AZKOYEN
INDUSTRIAL

Technical information

TEMPO

Avda. San Silvestre, s/n
31350 Peralta (Navarra) Spain
Tel.: +34 948 709 709
www.sat.azkoyen.com

■■ I N D E X ■■

1. INTRODUCTION

The automatic vending machines in the **TEMPO** range are destined to the elaboration and sale of *espresso coffee* and instant beverages that consist of the mixture of hot water and soluble powder or granules. The product is served in a plastic cup.

In the rest of this document the following elements will be called:

The machines in the **TEMPO** range, *machine* or *machines.* The espresso coffee infusion element, *infusion element*. The electro valve, *EV* or *EVs*

1.1. DEFINITIONS

Espresso coffee: infusion of coffee elaborated according to the following conditions:

- 7 g of ground coffee.
- The temperature of the infusion water between 92º C and 96º C.
- The water pressure at 8 kg/cm².
- The infusion time of the coffee between 20 and 28 seconds.
- The volume of water in the infusion 40 ml.

Volume dosage: this dosage system measures the volume of water that is used for the espresso infusion.

Water pump: an electro magnetic system for pumping the infusion water and giving it the correct pressure.

Infusion: this is the name given to the process of passing hot water through the ground coffee to extract its oils and essences.

- **Volumetric infusion**: when the process of infusion uses a constant volume of water.

Coffee tablet: the residual compressed coffee grounds after the infusion process.

Programming mode: when the *machine* is ready for any of its functions or parameters to be programmed.

Working mode: when the *machine* is in the working state and ready to prepare any of the services it offers.

1.2. RANGE

The **TEMPO** range is comprised of the **M, Mz, L and Lz** series. The cabinets of the **Mz** and **Lz** series are narrower than those in the **M** and **L** series. Each of the four series have models that elaborate *espresso coffee* and instant products.

- The models with **espresso coffee** elaborate instant products as well.
- The models with **instant** products only elaborate **instant** products
- The L range has a Fresh brew model destined to the elaboration of tea infusions

1.3. PRINCIPLE TECHNICAL CHARACTERISTICS

➘ Super automatic function: the press of a button is sufficient to elaborate a magnificent *espresso coffee*.

➘ It grinds the coffee at the moment it is ordered.

➘ Products that each machine can elaborate:

Tempo	Coffee beans	Sugar	Instant coffee	Decaffeinated	Milk	Chocolate	Tea
MI		Yes	Yes		Yes	Yes	
ME	Yes	Yes			Yes	Yes	
MzI							
MzE							
LI		Yes	Yes	Yes	Yes	Yes	Yes
LE							
LzI							
LzE	Yes	Yes		Yes	Yes	Yes	

➘ The water temperature is programmable.

➘ The ground coffee dose is programmable between 5 g and 8 g.

➘ The switching on and off of the *machine* is automatic and programmable.

➘ *Water pump* for water pressure incorporated in the *machine*.

➘ Volume dosage of water in the different *espresso coffee* services is programmable.

➘ The *infusion element* is thermo compensated.

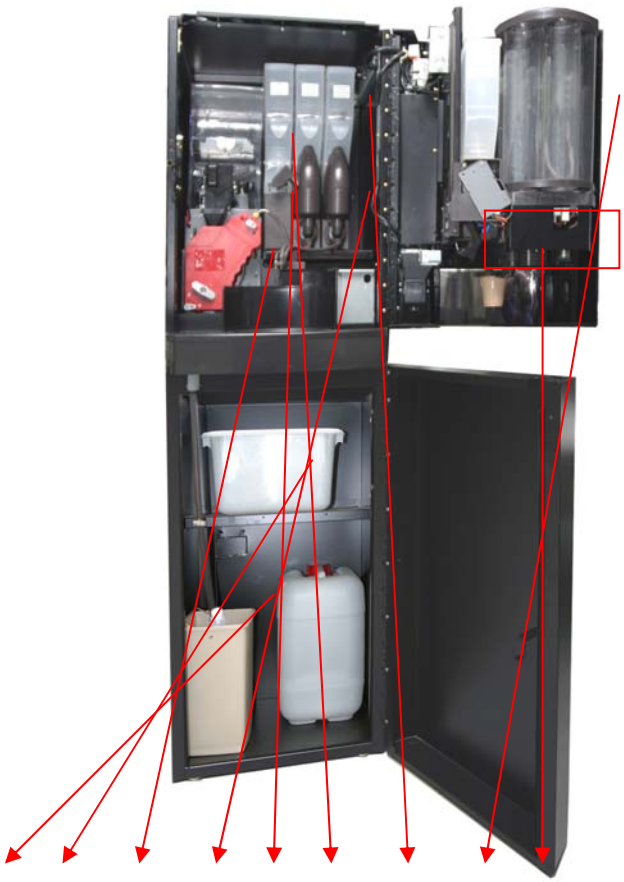
➘ Power supply:

TEMPO instant	Voltage	Power	Length
Mains voltage	230 Vac / 50 Hz		
Heating element	230 Vac / 50 Hz	1500 W	
Average daily consumption		3500 W	
Mains flex			3700 mm

TEMPO espresso	Voltage	Power	Length
Mains voltage	230 Vac / 50 Hz		
Heating element	230 Vac / 50 Hz	1500 W	
Average daily consumption		3000 W	
Mains flex			3700 mm

2. DESCRIPTION OF COMPONENTS

2.2. PRINCIPLE COMPONENTS



A1 A2 A3 A4 A5 A6 A7 A8 A9

A1. Residue liquid bucket

It collects all the residue liquids that the machine generates. It has a capacity of 8 litres. When it reaches a determined level a float device is activated to put the machine out of order until it is emptied.

A2. Coffee residue bucket

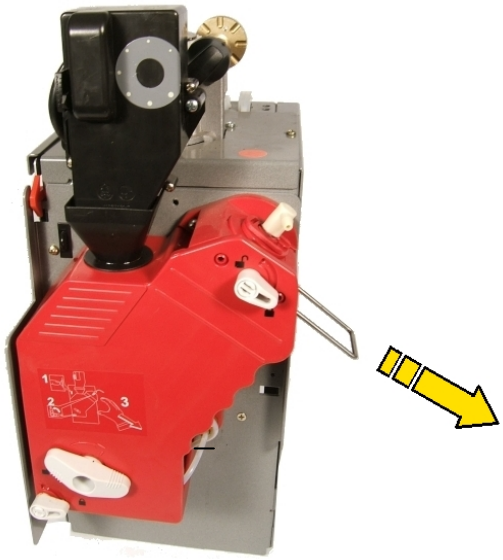
It collects the solid residue that the machine generates. It has a capacity for the residue of 7500 grams of ground and elaborated coffee beans.

A3. Infusion element

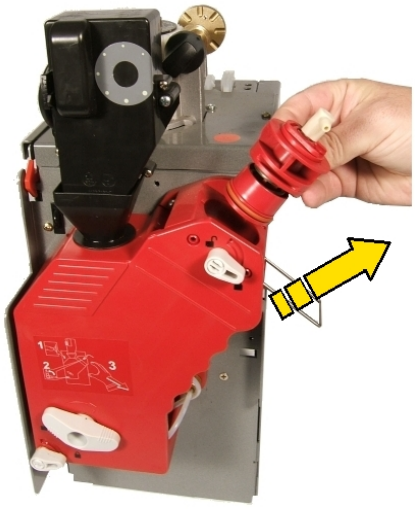
Made of resin, it is the element that the *machine* uses to make the espresso coffee.

Between the *piston* and its support there is a spring and a espacer that, depending how it is placed, will vary the capacity of ground coffee the chamber will hold.

The spacer should be placed **between** the piston and its support when the dosage is set for 5 to 6.5 g of ground coffee. When the dosage is set for 7 to 8 g of ground coffee, the space should be placed **on** the piston support.



Pull out the clip

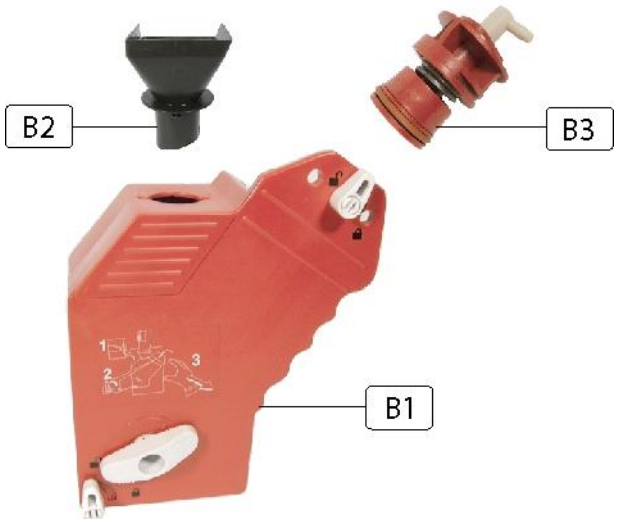


Remove the piston

B1. Infusion element inferior

B2. Loading funnel

B3. Pistón



The possible regulation of the capacity of the *infusion element*, using the washer, and the position of the dosage handle are shown in the table below:

Dose	Piston washer position		Dosage position
5 g	Under		1
5.5 g	Under		2
6 g	Under		3
6.5 g	Under		4
7 g		Over	5
7.5 g		Over	6
8 g		Over	7

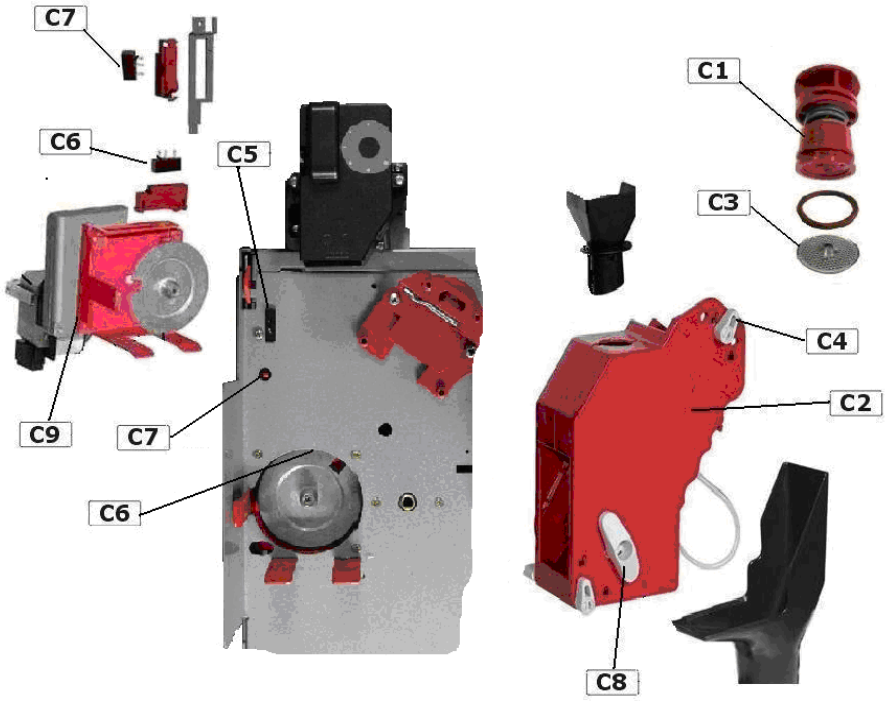
The *infusion element* has moving parts that are activated by a 24 Vdc motor that moves a crank which moves the *coffee* from the dosage element to the piston. At the same time it also moves a lever that activates a *micro switch*; this indicates the position of the *infusion element* to the control board.

At rest, the *infusion element* cannot move from its position as it is held by the piston. Before extracting the piston the black extraction button (C7) should be pressed (with the machine switched on). On pressing the extraction button the *infusion element* will position itself in the coffee loading position. After this the two levers that hold it can be turned and it can be removed with ease.

In the *infusion element* support there is another *micro switch* that deactivates when the *infusion element* is removed. This way, the control board knows whether the *infusion element* is correctly positioned or not.

To replace the *infusion element* into the machine it may be in any position and it does not matter if it moves while out of the machine. It only needs to be replaced and the two holding levers fixed. When the presence micro switch is activated, the *infusion element* motor will position it correctly.

C1. Piston
C2. Spring
C3. Washers
C4. Infusion element
C5. Lever
C6. Holding handle
C7. Extraction button
C8. Position micro switch
C9. Presence micro switch
C10. Infusion element movement handle
C11. Filter



A4. Beaters

The mixing of the products with hot water from the boiler is done with these elements.

Technical characteristics:

Make of motor	Mabuchi
Voltage	24 Vdc
Power	20 w
Speed	16 rpm

The EVs of the instant beverages are an important part of the beating process. They control the hot water from the boiler to the beaters for the elaboration of the instant beverages.

They are fitted to a thermo compensated brass support that provides a constant temperature by means of a tube through which hot water from the boiler flows. This circulation is produced by convention; the water cools in the brass support and drops while the hot water from the boiler enters at the top. This way, during the elaboration of the instant beverages, the hot water that goes to the beaters does not suffer excessive temperature losses.

The working voltage of the EVs is 24 Vdc
Maximum pressure they accept is 15 Kg/cm²

The EVs are positioned horizontally and correspond to the following products:

Tempo ME

D1. Decaffeinated

D2. Coffee

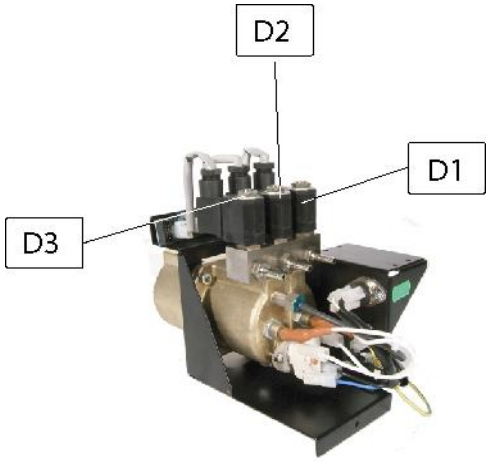
D3. Milk y chocolate

Tempo MI

D1. Coffee and decaffeinated

D2. Milk

D3. Chocolate



Tempo LE

D1. Descafeinado

D2. Milk and chocolate

D3. Coffee

D4. Tea

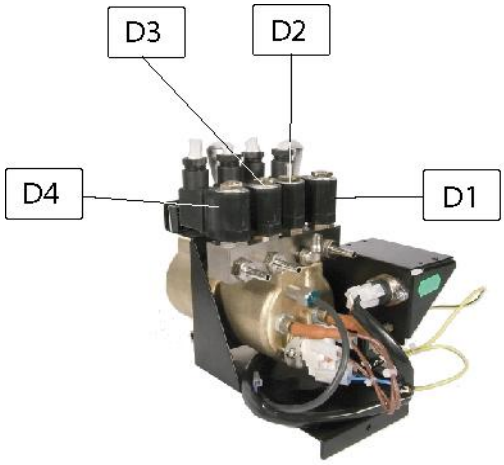
Tempo LI

D1. Tea

D2. Chocolate

D3. Milk

D4. Coffee and decaffeinated



Order of the EVs looking from the exterior of the machine

A5. Ground coffee dosage element

Situated on the side of the grinder, its function is to measure the quantity of ground coffee for each service, and later put a dose into the *infusion element*.

The principle function is based on a moving wall that the ground coffee moves and a micro switch that is activated by the moving wall. On activating the micro switch, the grinder stops and the EV drops the ground coffee into the *infusion element*.

Technical characteristics:

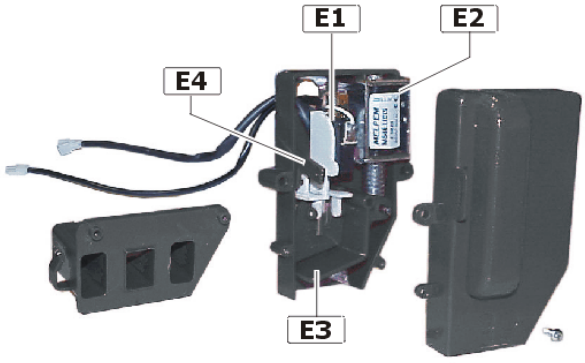
Voltage	24 Vdc
Regulation	Minimum 5g and maximum 8g
Regulation lever	7 points: Point 1 is 5 g Point 7 is 8 g

E1. Micro switch

E2. Solenoid

E3. Micro activated flap

E4. Regulation lever



A6. Coffee bean hopper

The capacity is:

Series ME	1.3 kg
Series LE	2.2 kg

A7. Instant product hoppers

The capacities are:

Series ME and MI	1.6 litres
Series LE and LI	3 litres

The approximate weight of the product is:

	Capacity in grams			
Product	Series ME	Series MI	Series LE	Series LI
Instant coffee	280	280	525	525
Decaffeinated coffee	280	280	525	525
Milk	700	700	1300	1300
Chocolate	800	800	1500	1500
Tea	1000	1000	2000	2000
Soup	1600	1600	3000	3000
Sugar	1400	1400	2600	2600

A8. Programming box

This element is used for programming the machine.

A9. Extractor systems for cups, sugar and spoons

The three systems are mounted in the one support.

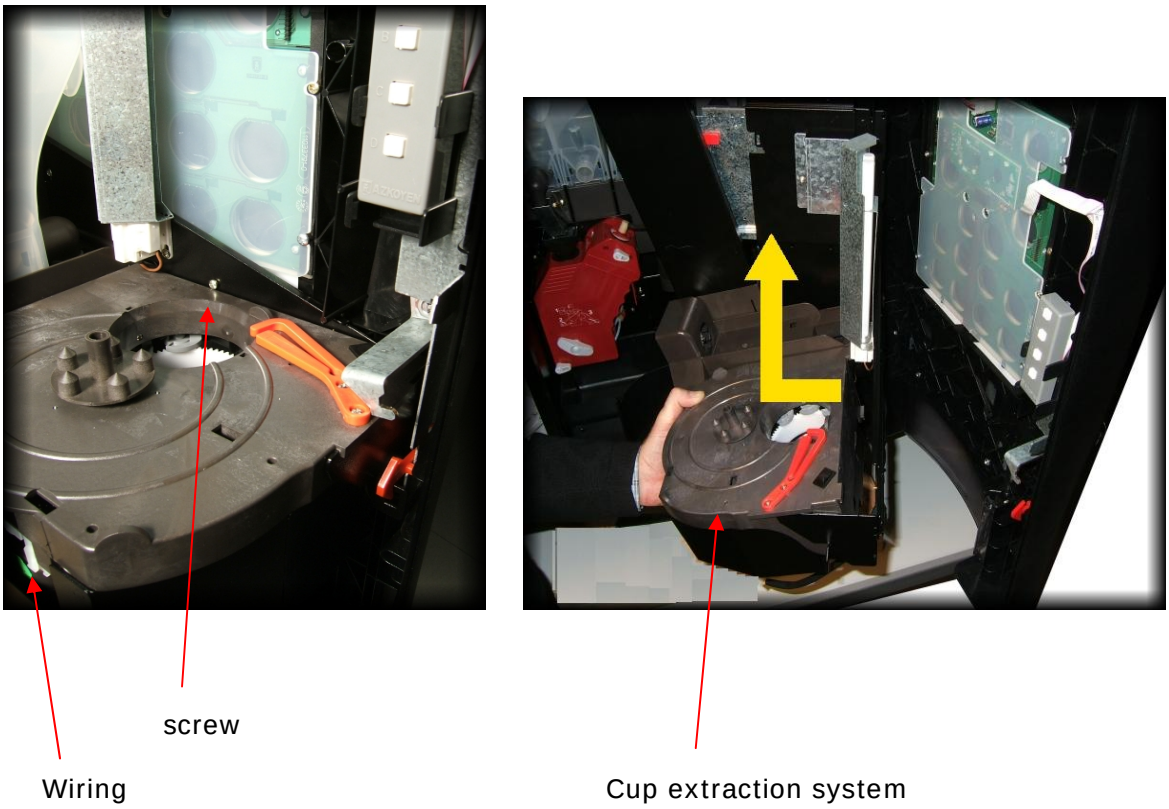
> The MI and LI series, standard, do not have a container for *spoons*

To remove the extractors from the machine, follow these steps:

1st Disconnect the wiring loom from the cup extractor board.

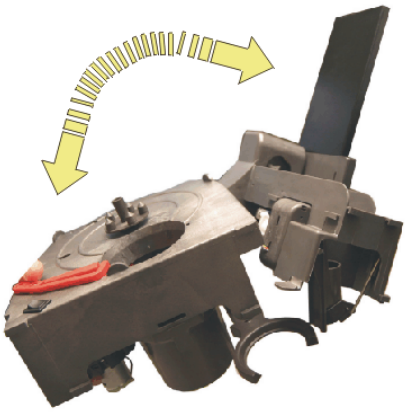
2nd Unscrew the screws indicated in the photo.

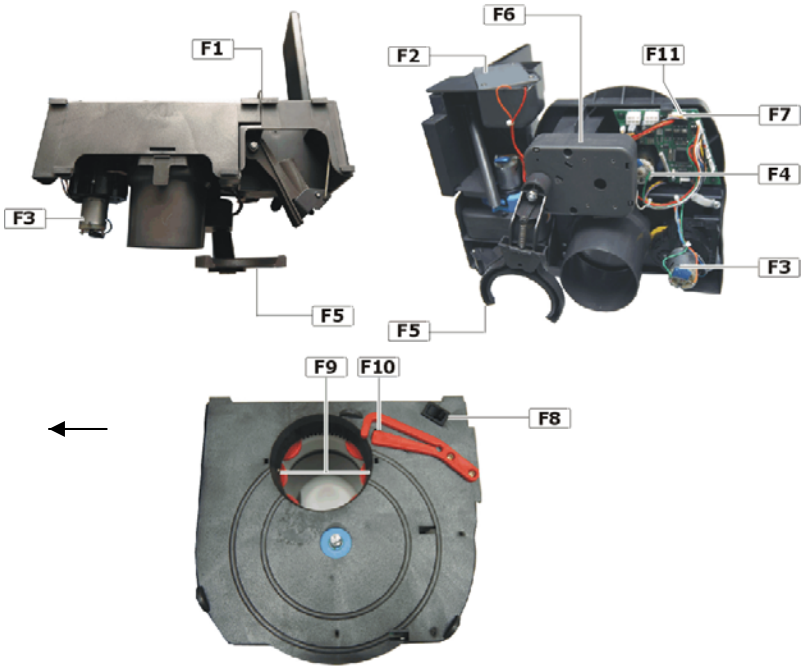
3rd Pull the extractors upwards until freeing them from the clips in the support.



Tempo door: cup extraction system disassembly

First the wiring loom should be disconnected by removing the cover that protects the cup extractor. The sugar and *spoon* extractor can be separated from the cup extractor by freeing the clip indicated in the photo and pulling upwards.





F1. Clip

F2. Sugar and spoon extractor motor

F3. Cup extractor motor

F4. Cup container movement motor

F5. Cup support arm

F6. Cup arm motor

F7. Control board

F8. Cup extraction button

F9. Cup presence photocells

F10. Hopper position micro

F11. Sugar and spoon extractor connector

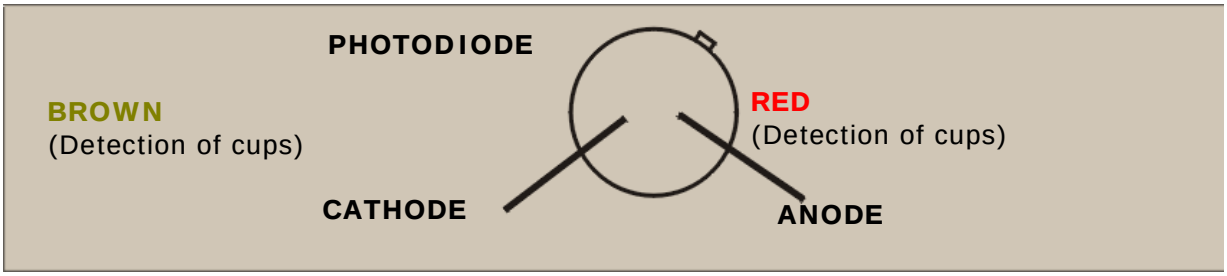
Cup extractor characteristics:

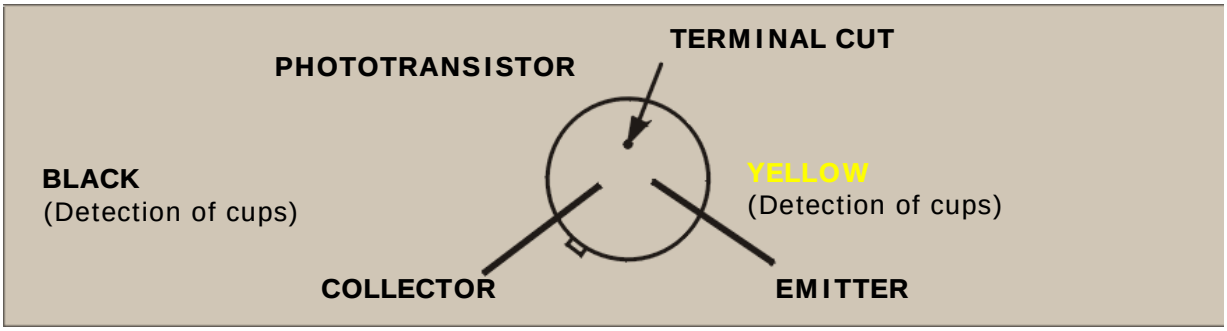
	Cup container	
	ME and MI Series	LE, LI and LFB Series
Quantity	500	700
Ø of cups	70 to 71 mm	70 to 71 mm
Voltage to motor	24 Vdc	24 Vdc

There is a cup extractor designed for cups of 73 mm.

The cups should be opaque so the infrared detectors can detect them

- The cup container is divided into 5 separate columns. When one of them runs out of cups, the motor turns the container until the next column is situated over the extractor. After the motor turns for 6.5 seconds and the photocells do not detect a new column of cups, the machine will go out of order and the display will show “Out of cups”.
- The cup container holder has a button to extract a cup when it is pressed.
- The electrical connections for the infrared photocell terminals that are used to detect the cups are:





Spoon extractor characteristics:

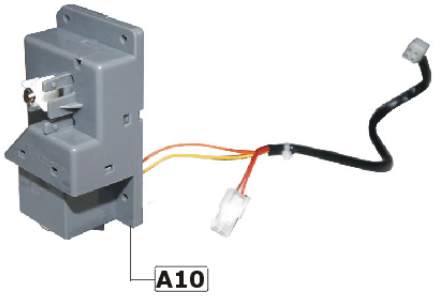
	Spoon container	
	ME and MI Series	LE, Li and LFB Series
Quantity	250	350
Standard spoon measurement	90 x 9 x 1.5 mm	90 x 9 x 1.5 mm
Motor voltage	24 Vdc	24 Vdc

There is a Spoon extractor designed for spoons of 110 x 9 x 1.5 mm

Sugar extractor characteristics:

	Sugar extractor	
	ME and MI Series	LE and LI Series
Capacity	1400	2600
Motor voltage	24 Vdc	24 Vdc

A10. Product extractors



Technical characteristics:

Motor manufacturer	Mabuchi
Voltage	24 Vdc
Speed	40 rpm

A11. Coin system

All the models in the **TEMPO L** range use coin changers with **Executive** or **MDB** communication protocol.

The models in the **TEMPO M** range use a **coin validator**. It is always “exact amount”; no change given.

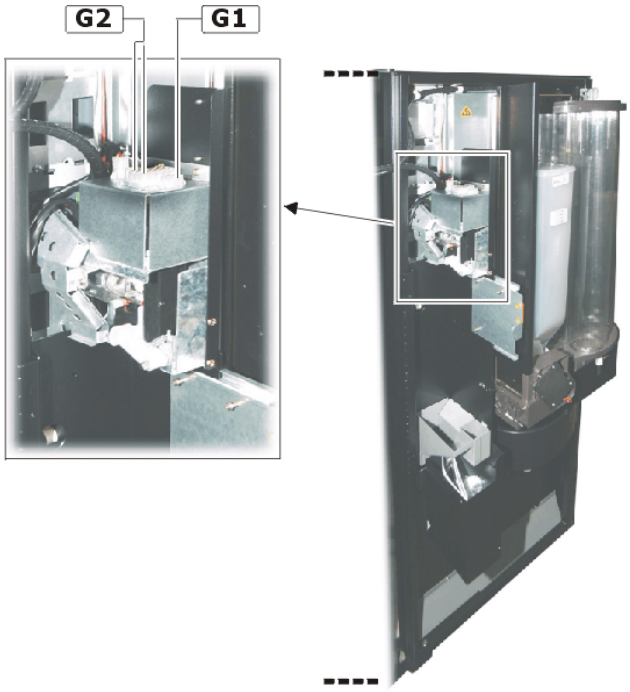
On the left of the door there is a space for the coin changer which is held with three screws. The connectors are situated on the upper part. When the machine is connected, it will automatically detect if it has a coin changer with **MDB** or **Executive** communication protocol.

Executive coin changer

MDB coin changer

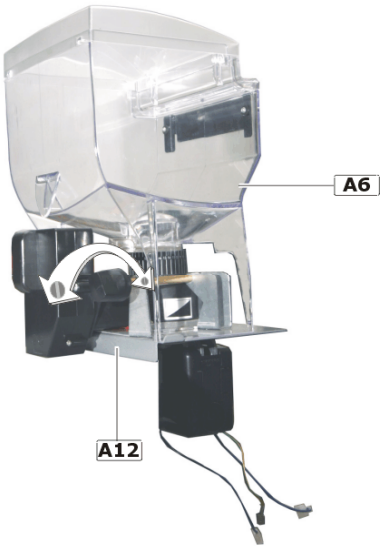
G1. Conector for MDB communication protocol coin system

G2. Conectors for communication executive protocol coin system



A12. Coffee grinder

It has the model M03 from Azkoyen installed, although before they had the grinder from Componenti installed



Componenti

M03

Technical characteristics:

	Componenti	M03
Voltage	230 Vca	230 Vca
Nominal power	65 w	350 w
Speed	1.250 rpm	1390 rpm
Diameter of the grinders	45 mm	63 mm
Grind points	0,026 mm	0,026 mm

Moving the handle anticlockwise gives a coarser grind and moving it clockwise gives a finer grind.

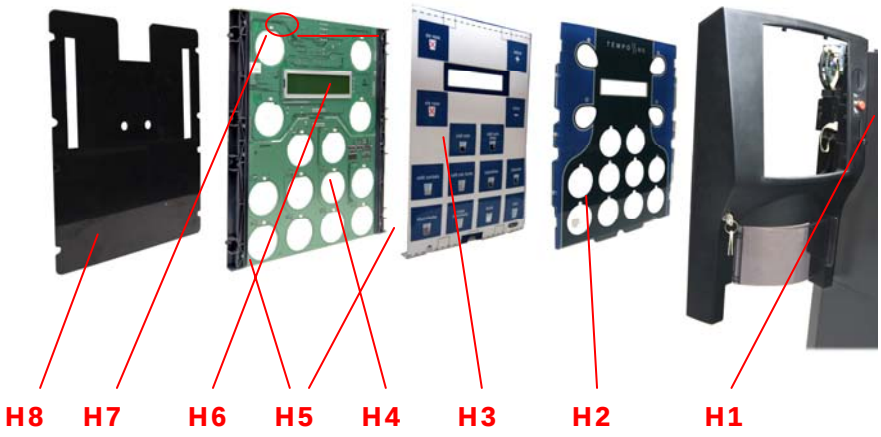
A13. Button panel and display

These machines have an innovative system for the product selection buttons. The system is based on capacitive detection. To request a product it is not necessary to actually press the button, it is enough to put your finger near the button and the machine will detect its presence and start the elaboration of the requested beverage. All the product selections have a red *led diode* that lights when the machine is elaborating that beverage. There is a panel with a label of all the available products in the machine between the Perspex protection and the circuit board of the buttons.

On the circuit board there is also an alphanumeric *display* with two 16-character lines.

The panel with the product labels can be removed by pulling downwards. It is held between two grooves on both sides of the circuit board so to replace it is necessary to insert it in the grooves.

H1. Reject button
H2. Exterior panel
H3. Product labels
H4. Button circuit board
H5. Grooves for product labels
H6. Display
H7. Leds
H8. Protector



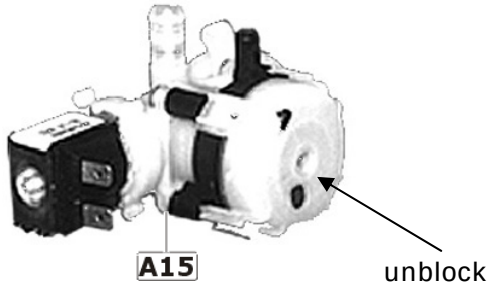
To help in the process of fitting the product label panel, the button circuit board that is held with eight screws can be removed.

A14. Product door

Made of polycarbonate, its main purpose is to prevent the entry of insects into the machine. It can be removed by removing the holding plate on the interior of the machine.

A15. Water inlet EV

It allows the entry of water from the mains to the cold water deposit. It works at 230 Vac. This EV is only fitted to machines that are connected to the mains water supply.

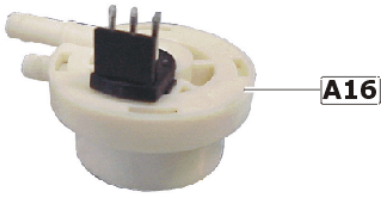


It has a security block system for cases where, for lime scale or any solids from the main water supply, the EV does not close properly. This system activates when the level in the residue bucket is excessively high.

To unblock the EV, switch off the water pressure from the mains. If this is not possible, tap the EV with a blunt object, for example an Allen key, on the inside of the hole on the top part of the EV as shown in the photograph.
It you may also unblock the EV by tapping it with something like the handle of a screw driver.

A16. Volumetric counter

Its function is to measure the quantity of water that is pumped for the elaboration of the espresso coffee.

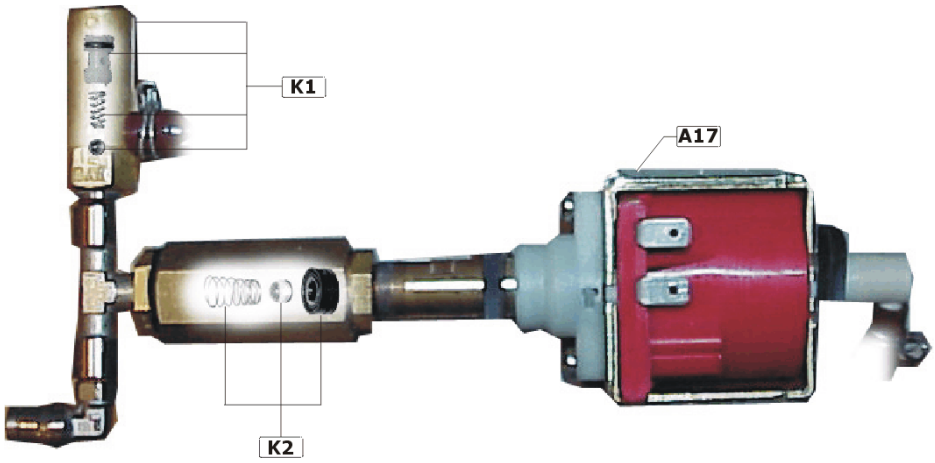


A17. Water pump

This element has the job of pumping water from the cold water deposit to the hot water boiler; the cold water pushes the hot water towards the EVs for the instant products or towards the *infusion element* for making espresso coffee.

K1. By-pass

K2. Anti return valve



When an espresso coffee is elaborated, the water pressure needed is quite high to be able to pass through the compressed ground coffee in the *infusion element*. This resistance the coffee offers makes the water pressure in the boiler increase up to a pressure of 9 Kg/cm². At this pressure the by-pass (2) opens allowing a small amount of water to return; sufficient to prevent the water pressure from going over the 9 Kg/cm².

The by-pass is a small hole covered with a ball that is held in place by a spring. This spring will hold a pressure of 9 Kg/cm², but over this pressure it compresses and allows the water to pass.

The pressure of 9 Kg/cm² is considered the ideal for elaborating espresso coffee.

When the instant beverages are elaborated, there is no resistance offered and so during there elaboration the water pump works at lower pressures than when elaborating espresso coffees.

Technical characteristics:

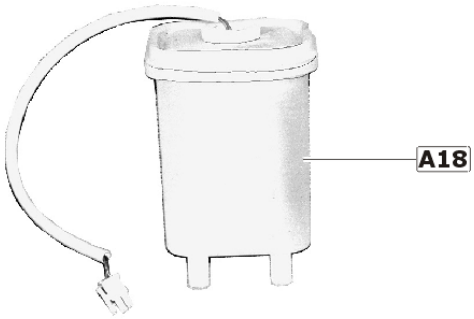
Voltage	Pulsing 110 V
Power	70 w
Working pressure	8 Kg/cm²
Maximum pressure	12 Kg/cm²

The pump has an anti return valve that prevents the return of water from the boiler.

A18. Cold water deposit

Made of polypropylene, It has the capacity of 500 cc. It is at atmospheric pressure and temperature. From this deposit is taken the water to elaborate the *espresso coffee* and instant beverages.

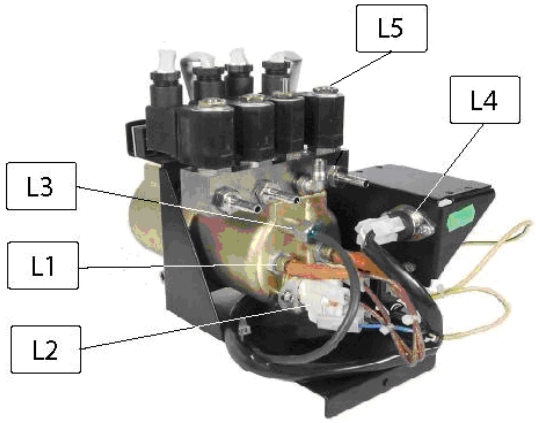
The water level in the deposit is controlled by a float that activates a magnetic switch.



A19. Hot water boiler

The boiler works under pressure and has a capacity of 0.5 litres of water. The water for elaborating espresso coffee and instant beverages is heated in this deposit.

L1. 1500 W heating element
L2. Security thermostat 120º C
L3. Temperature sensor (PTC)
L4. Triac
L5. Electrovalves



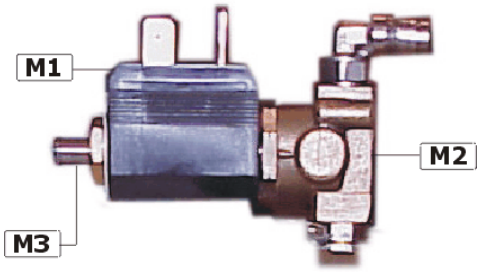
The boiler is made of brass and does not need any device to control the level of water as the boiler fills automatically from the moment the machine is switched on. After this the water that is used is replaced with water from the cold deposit so the boiler is always full.

There are three outlets; one through a 3-way *EV* for the elaboration of espresso coffee. This *EV* has an outlet from the boiler, another goes to the *infusion element*, and the third that, at rest, allows the *infusion element* to be at atmospheric pressure.

M1. Solenoid

M2. Valve

M3. 3º outlet

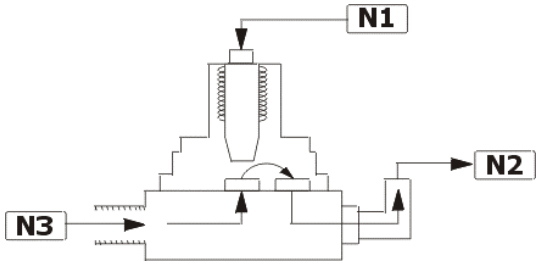


When the machine is in the espresso coffee making process, the third is closed while the outlet from the boiler and the inlet to the *infusion element* are open to each other.

N1. 3rd closed

N2. To the infusion element

N3. From the boiler



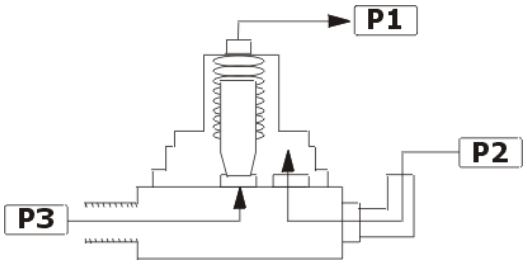
When the machine finishes elaborating an espresso coffee, the *EV* goes to rest state and closes the outlet from the boiler leaving the *infusion element* open to the third outlet. In this way the water that did not pass through the coffee and was retained in the *infusion element* goes out through the third outlet to the residue bucket.

The water recedes back from the *infusion element* towards the third outlet because of the pressure it was submitted to by the pump in the infusion process.

P1. 3ª open

P2. Infusion element joined to atmospheric pressure

P3. Boiler water closed



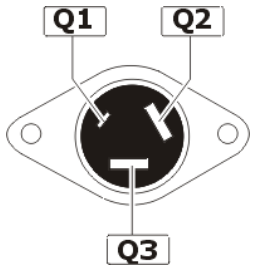
The other two outlets are connected to the instant beverage EV. When the machine is at rest, these outlets allow the circulation of water, through convection, between the boiler and the brass support of the instant beverage EV. This way the support is *thermo compensated* and the water that reaches the beaters is always at the correct temperature.

Technical characteristics:

Heating element voltage	230 Vac
Power	1.500 w
Temperature programming	40 a 99º C
Safety protection with manual reset	120º C
Voltage of EVs	24 Vac
Power of instant EV	8 w
Power of espresso coffee	10 w
Maximum pressure of EVs	15 Kg./cm²
Working temperature of EVs	-10º C a 140º C

Control of the *heating element* is done with a *triac* that is situated on the boiler support. Always respect the position of the connection cables.

Q1. White
Q2. Black
Q3. Brown

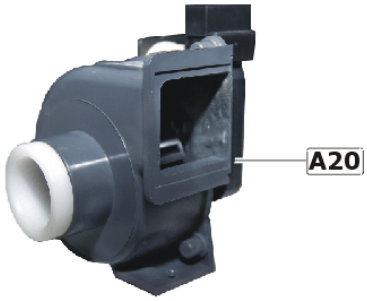


Temperature control of the water in the boiler is done with a PTC100. The following table shows the resistance values that the PT100 gives according to the temperature that it is submitted.

ºC	0	1	2	3	4	5	6	7	8	9
0	100,00	100,39	100,78	101,17	101,56	101,95	102,34	102,73	103,12	103,51
10	103,90	104,29	104,68	105,07	105,46	105,85	106,24	106,63	107,02	107,40
20	107,79	108,18	108,57	108,96	109,35	109,73	110,12	110,51	110,90	111,28
30	111,67	112,06	112,45	112,83	113,22	113,61	113,99	114,38	114,77	115,15
40	115,54	115,93	116,31	116,70	117,08	117,47	117,85	118,24	118,62	119,01
50	119,40	119,78	120,16	120,55	120,93	121,32	121,70	122,09	122,47	122,86
60	123,24	123,62	124,01	124,39	124,77	125,16	125,54	125,92	126,31	126,69
70	127,07	127,45	127,84	128,22	128,60	128,98	129,37	129,75	130,13	130,51
80	130,89	131,27	131,66	132,04	132,42	132,80	133,18	133,56	133,94	134,32
90	134,70	135,08	135,46	135,84	136,22	136,60	136,98	137,36	137,74	138,12
100	138,50	138,88	139,26	139,64	140,02	140,39	140,77	141,15	141,53	141,91
110	142,29	142,66	143,04	143,42	143,80	144,17	144,55	144,93	145,31	145,68
120	146,06	146,44	146,81	147,19	147,57	147,94	148,32	148,70	149,07	149,45
130	149,82	150,20	150,57	150,95	151,33	151,70	152,08	152,45	152,83	153,20
140	153,58	153,95	154,32	154,70	155,07	155,45	155,82	156,19	156,57	156,94
150	157,31	157,69	158,06	158,43	158,81	159,18	159,55	159,93	160,30	160,67
160	161,04	161,42	161,79	162,16	162,53	162,90	163,27	163,65	164,02	164,39
170	164,76	165,13	165,50	165,87	166,24	166,61	166,98	167,35	167,72	168,09
180	168,46	168,83	169,20	169,57	169,94	170,31	170,68	171,05	171,42	171,79
190	172,16	172,53	172,90	173,26	173,63	174,00	174,37	174,74	175,10	175,47
200	175,84	176,21	176,57	176,94	177,31	177,68	178,04	178,41	178,78	179,14
210	179,51	179,88	180,24	180,61	180,97	181,34	181,71	182,07	182,44	182,80
220	183,17	183,53	183,90	184,26	184,63	184,99	185,36	185,72	186,09	186,45
230	186,82	187,18	187,54	187,91	188,27	188,63	189,00	189,36	189,72	190,09
240	190,45	190,81	191,18	191,54	191,90	192,26	192,63	192,99	193,35	193,70
250	194,07	194,44	194,80	195,16	195,52	195,88	196,24	196,60	196,96	197,33
260	197,69	198,05	198,41	198,77	199,13	199,49	199,85	200,21	200,57	200,93
270	201,29	201,65	202,01	202,36	202,72	203,08	203,44	203,80	204,16	204,52
280	204,88	205,23	205,59	205,95	206,31	206,67	207,02	207,38	207,74	208,10
290	208,45	208,81	209,17	209,52	209,88	210,24	210,59	210,95	211,31	211,66
300	212,02	212,37	212,73	213,09	213,44	213,80	214,15	214,51	214,86	215,22
310	215,57	215,93	216,28	216,64	216,99	217,35	217,70	218,05	218,41	218,76
320	219,12	219,47	219,82	220,18	220,53	220,88	221,24	221,59	221,94	222,29
330	222,65	223,00	223,35	223,70	224,06	224,41	224,74	225,11	225,46	225,81
340	226,17	226,52	226,87	227,22	227,57	227,92	228,27	228,62	228,97	229,32
350	229,67	230,02	230,37	230,72	231,07	231,42	231,77	232,12	232,47	232,82
360	233,17	233,52	233,87	234,22	234,56	234,91	235,26	235,60	235,96	236,31
370	236,65	237,00	237,35	237,70	238,04	238,39	238,74	239,09	239,43	239,78
380	240,13	240,47	240,82	241,17	241,51	241,86	242,20	242,55	242,90	243,24
390	243,59	243,93	244,28	244,62	244,97	246,69	245,31	245,66	246,00	246,35
400	247,04									

A20. Extractor

The steam and vapour that is generated by the beaters can reach the product containers and if they become damp they form lumps in the powder. This consequently results in the irregular extraction of the product. To avoid this, the extractor is used to remove the steam and vapour
from the interior of the machine. It works on 230 Vac.



Extractor

A21. Transformer

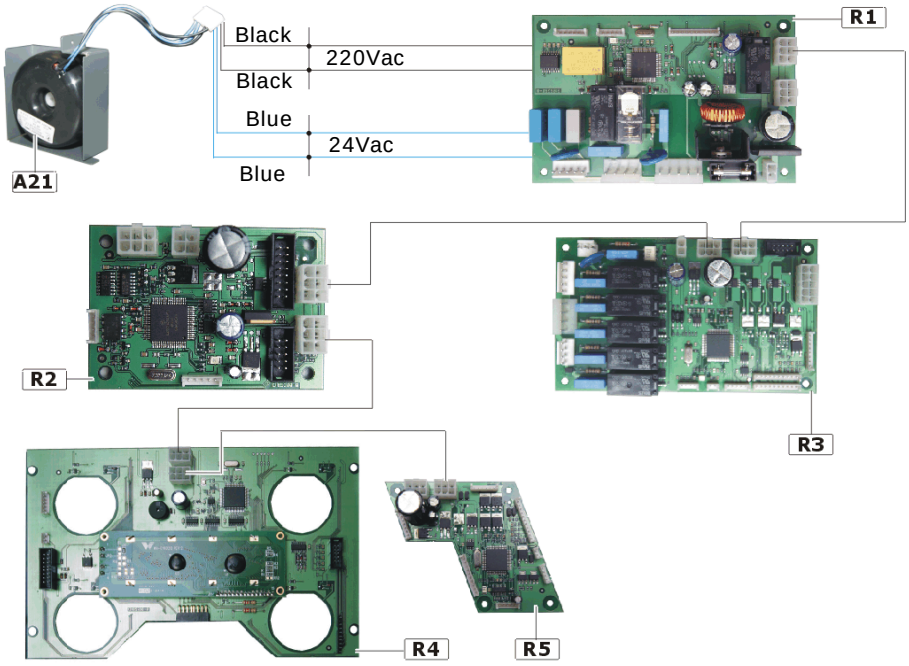
Technical characteristics:

Primary	230 Vac
Secondary (blue-blue)	24 Vac
Secondary (black-black)	230 Vac
Power	96 w

A22. Circuit boards

All the models in the **City** range have 5 *circuit boards*. The *main module* is the one that provides the power supply to the other boards and takes the decisions for the correct working of the machine. The other four boards control independently a determined number of elements in the machine.

R1. Main module
R2. Payment module
R3. infusion module
R4. IDU module
R5. Cup module



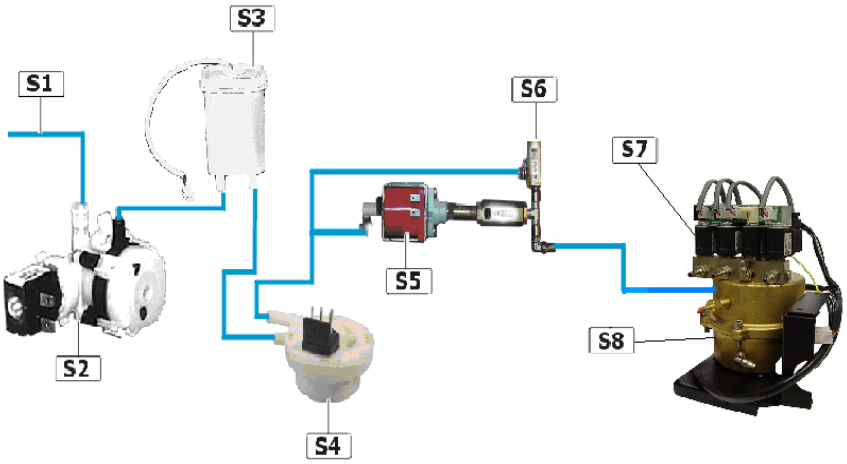
The five boards are joined by one loom of 6 strands called a CAN bus. Two of these wires are used for the transmission of 34 volts, another two for 8 volts and the remaining two are used for the communication between boards. The colour and the function of each of the wires are the following:

PIN 1. Orange	Positive 34 volts
PIN 2. Grey	Negative 34 volts
PIN 3. Red	Positive 8 volts
PIN 4. Yellow	Communication
PIN 5. Green	Communication
PIN 6. Black	Negative 8 volts

2.2. HYDRAULIC CIRCUIT OF THE ESPRESSO COFFEE

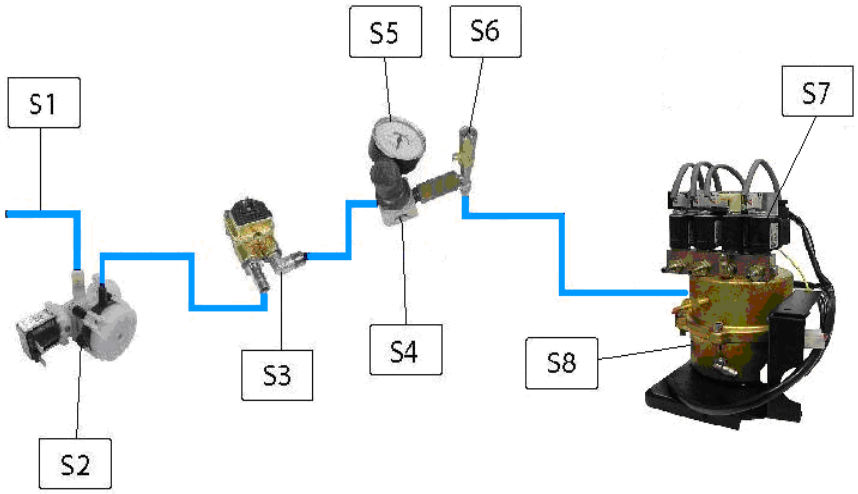
In the following diagram are represented all the elements of the machine that are needed to control and make the water reach the *infusion element* or the instant beverage beaters.

S1. Water inlet
S2. Inlet electro valve
S3. Cold water deposit
S4. Flowmeter
S5. Water pump
S6. Security valve
S7. Electrovalves
S8. Hot water boiler



2.3. HIDRAULIC CIRCUIT OF THE FRESH BREW MODEL

S1. Water inlet
S2. Inlet electro valve
S3. Flowmeter
S4. Pressure regulador
S5. Manometer
S6. Security valve
S7. Electrovalves
S8. Hot water boiler



This model will only work when connected to a mains water supply with a minimum pressure of 2 kg/cm². The machine comes with a pressure regulator of 2 kg/cm² and this is the pressure that all the instant beverages and the teas are elaborated.

The pressure of the regulator can be modified by lifting the cover and turning it to the left or right. Once regulated, push down the cover again. The manometer will show the pressure you have set.

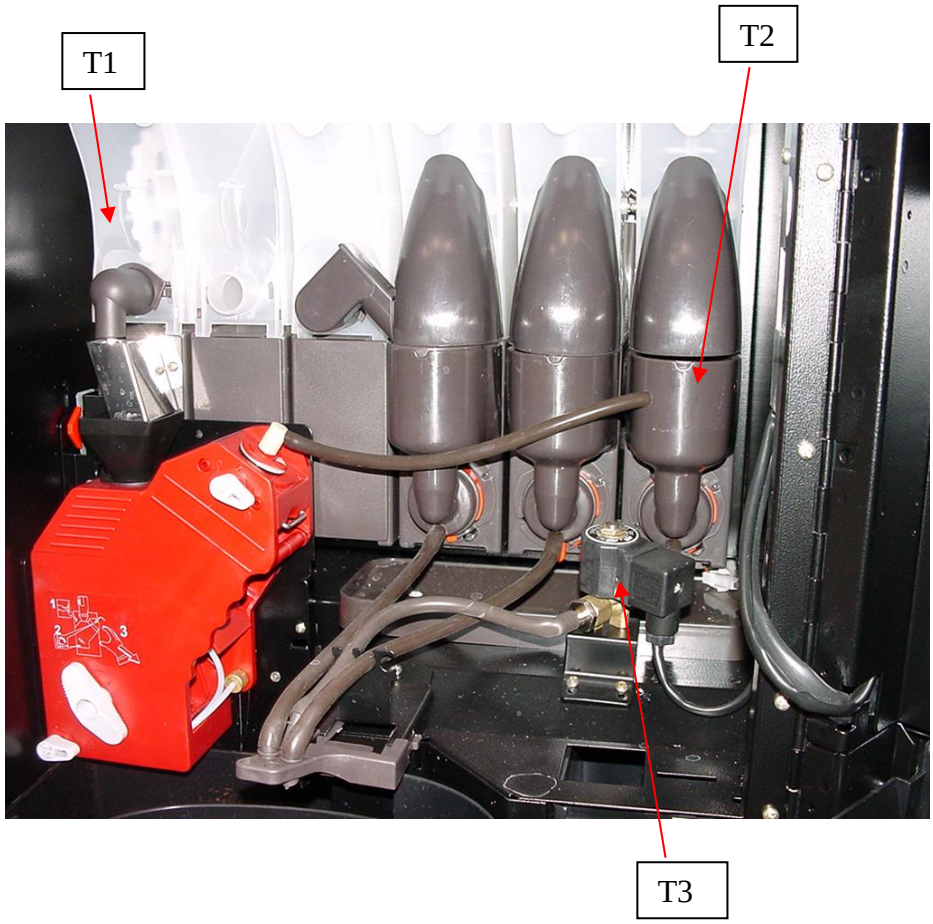
The tea is infused in the same way as in an infusion group for the espresso coffee machines. The tea that has been infused goes to the instant tea beater, once the whole infusion process is finished, and then an electro-valve is opened to let the infusion go to the cup. With this

method the infusion reaches the cup from a lesser height than the height of the outlet tube of the infusion group, and thus avoiding bubbles in the tea.

T1. Container for green tea (Infusion)

T2. Instant tea beater

T3. Electro-valve for tea outlet



3. INSTALLATION AND SWITCHING ON

3.1. UNPACKING

The power supply of the machine requires a socket, or another system, that allows its disconnection.

The method used must guarantee the complete disconnection of both poles.

Elemental safety requirements:

a) Never touch any mechanisms with wet hands or feet.

b) Never connect or use the machine barefoot.

c) Never pull on the flex to unplug the machine.

d) Never leave the machine exposed to the elements: sun, rain, snow, etc.

3.2. SWITCHING ON

Site the *machine* in its place and level it using the regulating feet.

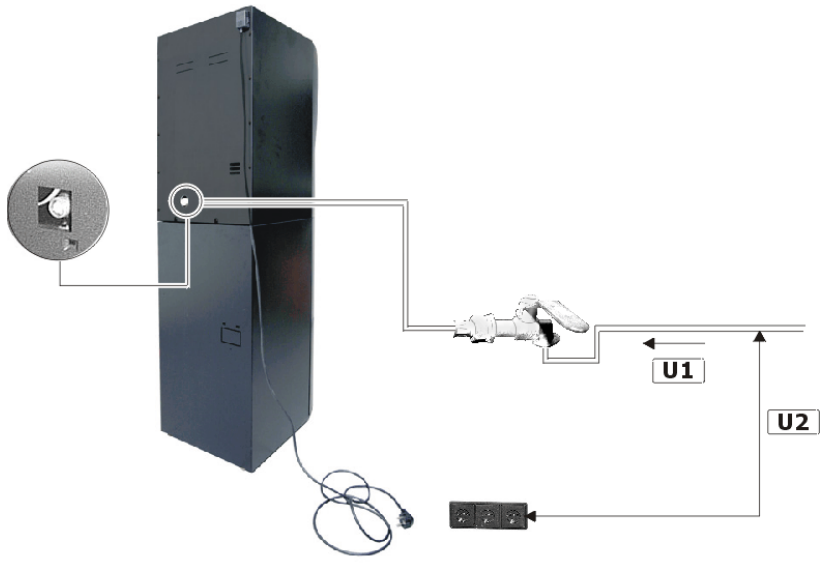
3.2.1. Water connection

The machine can be used connected to the mains or with an autonomous water deposit. To connect the machine to the mains use a **¾" male** connection. The mains supply must provide drinking water at a minimum of 5 litres/minute and a pressure of between 0.5 and 10 kg/cm². For the Fresh brew model, the minimum pressure is 2 kg/cm².

The connection hose for the mains is not supplied with the machine.

U1. Water

U2. Socket distance minimum 1 metre



Models LE and LI are prepared for connection to the mains water supply in the factory, so no additional parts are necessary.
However, for models **ME** and **MI**, it is necessary to add: an electro valve for the mains connection, a cold water deposit, a water level gauge and the connection hoses. The reference of this connection kit that includes this set is **41511891-0.**

Depending on the quality of the water, hardness, chlorine, bleach, etc, the connection should be complemented with a filter.

If the machine is fitted with a filter, the minimum water pressure should be **1 Kg/cm².**

3.2.2. Electrical connection

The *machine* works with 230 Vac (50 Hz). The installation must have:

- An earthed socket
- A minimum power rating of 2500 w
- The installation site must have a breaker switch and a good earth connection

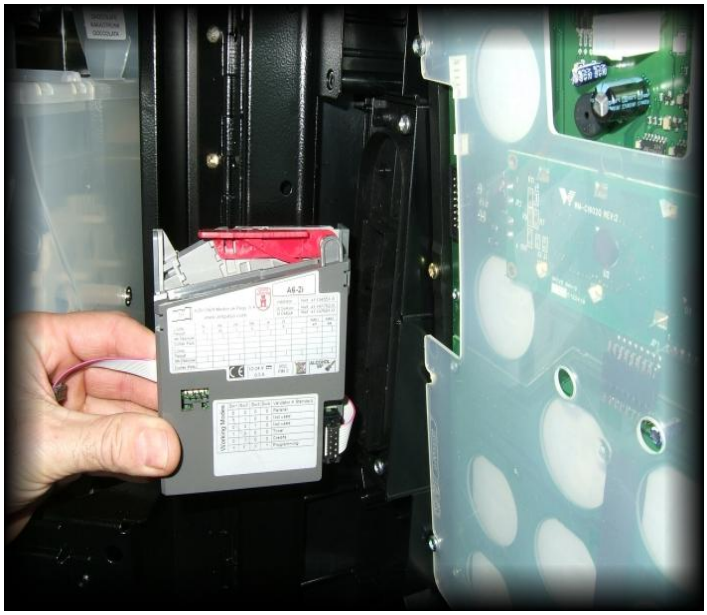
3.2.3. Connecting a Coin Validator (Ranges MI / ME)

The Tempo ME and Tempo MI models are factory prepared to install a coin *validator*, which can be from Azkoyen or another manufacturer. The *validator* is not supplied with the machine.

The fitting of the *validator* is simple; it is clipped into the bracket.

The wiring loom for the *validator* is connected to **JP8** on the **MDP** circuit board. The machine only works with exact change.

Azkoyen A6 2i validator

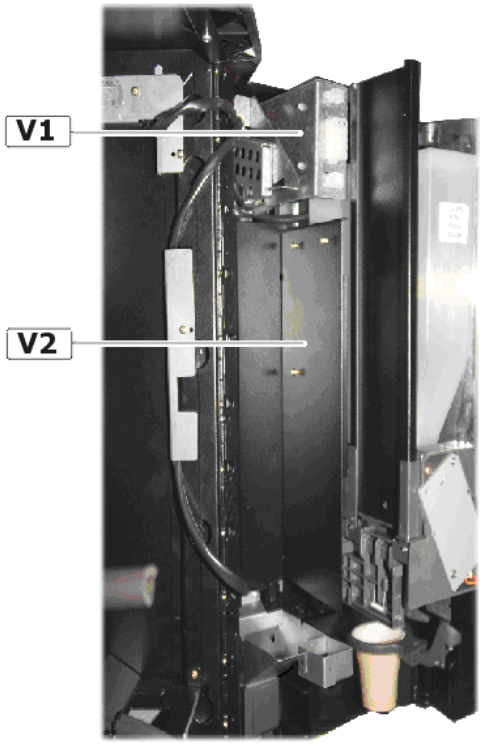


3.2.4. Installing the coin changer with Executive or MDB protocol

The Tempo LE and Tempo LI models admiten cualquier monedero con protocolo **MDB** o **Ejecutivo**. Se fija mediante tres tornillos al soporte situado en la puerta. Este soporte es el mismo para los dos modelos de monedero.

V1. Soporte conexiones

V2. Soporte monedero

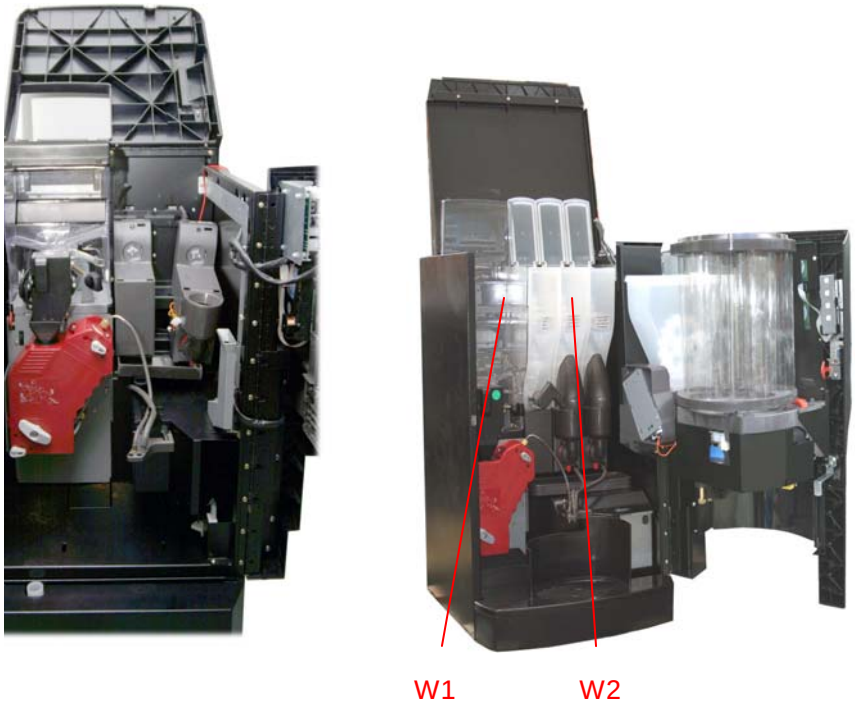


3.2.5. Filling the product containers

To put products in the containers, you should lift the cover of the machine. Otherwise it is necessary to remove the container from the machine.

After filling the containers for instant beverages, it is advised to request a service of each as the first time it is used, only a small quantity of product is served

W1. Coffee bean hopper
W2. Instant powder hoppers



Now the machine can be switched on.

3.2.6. Filling the hot water boiler

On connecting the machine the hot water boiler fills automatically. In the espresso coffee machines the following process occur:

- The cold water deposit fills up, if it is empty.
- The volumetric counter is tested and the boiler is filled with the EVs closed. When the counter stops spinning, the boiler is full. Then the instant product EVs open to let out the air in the lines and boiler.

If the counter does not spin for 10 seconds while filling the boiler the machine will go out of order as there is no water. To reset this state, just switch the machine off and then back on

3.3. ERROR MESSAGES SHOWN ON THE DISPLAY

The description of the incident, the corresponding message that the display shows and the codes that in each case will be transmitted when using VTM or EVADTS communication protocols are:

Notes:

►: The machine is "out of order"
nn: number of the element that is faulty

	Description		Message on the Display	VTM	EVADTS
	Fault in a CHANGER, type of fault 1 **MDB: Sensor in tube defective**	nn	ERROR CHANGER	08	EAN1
	Fault in a CHANGER, type of fault 2 **MDB: Jam in tube**	nn	ERROR CHANGER	09	EAN2
	Fault in a CHANGER, type of fault 3	nn	ERROR CHANGER	0A	EAN3
	Fault in a CHANGER, type of fault 4	nn	ERROR CHANGER	0B	EAN4
	Fault in a CHANGER, type of fault 5	nn	ERROR CHANGER	0C	EAN5
	Fault in the validator			0D	EAL
	MDB: Validator disconnected	00	ERROR VALIDATOR		
	MDB: Error of checksum ROM	01	ERROR VALIDATOR		
	MDB: Jam of coins	02	ERROR VALIDATOR		
	VALID: Error in signal of coins	03	ERROR VALIDATOR		
►	**Fault in the module of recuperation**		**ERROR RECUPERATION**	0E	EAB
	Fault communication with the changer			11	EAR
	MDB: Reply incorrect of the changer	02	ERROR CHANGER		
	MDB: Reply incorrect of the note reader	03	ERROR CHANGER		
	MDB: Reply incorrect of the card reader	04	ERROR CHANGER		
	MDB: Reply incorrect of the slave	05	ERROR CHANGER		
	MDB: Err. Product out of date (slave)	81	ERROR CHANGER		
	MDB: Err. Product sensor (slave)	82	ERROR CHANGER		
	MDB: Err. Keyboard in the slave	83	ERROR CHANGER		
	Fault button recuperation		**ERROR KEYBOARD**	12	EGK
	Fault keyboard selection			13	EGK
	Number of button	nn	ERROR KEYBOARD		
	Fault cup extractor	EB	ERROR CUP		
	Fault Infusion	EC	ERROR INFUSION		
	Fault keyboard selection, no keyboard		**ERROR KEYBOARD**	14	EGK
	Fault in the card reader			15	
	MDB: Error in the circuit board	00	ERROR CARD READER.		
	MDB: Circuit board not valid	01	ERROR CARD READER		
	MDB: Tamper Error (Fraud?)	02	ERROR CARD READER		
	MDB: Error defined by the manufacturer	03	ERROR CARD READER		
	MDB: Error in communications	04	ERROR CARD READER		
	MDB: Repair reader	05	ERROR CARD READER		

Description		Message on the Display	VTM	EVADTS
MDB: Not assigned	06	ERROR CARD READER		
MDB: Error defined by the manufacturer	07	ERROR CARD READER		
MDB: Error of the lector	08	ERROR CARD READER		
MDB: Error in communications	09	ERROR CARD READER		
MDB: Jam circuit board	0A	ERROR CARD READER		
MDB: Error defined by the manufacturer	0B	ERROR CARD READER		
MDB: Error refunding credit	0C	ERROR CARD READER		
Fault in the note reader				
MDB: Motor defective	00	ERROR NOTE READER		
MDB: Sensor defective	01	ERROR NOTE READER		
MDB: Error checksum ROM	02	ERROR NOTE READER		
MDB: Jam	03	ERROR NOTE READER		
MDB: Store / Stacker not present	04	ERROR NOTE READER		
MDB: Lector deactivated	05	ERROR NOTE READER		
▶ **Out of order because prices deprogrammed**		**PRICE NOT PROGRAMMED**	17	EAK
▶ **Out of order for all coins inhibited**		**COINS INHIBIT.**	18	EAC
Fault in extraction grid, type of ERROR 1			19	ELZ1
Fault in extraction grid, type of ERROR 2			1A	ELZ2
Fault in extraction grid, type of ERROR 3			1B	ELZ3
Fault detector product (fault type 1)		**FAULT IDETECT**	1C	
Fault in temperature			1D	EJJ
Fault in product out of date			1E	EJH
Fault detector product (fault type 2)		**FAULT IDETECT**	1F	
Switch on of the machine			20	OEZN
Switch off of the machine			21	OEZF
Activation of infra red reception			22	OEZI
Communication AZKOYEN protocol			23	OEZA
Communication EVADTS protocol			25	OEZE
Communication VTM under SMS			26	OEZS
▶ **Reset configuration**		**Machine NOT CFG[F401]**	30	ECZC
Reset program. Channels ,prices, etc			31	ECZP
Reset program. Messages			32	ECZM
Reset of accounting			33	ECZO
▶ **Error in EEPROM**		**ERROR EEPROM 'Module'**	37	ECO
Power low		**VOLTAGE LOW**	38	ECA
Total memory erase order			39	ECN
Error clock			EA	ECL
Error temperature probe		**FAULT SENSOR TEMPER**	EB	EJK
Temperature probe open	01	OPEN SENSOR TEMP. AB		
Temperature probe short circuited	02	OPEN SENSOR TEMP. CC		
Error in system of door close		**DELIVERY DOOR OPEN**	3D	EGC
Gate closed	01	DELIVERY DOOR C		
Gate open	02	DELIVERY DOOR A		

	Description		Message on the Display	VTM	EVADTS
	Gate undefined position, both micros closed	03	DEL. DOOR P.D. MC		
	Gate undefined position, both micros closed	04	DEL. DOOR P.D. MA		
	Detected manipulation of collection hatch	05	DEL. DOOR MANIP.		
	Product collection hatch open			41	EGC
	Received module software by EVADTS			50	
	Received module software by MDB			51	
▶	**Fault in system heater**		**ERROR CALDERA**	60	EDK
▶	Error in the temperature probe	01	ERROR PROBE TEMP.		
▶	Error in the heating element	02	ERROR HEATING ELEMENT		
▶	**Fault in water entry**		**ERR. WATER LEVEL**	61	EFL
▶	Volume meter faulty	02	ERR: NO WATER		
▶	Error in the water level (no water)	03	NO MAINS WATER		
	Fault arm: not in out position			62	EBI1
▶	**Fault arm: not reached position**		**ERROR ARM**	63	EBI2
▶	Arm not reached cup position	01	ERROR ARM P. CUP		
▶	Arm not reached liquid position	02	ERROR ARM P. LIQ.		
▶	Arm not reached sugar position	03	ERROR ARM P. SUGAR		
▶	Arm not reached stirrer position	04	ERROR ARM P. STIR.		
▶	**Fault arm 3 faults without reset**			64	EBI3
	Fault system extractor of cups		**ERROR SYS. COPS**	65	EBM
▶	Error in the mfc of the cup hopper	01	ERROR CUP HOPPER		
	Cup hopper empty after 5 turns	02	NO CUPS		
▶	Error in the mfc of the extractor of cups	04	ERROR EXTRAC. CUPS		
▶	Cup arm turning	05	ARM HOP. TURNING		
▶	Cup extractor turning	06	CUP EXTR. H. TURNING		
▶	Cup hopper turning	07	HOPPER V. TURNING		
	Fault system extractor of stirrers		**ERROR STIRRERS**	66	EDF
	Stirrer arm turning	01	ARM STIR. TURNING		
	Fault in the espresso infusion group		**ERROR GRP. ESPRESSO**	67	EE
	Error in the mfc of the doser	01	ERROR DOS.		
	Error in the positioner of the group	02	ERR. POS. GROUP		
	No coffee in grinder	03	NO GROUND COFFEE		
	No infusion group	04	NO GROUP		
	Infusion time too long	05	LONG INF. TIME.		
	Retry of position of the group	06	RETRY. POS. GROUP		
	Retry of priming water pump in mach with deposit	07	RETRY PUMP PRIME		
▶	**Fault in waste drawer**		**ERROR IN WASTE**	68	EDZ
▶	Waste drawer full	00	WASTE DRAWER FULL		
▶	No waste drawer fitted	01	WASTE DRAWER NOT PRES.		

3.4. Control points

Heating element

It is measured on the **infusion board** on the connector J12

Between pins 1 and 2 (black and brown) it will show 0 Vac when the heating element is working. (Keeping in mind the 10 Amp fuse is correct)

Between pins 1 and 2 it will show 220 Vac when the heating element is not heating.

Infusion pump

It is measured on the **infusion board** on the connector J14

Between pins 1 and 4 it will show 200 Vac when the pump is working.

Water inlet electro-valve

It is measured on the **infusion board** on the connector J14

Between pins 2 and 4 it will show 200 Vac when the pump is working.

Motor of the infusion group

It is measured on the **infusion board** on the connector J15

Between pins 1 and 3 it will show 220 Vac when the group is working.

Dosage element

It is measured on the **infusion board** on the connector J15

Between pins 1 and 4 it will show 220 Vac when the dosage element is active.

Grinder

It is measured on the **infusion board** on the connector J15

Between pins 1 and 5 it will show 220 Vac when the grinder is working.

Transformer

It is measured on the **PRI board** on the connector JP1

Pins 1 and 2 = 220 Vac (black wires).

Pins 4 and 5 = 24 Vac (blue wires)

Infusion electro-valve

It is measured on the **infusion board** on the connector J9

Between pins 7 and 8 it will show 25 Vdc when the electro-valve is activated.

Volume counter

It is measured on the **infusion board** on the connector J10.

The pin 3 corresponds to +, the pin 4 to ground and the pin 2 to signal.

When the counter spins, the reading will show 2.5 Vdc measuring between pins 2 and 4.

Water level buoy

It is measured on the **infusion board** on the connector J10.

Between pins 1 and 4 it will show 0 Vdc when the deposit is contains water.

Between pins 1 and 4 it will show 5 Vdc when the deposit is empty.

Micro-switch-switch for dosage element

It is measured on the **infusion board** on the connector J9.

Between pins 1 and 6 it will show 5 Vdc when the dosage element is full.

Between pins 1 and 6 it will show 0 Vdc when the dosage element is empty.

Micro-switch-switch for infusion group motor

It is measured on the **infusion board** on the connector J9.

Between pins 2 and 6 it will show 5 Vdc when the infusion group is in the coffee making position.

Between pins 2 and 6 it will show 0 Vdc when the dosage element is in the loading position.

Micro-switch-switch to detect infusion group presence

It is measured on the **infusion board** on the connector J9.

Between pins 3 and 6 it will show 0 Vdc when the infusion group is fitted in the machine.

Between pins 3 and 6 it will show 5 Vdc when the infusion group has been removed from the machine.

Micro-switch for waste bucket

It is measured on the **infusion board** on the connector J11.

Between pins 1 and 2 it will show 5 Vdc when the waste bucket is full.

Between pins 1 and 2 it will show 0 Vdc when the waste bucket is not full.

Cup extractor motor

It is measured on the **Cup Board** on the connector J5.

Between pins 9 and 11 it will show 0 Vdc when the motor is at rest.

Between pins 9 and 11 it will show 25 Vdc when the motor is working.

Motor for turning the cup container

It is measured on the **Cup Board** on the connector J5.

Between pins 7 and 10 it will show 30 Vdc when the motor is at rest.

Between pins 7 and 10 it will show 0 Vdc when the motor is working.

Motor for the sugar extractor

It is measured on the **Cup Board** on the connector J7.

Between pins 3 and 6 it will show 30 Vdc the motor is at rest.

Between pins 3 and 6 it will show 0 Vdc when the motor is working.

Motor for the stirrer extractor

It is measured on the **Cup Board** on the connector J7.

Between pins 3 and 5 it will show 30 Vdc the motor is at rest.

Between pins 3 and 5 it will show 0 Vdc when the motor is working.

Photocell for detecting cup presence

It is measured on the **Cup Board** on the connector J5.

Between pins 6 and 7 it will show 5 Vdc when there are cups between the photocells.

Between pins 6 and 7 it will show 0 Vdc when there are no cups.

Micro-switch of the cup container lever

It is measured on the **Cup Board** on the connector J5.

Between pins 3 and 7 it will show 5 Vdc when the lever is at rest.

Between pins 3 and 7 it will show 0 Vdc when the lever closes the micro-switch.

Micro-switch for the cup extractor motor

It is measured on the **Cup Board** on the connector J5.

Between pins 4 and 7 it will show 0 Vdc when the motor is at rest.

Between pins 4 and 7 it will show 5 Vdc when the motor turns to extract a cup.

Micro-switch sugar arm

It is measured on the **Cup Board** on the connector J7.

Between pins 2 and 3 it will show 5 Vdc when the arm is at rest.

Between pins 2 and 3 it will show 0 Vdc when the arm moves to deposit sugar in the cup, it returns to 5 Vdc when it returns to its original position.

Temperature probe

It is measured on the **infusion board** on the connector J2. It measures the resistance values (see the table for the PTC values).

4. CLEANING AND MAINTENANCE

❒ Daily

- ➘ *Liquid residue bucket*. Empty the waste water and rinse with clean water.
- ➘ *Solid waste bucket*. Empty the coffee residues and rinse with clean water.
- ➘ *Liquid collector tray*. Clean with a water and dish washing liquid solution.
- ➘ *Beaters*. Carry out various auto-cleaning operations by pressing button “B” on the programming handset.

❒ Weekly

- ➘ *Infusion group*. Remove it from the machine and rinse it under a tap to remove coffee particles. Before replacing the group, dry it with a cloth.
- ➘ *Beaters*. Remove the beaters, the outlet tubes and the chamber from the machine, and clean everything with a water and dish washing liquid solution. If necessary, only use a soft cloth to clean so as not to scratch their surfaces.
- ➘ *Product collection cover*. Clean it with a water and dish washing liquid solution.
- ➘ *Cup support arm.* Remove and clean it with a water and dish washing liquid solution.

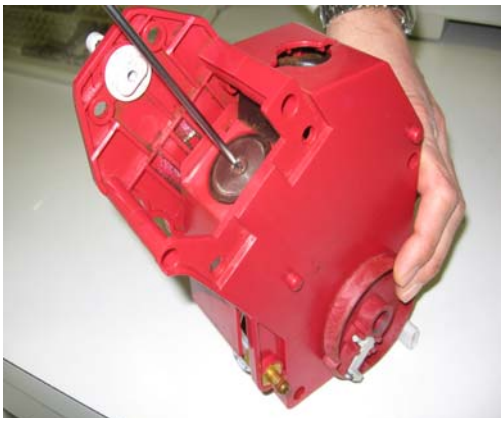
❒ Three monthly

- ➘ *Product hoppers*. Remove them from the machine and empty them. Clean them with a water and dish washing liquid solution. Dry them before replacing into the machine. Clean the supports where the hoppers are fitted.
- ➘ *Coffee bean hopper*. Carry out the same as with the product hoppers.

❒ Depending on the use of the machine

- *Piston filter*. Every 15,000 services, it is recommended to remove and clean it. If necessary, it can be cleaned with a non metallic brush. If the holes are blocked, do not introduce sharp objects into the holes to clean them. It is recommended to replace the filter with a new one when is becomes blocked.

- *Infusion group filter*. Clean the infusion group filter at the same time as you clean the piston filter. To remove the filter without damaging it, follow the guidelines below: Move the group to the coffee cake extraction position. Hold the group and the lever with one hand while loosening the filter screw with the other. On replacing the screw it is recommended to use Loctite 243 or a similar product to keep it tight.

	
OK	**NO**

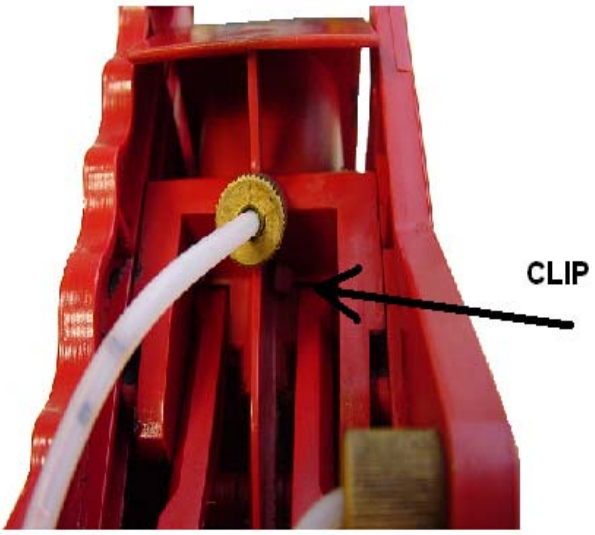
- *Piston seal*. Substitute every 30,000 services

- *Group seals*. Substitute every 60,000 services. To get to these it is necessary to remove the group filter. They are reachable by following the explanation below.

1. Remove the filter holder and the group filter as shown above.

2. Press the clips (one on each side) indicated in the following photo until the part is released at the gaskets.

3. After replacing the gaskets, fit the cover and gaskets back on the group.



Juntas

❒ Maintenance tool

The maintenance tool is used in machines in the **Tempo** and **City** series to carry out various advanced configuration and programming tasks.

The tool is micro-processor controlled and has a flash memory with a capacity to store at least 8 programme modules, 100 configurations or a combination of both.

The tool is connected directly to the machine to save or recuperate configurations. It can also be connected to a PC to modify configurations or manage the module update programming a small non metallic brush.

5. WORKING CONDITIONS AND NORMS

The optimum working conditions of this equipment is achieved by fulfilling the following requirements:

- Temperatures:
  - Storage: -25 to + 70ºC.
  - Working: 0 to 50º C.
  - Maximum relative humidity without condensation 85%
- Norms that are met:
  - The coffee machines meet the following EU directives: Directive 73/23/CEE electrical safety and Directive 89/336/CEE electromagnetic compatibility.
  - The mains connection cable has an earth wire as established in the electrical safety norm.
  - The boiler has a temperature sensor that controls the connection and disconnection of the heating element automatically.
  - The boiler has a temperature clixon that disconnects the heating element when it reaches 120º C.
  - EN 60335-2-63:96
  - EN 60 335-1(88) + A2(88) + A5(89) + A6(89) + A51(91) + A52(92) + A53(92) + A54(92) + A55(93)
  - EN 55014-1
  - EN 61000-3-2
  - EN 61000-3-3
  - EN 55014-2:98 (EN 61000-4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 4-8 and 4-11)
  - **CE**
- For the correct working of all the elements, the maximum inclination the machine should have on any of its axis should be ± **5º.**

6. DIMENSIONS

The measurements are in mm and the weights in Kg.

MACHINE				
Tempo	Width X1	Height X2	Depth X3	Weight
ME/MI	600	1620	620	49/44
LE/LI	600	1830	620	60/55

CABINET				
Tempo	Width X1	Height X2	Depth X3	Weight
ME/MI	410	865	500	16/16
LE/LI	480	890	530	19/19


GRUPO
AZKOYEN