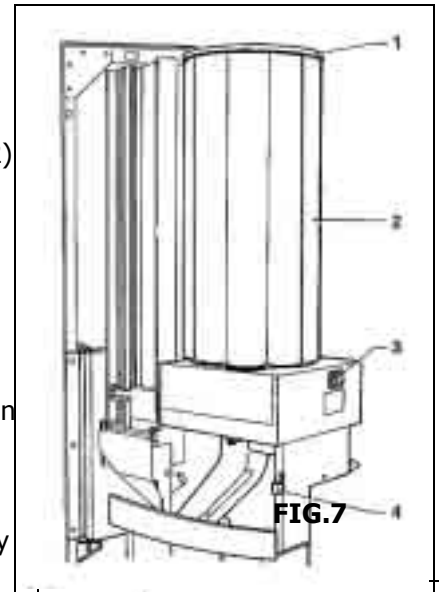
## Weekly cleaning and hygiene

**(Expected time 6')**

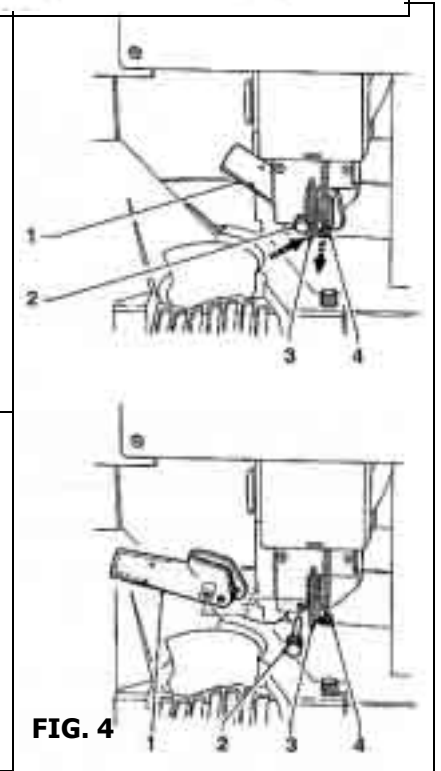


**FIG. 1**

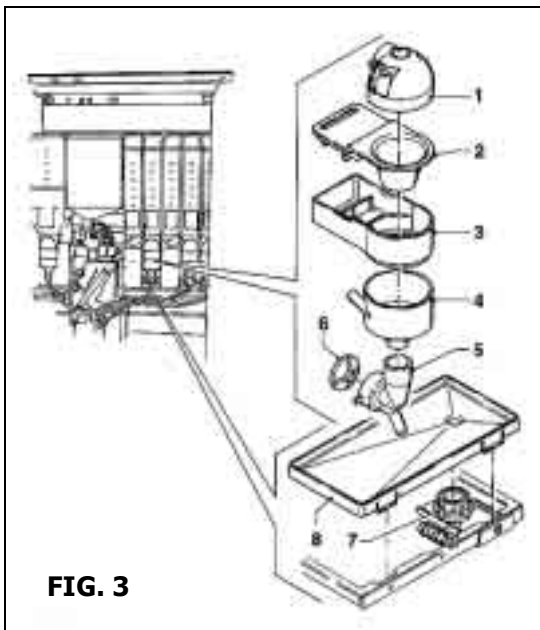
Open the door and disconnect the machine from the power supply (FIG 1)  
 Remove the powder dispensing spouts and clean thoroughly using specific hygiene products (FIG.2)  
 Remove the containers, empty them completely and clean thoroughly. (FIG 2)  
 Remove the liquid collection container and the grounds container, empty and clean them  
 Empty any residue from the coffee grinder and doser assembly, clean thoroughly and rinse with hot water. (FIG 5)  
 Remove the coffee dispensing assembly and clean thoroughly (FIG. 5)  
 Remove the sugar dispensing spout and clean thoroughly (FIG. 4)  
 Remove and clean the dispensing spout assembly (FIG 6)  
 Disassemble completely the mixers and clean thoroughly (FIG. 3)  
 Empty the powder collection containers, located within the steam suction system, and disinfect. (FIG.3)  
 Reassemble all parts, taking care not to touch with your hands any parts that come into contact with food.  
 Close the door and make some test selections.  
 Carry out a mixer automatic wash cycle according to the pre-set procedures. Enter the operations carried out in the HACCP log.



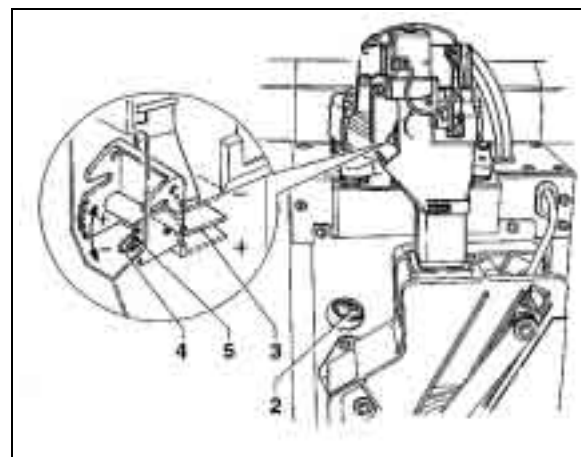
**FIG. 7**



**FIG. 4**



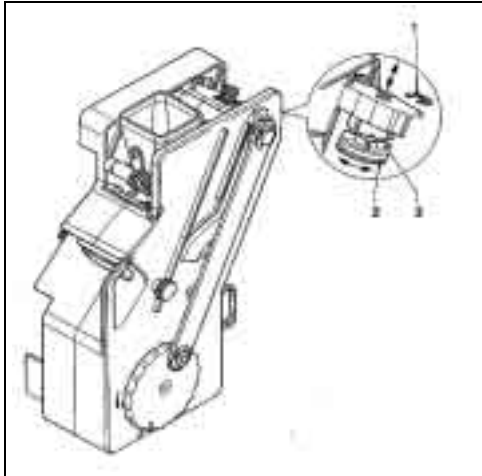
**FIG. 3**



# Monthly cleaning and hygiene (or every 5000 selections)

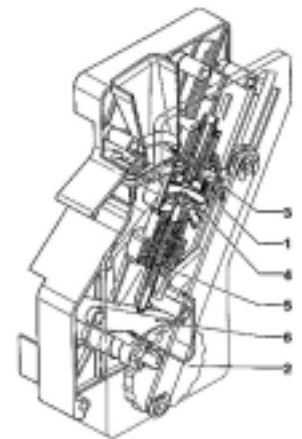
**Expected time 14' (in addition to the time taken for regenerating the filter)**

**FIG.1**



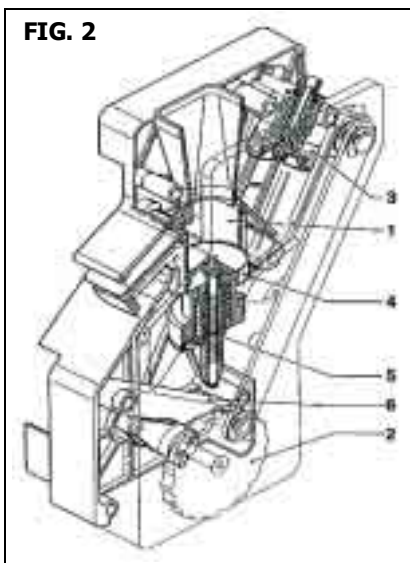
In addition to the **weekly** operations, also the following must be carried out:  
Remove the brewer unit from the machine and disassemble, then clean all residue and rinse thoroughly with hot water, check the filters for clogging and if necessary descale or replace them. Reassemble all parts and slightly lubricate the piston o-rings using food-safe grease or replace them if even slightly damaged. (FIG. 1-2-3)

Disassemble the mixers completely, clean and wash using sanitising products, especially the powder removal areas, disassemble completely the wheel and check the state of the seal (Fig. 7), when reassembling don not touch with the bare hands (Fig. 8)



**FIG. 3**

**FIG. 2**

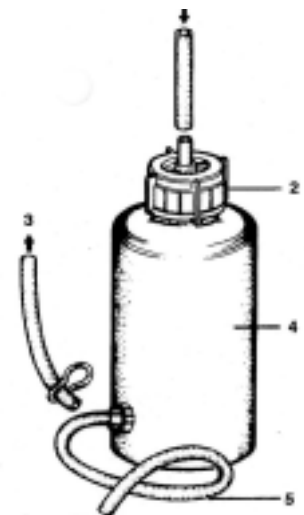


Regenerate the water softener (if installed) using the special salt solution, even if the softener efficiency test is still positive. (FIG 4)  
The softener filter can be contaminated easily and therefore regeneration ensures maximum hygiene.

Remove and clean the air-break and all tubes in the circuit up to the boiler, rinsing them using sanitising products (FIG. 5), replace the filter.

During regeneration, it is advisable to completely sanitise the hydraulic system and the water inlet solenoid valves. (FIG 6)

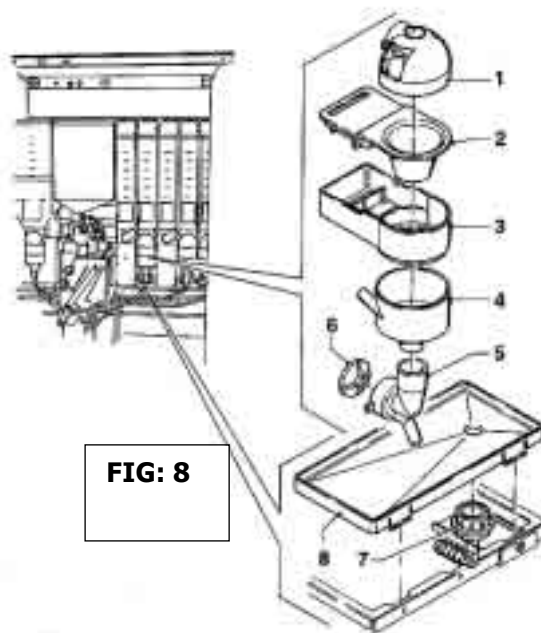
Enter the operations carried out in the HACCP hygiene program log



**FIG. 4**

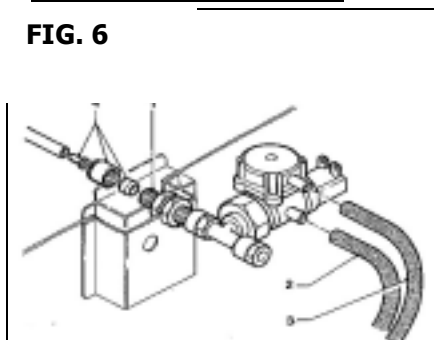


**FIG. 5**



**FIG: 8**

**FIG. 6**



**FIG. 7**

