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VITRO M5 – TECHNICAL MANUAL

v0-10060-EN

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1 SAFETY AND WARNINGS

1.1 SYMBOLS

	The warning triangle appears in the instructions to warn users that failing to observe the safety warnings may result in a risk of personal injury or damage to materials.
	Danger, high risk that could cause serious or fatal injuries.
	Warning, medium risk that could cause serious or fatal injuries if it is not prevented.
	Caution, low risk that could cause minor or moderate injuries if it is not prevented.
	Danger of electric shock
	Risk of scalding / burn injuries
	Risk of trapping

1.2 IMPORTANT SAFETY INFORMATION

DANGER

Risk of death due to electric shock

Working with the machine doors/panels open can cause electric shock.

- Disconnect the machine from the mains.
- Make sure that the machine cannot be switched on by accident.
- Do not tamper with the machine or change any of its elements, following the instructions included in the documents supplied by Azkoyen at all times for these procedures.
- A damaged power supply cable can cause electric shock. Check it on a regular basis.
- Never operate damaged machines or machines with damaged power supply cables.
- If the power supply cable is damaged, it must be replaced by a cable with identical electrical features.
- Make sure that the power supply cable is not near hot surfaces, such as gas burners, ovens or kitchen griddles.
- Make sure that the power supply cable is not bent, snagged or in contact with elements with sharp edges.
- The machine has internal electrical parts and conductive elements that could cause fatal injuries.
- Repairs must only be carried out by qualified staff and using original spare parts.

DANGER

Risk of death by electric shock or damage to the machine caused by water

Incidents that cause liquids to be leaked and/or spilled could occur, such as leakages in the hydraulic circuit or liquids spilled from the waste container. If this occurs, do not handle the elements in this section of the machine until you make sure that the machine has been unplugged from the mains.

- First, disconnect the machine's power supply plug from the mains.
- Also disconnect the refrigeration unit from the mains.
- Close the water supply tap.
- Inspect the inside of the machine.
- Before connecting it again, make sure that the incident has been resolved and dry all affected parts and surfaces.

Never tamper with the elements inside the machine while it is connected to the mains and if there are water or liquid waste remains.

1.3 DANGER OF INJURY OR DAMAGE TO MATERIALS

WARNING

Danger of injury or damage to materials due to improper installation

There is a danger of injury and/or damage to materials if the machine is not installed correctly.

- Assess the installation requirements and local safety regulations before installing the machine.

The customer is responsible for providing the means required, which have been defined as installation requirements. If these requirements are not met:

- Do not upgrade the machine using your means and inform the customer, so the corresponding professional can repair or correct the deficiencies detected.

WARNING

Danger of burns or scalding

Hot water might come out of the dispenser tap or through the drain collectors connected to the liquid tray during the cleaning procedures.

- Keep your hands away from the outlet tap and liquid drainage conduits.
- The beverages served can cause burns or scalding.
- Hot water is poured out of the outlet tap during the initialisation process. Take care during initialisation.

WARNING

Risk of injuries by trapping with moving parts

Several mechanisms exist in Vitro M5 which could cause injuries by trapping while being manipulated.

- Always switch machine OFF before handling of coffee grinder or brewer unit.
- Upper cabinet lid could close itself by accident. Keep the lid in the open position only for the necessary time to fill up soluble products.

1.4 CAUTION

CAUTION

Risk of injuries due to lifting heavy weights

- Lifting heavy weights may cause injuries.
- Do not move or load the machine on your own.
- Request for the help of another person to move the machine during installation or for any other procedure that involves moving the machine.

CAUTION

Health hazards caused by the accumulation of bacteria

- It is of vital importance to clean the machine at regular intervals and following the manufacturer's recommendations.
- Before commissioning the machine, thoroughly clean all components of the machine in contact with food.
- Perform an in-depth cleaning cycle of the fresh milk module.
- Do not use the machine if it has not been cleaned following the instructions included in this manual.

The water filter must be replaced at regular intervals to prevent the formation of algae.

- Explain the daily cleaning process to the person responsible for cleaning the machine.
- Change the water filter according to the maintenance plan established with the service provider.

1.5 GENERAL CONSIDERATIONS

- This machine must be installed by an Official Certified Technical Service. Only certified technicians have the skills and knowledge to install the machine, according to AZKOYEN's specifications.

- AZKOYEN shall not be held liable for any damage caused by persons or materials due to:
  - Faulty installation
  - Improper electrical and/or hydraulic circuit installation
  - Failure to clean the machine properly or incorrect maintenance
  - Use of the machine for purposes other than the design purpose or under conditions out of the specifications
  - Use of non-original spare parts or unauthorised modification of the machine

- This device is not designed for use by people (including children) with reduced physical, sensory or mental capabilities, or who do not have the necessary experience or skills, except if they are supervised or have received instructions on using the device by a person responsible for their safety (in 60335-1:2002/a2:2006). Children must be supervised to ensure they do not play with the device (section 7.12 of EN60335).

- This device can be used by children aged 8 or more and by people with reduced physical, sensory or mental capabilities, or people who do not have the necessary experience or skills if they are supervised or trained on the safe use of the device and understand the dangers of handling it.

- The cleaning and maintenance tasks that need to be carried out by the user must not be carried out by unsupervised children.

- Given the characteristics of some food products, these may lead to improper operation of the machine if it is operated outside the relative humidity and temperature parameters recommended in this manual.

- If you need to transport the machine, try not to:
  - Turn the machine over.
  - Drag the machine or lift it with a pulling system (ropes, straps, etc.).
  - Hit or shake the machine, whether it is packaged or not.

Latest food regulations

AZKOYEN guarantees that all elements in contact with water or food products comply with the legal requirements established in regulation (EC) 1935/2004 or subsequent updates, in relation to materials and objects used that come in contact with food.

Installation

- These machines have been designed for INDOOR USE ONLY. Machines must not be placed in areas in which they can be exposed or cleaned with water jets.

- The machine must be installed in places that meet the temperature, electrical and water installation, weight and other recommendations included in this manual. Likewise, it must be installed by qualified personnel.

- The machine's power plug features a grounding connection. The base must be connected to a good grounding connection and be found in a place that can be accessed after the machine is installed.

- The installation procedures and operations required for initial start-up of the machine must be carried out by qualified technical staff.

- Follow the detailed instructions included in the chapter on installation and start-up procedures.

Maintenance

- Only use the specific food products to fill this type of machine. Do not touch the product with your hands and ensure no liquids fall into the product hoppers.
- Elements that require the use of tools to remove them must only be handled by qualified technical staff.
- Water must not freeze inside the machine. The boiler must be emptied if you are going to carry out maintenance tasks and have the machine disconnected for a long period of time.

Cleaning tips

- The user or person responsible for filling or cleaning the machine must follow the instructions included in this manual.
- These machines operate with water at high temperatures and steam, and hot water might be released during the cleaning procedures. Keep your hands far from the liquid outlets. Hot liquids could cause irritation, burns or scalding on your skin.
- Machines with the fresh milk mechanism must be cleaned every day, removing all milk and coffee remains. Otherwise, harmful bacteria could appear. Provide a clear explanation of the cleaning process to the person responsible for cleaning the machine every day.
- The elements used in the fresh milk cleaning service must be handled and cleaned according to the corresponding legal requirements related to food safety and hygiene.
- Only use the products recommended by the machine's manufacturer. Use of generic products not only does not guarantee that the machine can be cleaned properly, but may alter the taste of some drinks or result in situations that are harmful to health.

Risk of electric shock

- The machine features internal elements that are live with dangerous voltages. Do not disconnect the machine's elements. These procedures are only authorised to the Technical Service. The power cable must only be replaced by the technical staff authorised by AZKOYEN.
- Make sure that the electrical installation, plug and automatic switch are sized according to the machine's consumption.

2 DESCRIPTION OF VITRO M5

Vitro M5 is a medium-capacity automatic drink vending machine, which is capable of preparing hot drinks from coffee beans, freeze-dried products, natural milk, infusions, etc.

The incorporation of the fresh milk module provides a higher quality for beverages served in cups. The technology used allows for the safe use of milk in its natural condition, in semi-staffed environments, in which a quality service is the priority.

2.1 RANGE

Vitro M5 is based on Vitro S5. To sum up, Vitro M5 is part of Vitro S5, which also features the capacity to serve milk in its natural condition.

For this service, the Vitro M5 range features an innovative module that prepares and serves milk in liquid form and frothy milk. The unit features an external refrigerator to keep the milk at the optimum working temperature, from 4 to 5ºC.

The refrigerator supplied by AZKOYEN is connected to the machine's CPU though a serial connection based on CAN and using the I2C protocol to control the module's electromechanical elements from the fresh milk module's PCB.

Different accessories can be added to the Vitro M5 range to provide additional functions: cup heater cabinet, cash payment system or contactless technology, to name a few. Please contact our Sales Department for more information about the accessories available for Vitro M5.

Optional cups heater

Payment module

Cashless card reader

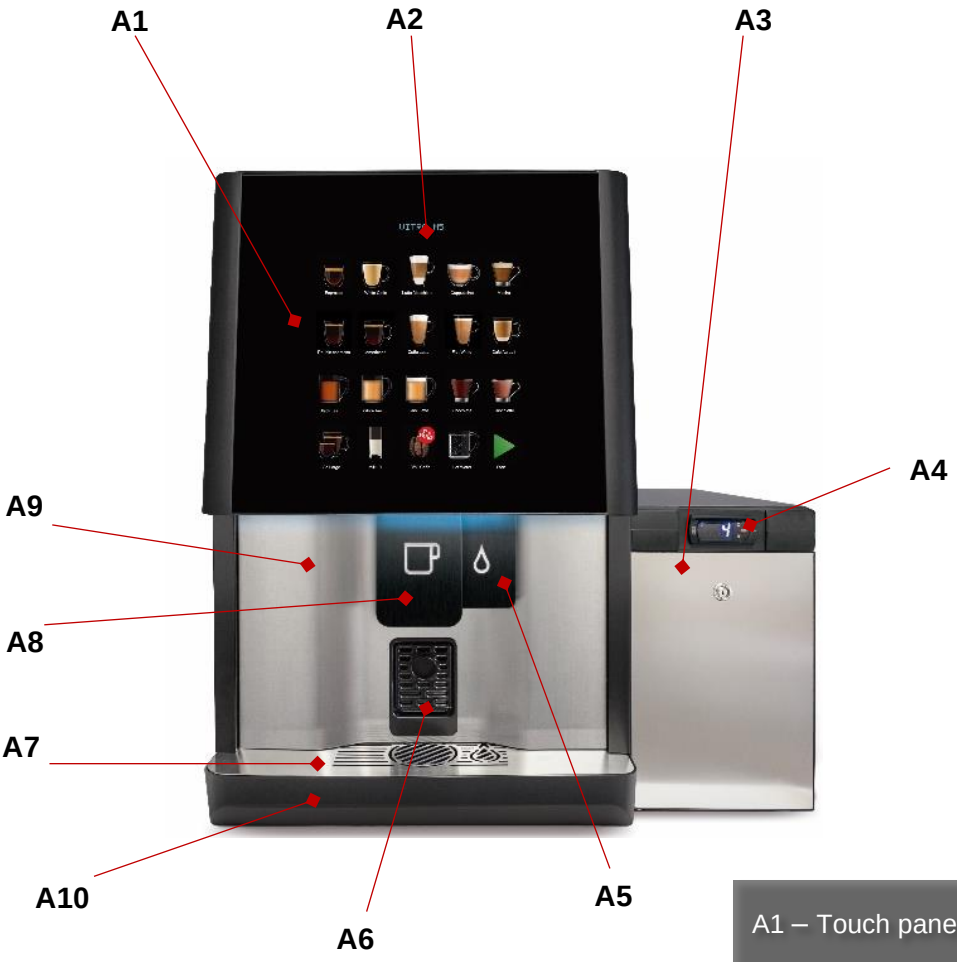
Versions, according to the machine's main elements

Code	Description
INS	Beverages based on freeze-dried soluble product.
ESP	Espresso coffee beverages.
20S	20-key selection touch panel
V10	In ESP models, V10 is the standard 8 g espresso group.
V20	In ESP models, V20 is the standard 14 g barista group.
V30	Variable capacity espresso group, from 7 to 14 g.

AZK 10	**AZK 20**	**AZK 30 Variable**

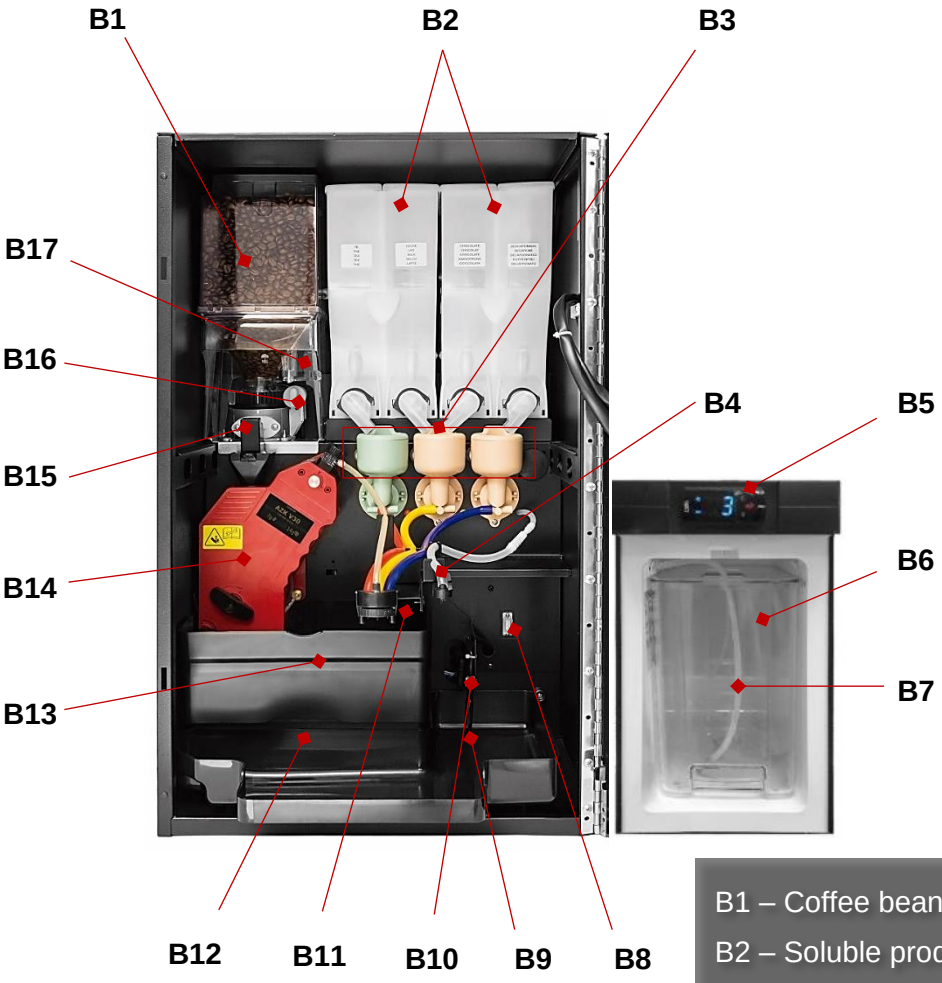
2.2 MAIN COMPONENTS

Front view



A1 – Touch panel, 20 selections
A2 – Alphanumeric display
A3 – Refrigerator FG16i DGT
A4 – Programmable thermostat
A5 – Independent hot water outlet
A6 – Folding cup holder
A7 – Liquid evacuation grille
A8 – Service head
A9 – Front service panel
A10 – Door liquid collection tray

Inner front view



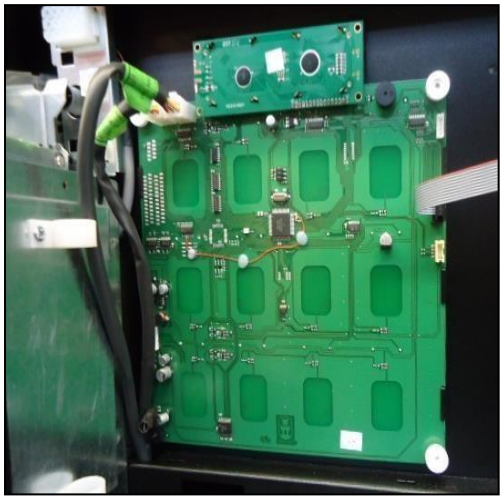
B1 – Coffee bean container
B2 – Soluble product hoppers
B3 – Beaters
B4 – Hot water outlet
B5 - Refrigerator temperature control
B6 – Milk container
B7 – Milk suction tube
B8 – Programming connector
B9 – Tray level sensor
B10 – Liquid waste outlet
B11 – Cream adjustment control
B12 – Liquid waste tray
B13 - Coffee grounds container
B14 – Espresso assembly and piston
B15 – M03 grinder
B16 – Ground coffee adjustment control
B17 – Coffee bean closing slide gate

A1. Selection touch panel

The Vitro S5 model may feature one of the following types of keyboards: basic keyboard with **12 keys**, with 8 direct product selection keys and 4 pre-selection keys, or the keyboard with 20 keys, with 19 product selection keys and 1 inactive key.

These product selections or pre-selections are activated with capacitive detectors. No key needs to be pressed to select a product, simply move your finger close to the desired product and the machine will serve it.

The push-button and each button are hosted behind the door's glass panel, with the corresponding product label; these labels will be attached to the label holder.



Each product and pre-selection label are backlit with a LED; all other labels will be switched off when a product is selected on the machine, so only the label of the selected product is lit. When a pre-selection is pressed, only the labels of products included in this pre-selection will be lit; all others will be turned off. Pre-selection refers to the service element that can be optional or configurable, for example, the option "No cup", when the customer brings a cup; or the settings for different ingredients "+/- sugar", "Extra milk", "25% Extra thick", etc.

The push-button card is fastened with 4 plastic nuts and protected by a panel. The label-holders are pressed onto the card.

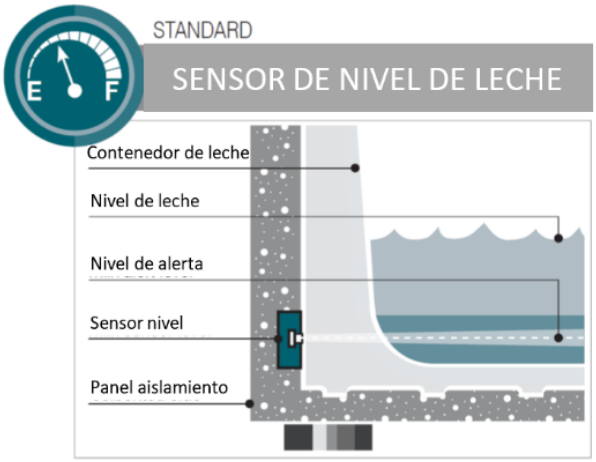
A2. Alphanumeric display

The *display* is connected to the electronic push-button card, which has two lines of 16 alphanumeric characters each.

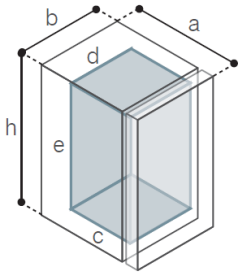
A3. Natural milk refrigerator

The natural milk storage refrigerator is a key component in the fresh milk system. This is an independent unit placed on one side of the machine or under the counter, which features a tank with a 9-litre capacity in the supply unit.

The refrigerator features an autonomous temperature control unit that can be programmed from the display/keyboard on the front panel, and which displays the inner temperature in real time, detects the minimum milk level using a capacitive sensor and an electronic system to monitor the temperature of the container, guaranteeing food safety at all times before the power is disconnected or there is a problem with the compressor. These two last functions are communicated to the machine via the serial connection (I2C) to take decisions accordingly.



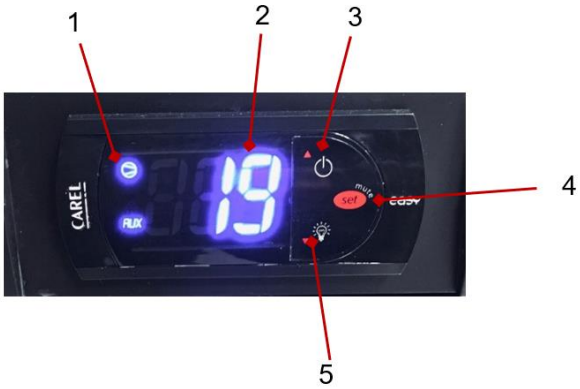
Main features

Designation	Volume	Container capacity	Power supply voltage	Volumetric dimensions
FG16I DGT	13 litres	9 litres	220-240 Vac/50 Hz	a b h 510 230 390 c d e 278 173 277 

B5. Refrigerator temperature control

It is hosted on the upper part of the refrigerator's front panel and it is used to configure the different parameters required to control the container's temperature. It features an independent control, although it uses serial communication to connect to the machine, informing it with I2C commands of the temperature monitor and minimum milk tank level sensor states.

These are its main elements.



1		Compressor active signal
2	T (°C)	Temp. Value measured in chamber. Temp. Set point (programming mode)
3		Power ON or increase Temp value in prog. mode
4	SET	Access prog. mode (press for 3s) or mute function for acoustic warnings
5		Display switch OFF or decrease temp. Value in prog. mode.

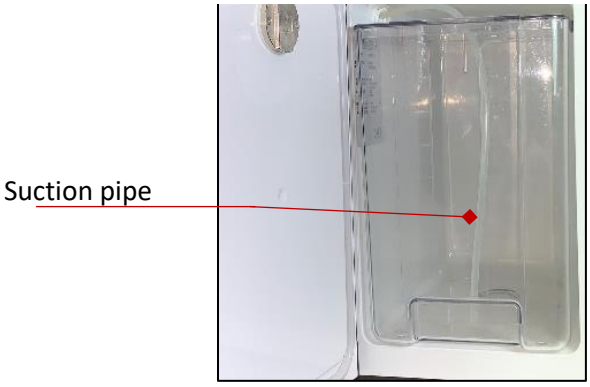
B6. Natural milk container

Included in the unit supplied, with a 9-litre capacity. It is advisable to only fill the container with the milk that will be used that day and to thoroughly clean it at the end of the day with neutral soap and/or a cleaning solution supplied by AZKOYEN.

Extracting the container from the refrigerator

B7. Milk suction tube

The tube sucks the milk from the container to the machine's milk module when the machine's milk pump is activated. This tube must have a particle micro-filter fitted at all times on the container end to prevent solid particles from going inside the container, due to the natural process of solidification of milk fat or foreign elements that could have accidentally fallen into the container. There are two holes on both sides of the refrigerator; you can use the one that best suits the refrigerator's position with respect to where the machine is found. Unused holes must be covered with the plugs fitted when the machine is supplied.



Suction tube through-holes

A5/B4. Independent hot water outlet

Separate water circuit used to prepare infusions or to serve hot water into cups. This outlet will only serve hot water, preventing any form of interference with any other ingredient.

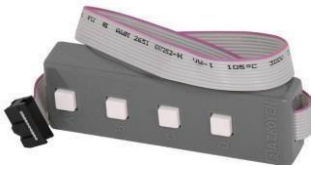
A10. Door liquid collection tray

It hosts a 1.2-litre tank that recycles the liquids spilled in the dispenser area. This tray is released by using two knobs on the rear of the door. The tray features two magnets, which maintain it steady in its position, so it can be easily removed from the front by simply releasing it from these two fastening elements.

Release knobs

A11. Programming box

This key module is used to programme the machine's settings and provides access to all functions. (See the programming manual)



B1. Coffee bean container

This container is supplied with all Vitro S5 machines. It is found on the grinder and used to store coffee beans. It has a 2.6 kg capacity.

B2. Soluble product hoppers

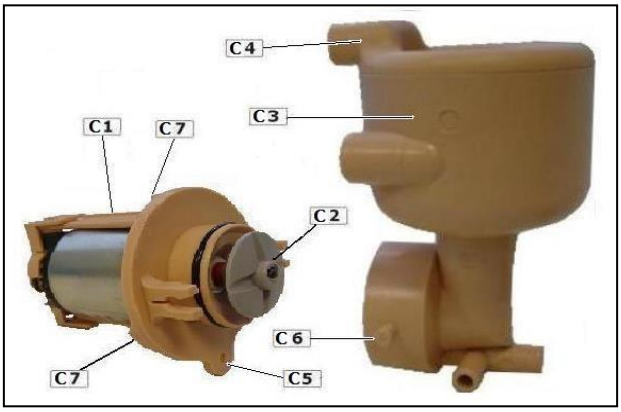
Product	Soluble coffee	Decaffeinated	Milk	Chocolate
Capacity / g.	460	460	2000	2300

The soluble product hopper capacity is of 3 litres and the approximate weight is shown,for each product, in the table.

B3. Whippers

These elements mix the soluble product with the hot water supplied from the boiler.

C1. Whipper motor assembly
C2. Whipper blade
C3. Whipper assembly
C4. Gas extraction cone
C5. Fastening bolt
C6. Whipper fastening pivots
C7. Motor fastening tabs



A motor with the following features moves the whipper blade:

Motor brand	Mabuchi
Power supply voltage	34 VDC
Consumption	20 W
Speed of rotation	15,000 rpm

The whipper assembly can be removed from the machine by pulling from it until the fastening pivots are released. To remove the motor assembly, release the fastening bolt and turn the motor to the right until its fastening tabs are released.

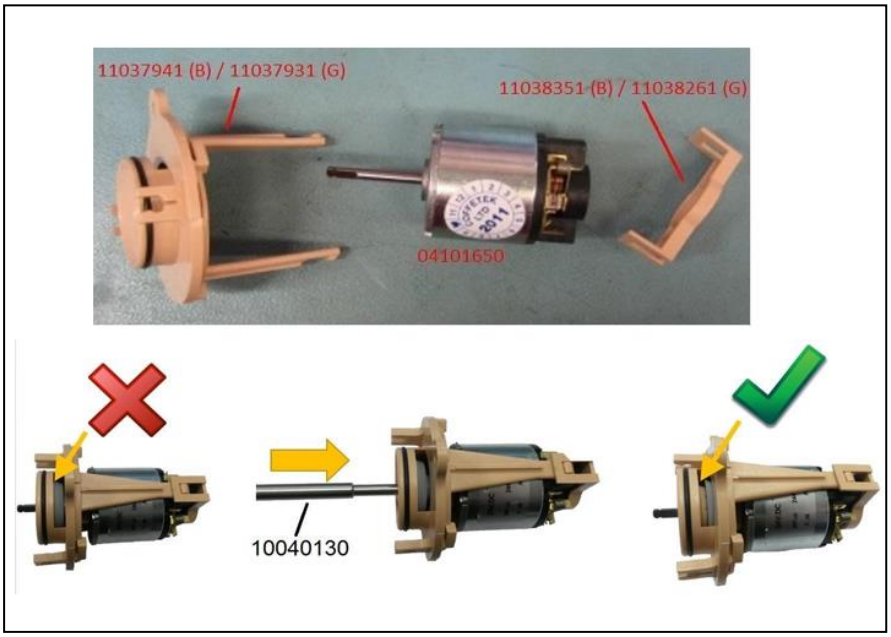
CAUTION

Right assembly of whipper components

To mount the beater motor (04101650) and beater base (11037941 Beige / 11037931 Grey / 41221621 Green), push the grey part inside the beater base in the direction of the motor.

Make sure that this grey piece is in contact with the outer body of the beater base. If these two bodies come into contact or are very close to each other, the friction between both pieces when the motor is activated will fuse them together, rendering the beater unusable. Azkoyen tool no. 10040130 in its parts catalogue should be used to perform this.

Assembling the whipper assembly



The soluble product EVs are a critical element during the beating process. It is used to allow hot water to flow from the boiler to the beaters to prepare soluble products.

They are placed on a brass support, which is set to a constant temperature and fastened to the upper section of the hot water boiler. Therefore, the processes carried out to prepare soluble products will not cause excessive temperature losses and the water will reach the beaters at the adequate temperature. (See A16, hot water boiler).

B8. RS-232 Programming connector

RS232 service connector for connection with a programming cable to a PC. The Azkoyen Configurator application can be used to perform the following service operations:

- Read the programming parameter settings, arrange the options on the panel, show the details of the selected service ingredients, etc.
- Upload a configuration from the PC to the machine.
- Upload firmware updates.

B9. Liquid waste tray level sensor

When the waste in the tray reaches the maximum level, this sensor detects it by the continuity of the two electrodes in contact with the liquid. The machine will show the "Liquid tray full" error on the display. The waste must be removed from the machine before it can be used again.

When the machine features an external drain, the liquid level in the tray will not activate this sensor.

The surface of the contact terminals should be cleaned after each drainage operation to prevent dirt from accumulating and interfering with the correct operation of the sensor.

B11. Cream adjustment control

This is a manually-operated knurled knob, located on the support arm of the dispenser tubes. It can be used to adjust the micro-injected air used to froth the milk and make the cream. In the clockwise direction, it closes the flow of air from the outside and in the counter-clockwise direction it opens it. The knob features a safety locknut that must be released before performing any adjustment.

The machine is fine-tuned at the factory for the optimum cream setting. This setting can be changed, according to the type of milk, increasing or decreasing the flow of air to prepare cream with the desired density. This control does not need frequent adjustment. The user can check the results to establish the time it needs to be adjusted, for example, signs of the need for new adjustment include a lower cream quality or density, irregular flow, excessive bubbling, splashing, etc.

B12. Liquid waste tray

Collects the liquid waste generated by the machine. It has a capacity for approximately 4.7 litres. When the water level in the container reaches the two filling detector terminals, the machine is set to the out of service mode.

B13. Coffee grounds container

Collects the solid waste generated by the machine. It has a capacity for 800 g of ground and brewed coffee.

B14. Brewing group and piston

The elements of the brewing group and piston are manufactured in resin and are the elements used to *brew* the ground coffee dose.

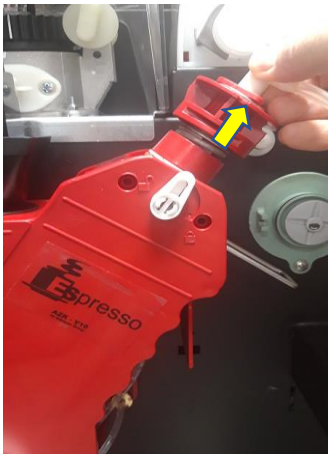
Azkoyen offers three coffee groups with different features and capacities. The Vitro S5 models may incorporate any of the three types of groups:

1. **AZK 10**. It can process 5 to 8 g coffee doses
2. **AZK 20**. It can process 10 to 14 g coffee doses
3. **AZK 30 or Variable group**. It can process 7 to 14 g coffee doses

AZK 10	**AZK 20**	**AZK 30 Variable**

The *groups* feature moving parts that are activated by a 120/230 VAC motor, which can rotate a bushing that pushes the *coffee holder* from the grinder to the piston (filling and brewing positions). A cam rotates as the motor rotates, which presses a *micro-switch*, indicating to the electronic card that the group has reached the brewing position.

To remove any of the 3 *groups* from their anchoring position, rotate the two levers that secure it to its support, as shown in the image below. If the group is in the brewing position, extract the piston to remove it.



To remove the AZK 30 group, in addition to the lower lever and the upper nut, release the bolt shown in the image above.

AZK 10 - AZK 20. Washer position and coffee capacity

The piston features a spring and two washers, which adjust the pressure of the piston on the ground coffee, depending on their position.

We recommend fitting two washers in the correct position, according to the amount of coffee dosed. Otherwise, the group may be blocked by excess coffee.

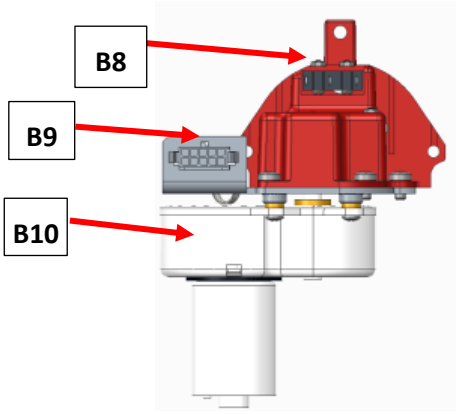
The amount of coffee that the two pistons of the AZK10 and AZK20 groups can compress is indicated in the table below, according to the position of their washers.

AZK 10 coffee dose	No. of washers in the lower position	No. of washers in the upper position	AZK 20 coffee dose
5 – 5.5 g	2	0	10 – 11.5 g
5.6 - 7 g	1	1	11.6 – 2.5 g
7.1 - 8 g	0	2	12.6 – 14 g

AZK 30. Variable group

The AZK 30 group has a variable and automatic positioning system, handling from 7 to 14 g, thanks to a 24 VDC position control motor.

The variable group allows a more controlled dosing system and better pressing results, since the piston is positioned by the activation of a DC motor, controlled by a pulse meter.



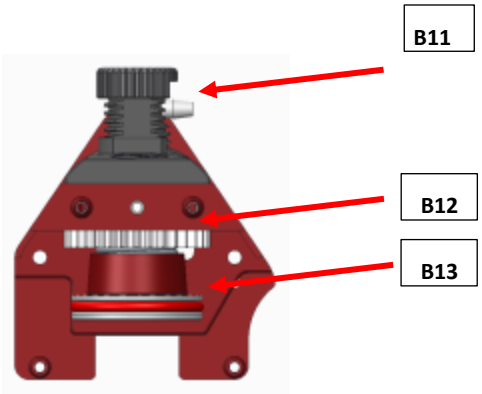
The motor assembly positions the piston and exerts the necessary pressure on the coffee, in accordance with the grinding time or grams of the recipe.

B8. Positioning micro-switch.

B9. Motor connector.

B10. Gear motor.

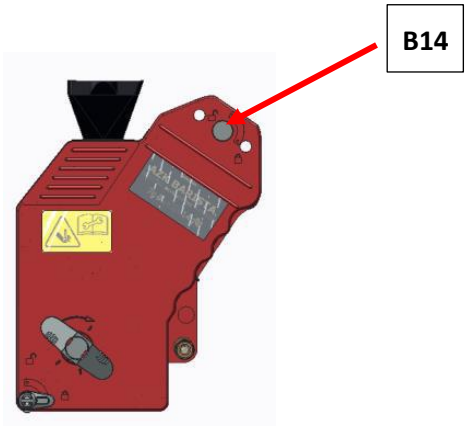
The upper piston assembly has a pinion that is coupled to the motor to press down the coffee, according to the quantity in grams.



B11. Espresso tap

B12. Positioning pinion

B13. Upper piston seal



B14. Fastening bolt

B15. M03 coffee grinder

Technical features:

Voltage	220 VAC
Nominal power	400 W
Speed of rotation	1,250 rpm
Grinding wheel diameter	63 mm
Grinding adjustment points	0.026 mm

Vitro S5 machines feature Azkoyen's M03 grinder. The grinder features flat grinding bits, dosing the amount of ground coffee in different time slots, without the need to use a volumetric dosing system. In addition, they offer a smoother and lighter coffee grinding process.

It is attached to a metal support, fastened to the cabinet chassis with 3 bolts. To remove it, simply remove these 3 bolts and the electrical connector.

The amount of coffee to grind in each service can be adjusted by time, using function 316; see the "programming manual".

Rotate the grinder's adjustment knob to change the size and amount of ground coffee; rotate it clockwise for finer grinding and reducing the amount. Rotate it counter-clockwise for thicker grinding and increased amount.

B18. Production extraction chutes

It is used to remove the soluble product from the corresponding hopper and transferring it to the product beaters. It features a Mabuchi motor and a gear motor developed by Azkoyen.

Motor brand	Mabuchi
Power supply voltage	24 Vdc
Speed of rotation	40 rpm

B19. Water inlet solenoid valve

It allows water to flow from the water network to the cold water tank. It operates at 120/230 VAC.

It features a grille to separate the solid elements coming from the hydraulic network; the normal closing procedure of the EV cuts the flow of water to the machine. Check that the filter and grille are not clogged by waste.

B20. Volumetric meter

This meter is used to calculate the amount of water driven by the pump to prepare *espresso coffee.*

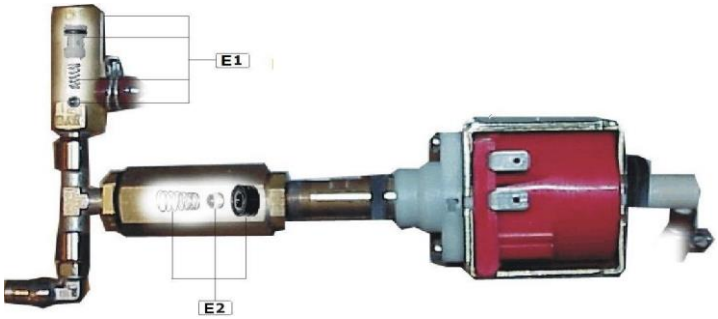
It features a blade inside, which rotates when water flows through it. This blade features two magnets, which act on the terminal on the meter's cover during rotation. The terminal on the cover has three contacts, identified as the positive (5 VDC), negative and _Π_. Measuring the voltage between the negative and _Π_ terminal when the brewing pump is operating will show a change in the voltage each time the magnet passes by; the voltage will change from 0 to 5 volts (3.5 VDC when measured with a multimeter), indicating that the meter is operating correctly.

B21. Pressure pump

This element is responsible for taking water from the cold water tank and transferring it to the boiler. The cold water drives the water inside the boiler towards the soluble product EVs or to the espresso coffee brewing *group*.

E1. Bypass

E2. Anti-return



When espresso coffee needs to be prepared, it offers a high resistance to the flow of water, since the coffee is ground and pressed down by the piston of the brewing *group*. This resistance of the coffee increases the pressure at which the pump supplies the water to the boiler; as the water pressure increases, the water coming out of the boiler to brew coffee can reach pressures of up to 9 kg/cm². The pump bypass (2) is opened at this pressure, allowing a small amount of water to be driven back, which is enough to prevent the pressure at which the pump operates to exceed 9 kg/cm².

The bypass is a water outlet hole that is closed by a spring-driven ball. This spring can withstand a pressure of 9 kg/cm², pressure at which it is compressed and allows water to flow through.

This pressure of 9 kg/cm² is the perfect pressure to prepare espresso coffee.

When a soluble product needs to be prepared, the water does not find resistance to reach the beater from the boiler, so the pump works at a smaller pressure than when preparing espresso coffee when preparing these products. The pump also features an anti-return valve that prevents water from being driven back from the boiler.

Technical features:

Power supply voltage	120/230 Vac
Nominal power	48 W
Operating pressure	8 kg/cm²
Maximum pressure	12 kg/cm²

B22. Cold water tank

It is manufactured in copolyester (PCTA) and has a 500cc capacity for water. It operates at the atmospheric pressure and temperature. It receives the water to prepare the soluble products and espresso coffee.

The water level in this tank is controlled by a magnetic switch activated by a float.

B23. Hot water boiler

The boiler operates under pressure and has a 700cc capacity for water. It is used to heat the water to prepare the products, i.e, *espresso* and soluble products. It is manufactured in brass and does not need additional devices to check the fill level, since the boiler is automatically filled with water when the machine is installed. Next, a service is completed, so the boiler is filled with the same amount of water as that used during the service. Therefore, except in the event of anomalous operation, it will be permanently filled.

F1. Temperature sensor (PTC)

F2. 120ºC Safety thermostat

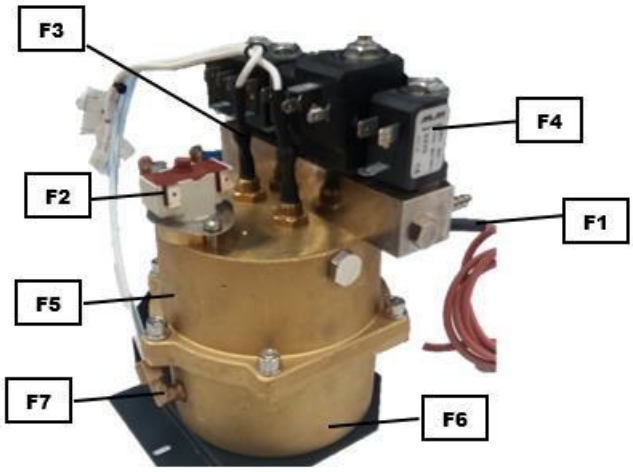
F3. 1,800 W heater resistor

F4. Electrovalves

F5. Upper cover

F6. Lower cover

F7. Water inlet

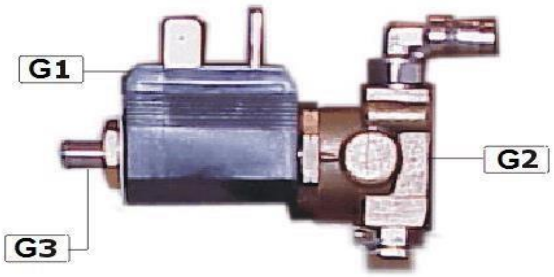


The *espresso* and soluble product electrovalves are found on a support bolted onto the boiler. The *espresso EV* is a 3-way valve: a boiler outlet way, a way used to access the *group*, and a third way, which when at standby, allows the *group* to be set at the environmental pressure.

G1. Coil

G2. Valve

G3. 3rd Way s

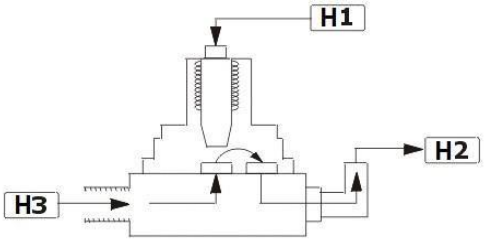


When the machine is brewing coffee, the third way is closed, while the boiler outlet and *group* inlet communicate.

H1. 3rd Way closed

H2. Outlet to the brewing group

H3. Water inlet from the boiler



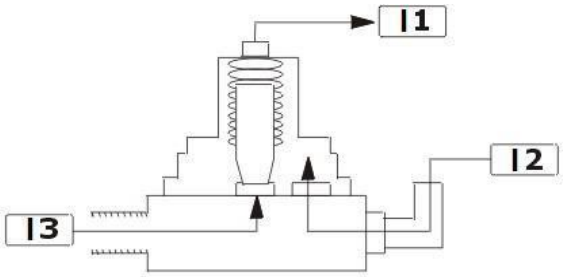
When the machine stops brewing espresso, the 3-way *EV* is set to standby, so it closes the water outlet from the boiler and the *group* is connected to the third way. Therefore, the water that could not flow through the coffee during the brewing process and which is held inside the *group*, will be driven through the third way to the waste container.

The water is pushed back from the brewing *group* to the third way of the *EV*, since it is at a high pressure, which will have been previously increased by the pump during the brewing process.

I1. 3-way channel open

I2. Group connected at the ambient pressure

I3. Water channel closed



Technical features:

Heater resistor voltage	120/230 VAC
Heater resistor power	1,800 W
Programming the temperature	70 to 94ºC
Manual reset thermal protection	120ºC
Power supply of the EVs	24 VDC
Soluble and espresso EV power	10 W
Maximum pressure supported by each EV	15 kg/cm²
Operating temperature of the EVs	-10º C to 140º C

The boiler water temperature is controlled with a PTC100. The table below shows the resistance values of the PT100, according to the temperature to which it is exposed.

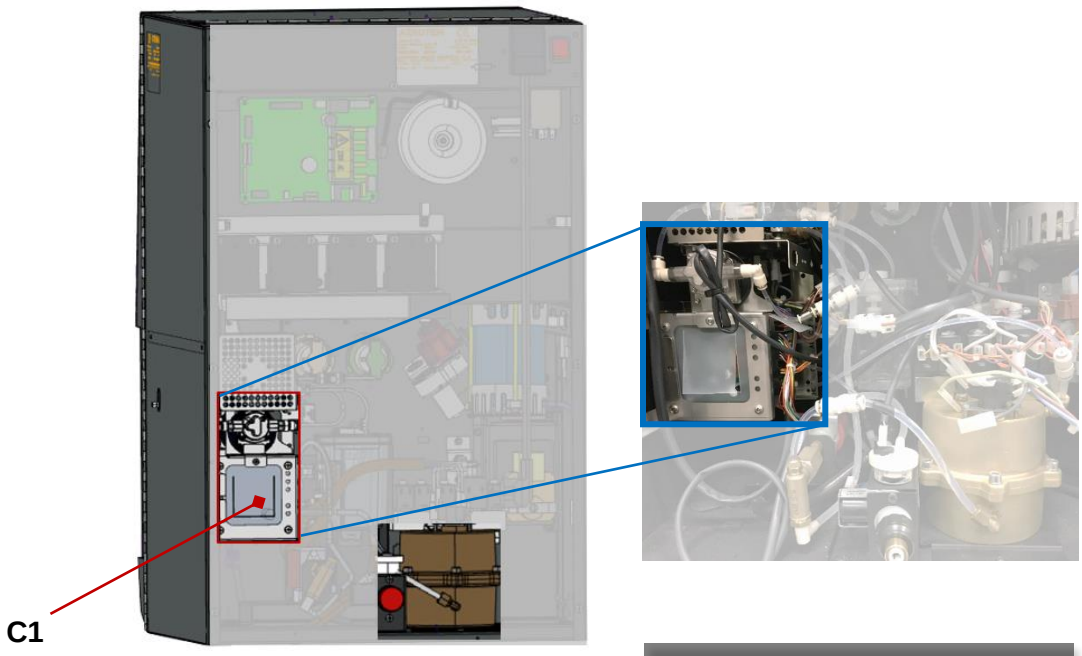
ºC	0	1	2	3	4	5	6	7	8	9
0	100.00	100.39	100.78	101.17	101.56	101.95	102.34	102.73	103.12	103.51
10	103.90	104.29	104.68	105.07	105.46	105.85	106.24	106.63	107.02	07.40
20	107.79	108.18	108.57	108.96	109.35	109.73	110.12	110.51	110.90	11.28
30	111.67	112.06	112.45	112.83	113.22	113.61	113.99	114.38	114.77	15.15
40	115.54	115.93	116.31	116.70	117.08	117.47	117.85	118.24	118.62	19.01
50	119.40	119.78	120.16	120.55	120.93	121.32	121.70	122.09	122.47	22.86
60	123.24	123.62	124.01	124.39	124.77	125.16	125.54	125.92	126.31	26.69
70	127.07	127.45	127.84	128.22	128.60	128.98	129.37	129.75	130.13	30.51
80	130.89	131.27	131.66	132.04	132.42	132.80	133.18	133.56	133.94	34.32
90	134.70	135.08	135.46	135.84	136.22	136.60	136.98	137.36	137.74	38.12
100	138.50	138.88	139.26	139.64	140.02	140.39	140.77	141.15	141.53	41.91
110	142.29	142.66	143.04	143.42	143.80	144.17	144.55	144.93	145.31	45.68
120	146.06	146.44	146.81	147.19	147.57	147.94	148.32	148.70	149.07	49.45
130	149.82	150.20	150.57	150.95	151.33	151.70	152.08	152.45	152.83	53.20
140	153.58	153.95	154.32	154.70	155.07	155.45	155.82	156.19	156.57	56.94
150	157.31	157.69	158.06	158.43	158.81	159.18	159.55	159.93	160.30	60.67
160	161.04	161.42	161.79	162.16	162.53	162.90	163.27	163.65	164.02	64.39
170	164.76	165.13	165.50	165.87	166.24	166.61	166.98	167.35	167.72	68.09
180	168.46	168.83	169.20	169.57	169.94	170.31	170.68	171.05	171.42	71.79
190	172.16	172.53	172.90	173.26	173.63	174.00	174.37	174.74	175.10	75.47

200	175.84	176.21	176.57	176.94	177.31	177.68	178.04	178.41	178.78	79.14
210	179.51	179.88	180.24	180.61	180.97	181.34	181.71	182.07	182.44	82.80
220	183.17	183.53	183.90	184.26	184.63	184.99	185.36	185.72	186.09	86.45
230	186.82	187.18	187.54	187.91	188.27	188.63	189.00	189.36	189.72	90.09
240	190.45	190.81	191.18	191.54	191.90	192.26	192.63	192.99	193.35	19.70
250	194.07	194.44	194.80	195.16	195.52	195.88	196.24	196.60	196.96	97.33
260	197.69	198.05	198.41	198.77	199.13	199.49	199.85	200.21	200.57	00.93
270	201.29	201.65	202.01	202.36	202.72	203.08	203.44	203.80	204.16	02.52
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									

2.3 FRESH MILK MODULE

The module is hosted to the left of the espresso boiler and is accessed from the rear panel.

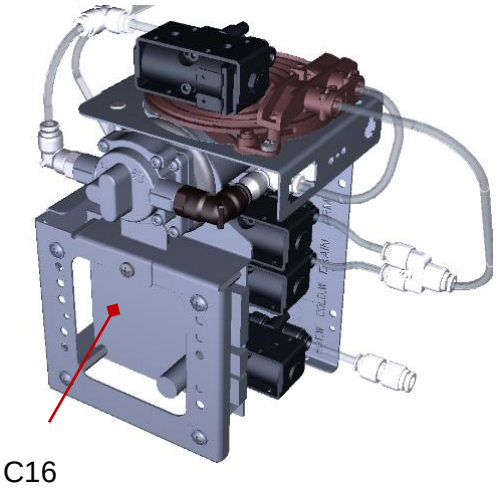
Rear view



C1 – Fresh milk module

2.3.1 Main components of the milk circuit

Overview



C1 – Air inlet for air injection

C2 – Cream adjustment control

C3 – Air inlet control EV

C4 – Milk heater element

C5 – Anti-return valve of the cleaning circuit

C6 – Milk inlet control EV

C7 – Milk suction channel to the refrigerator

C8 – Product outlet (milk)

C9 – Liquids waste outlet

C10 – Hot water inlet EV

C11 – Boiler water supply line

C12 – Control EV waste outlet to the tray

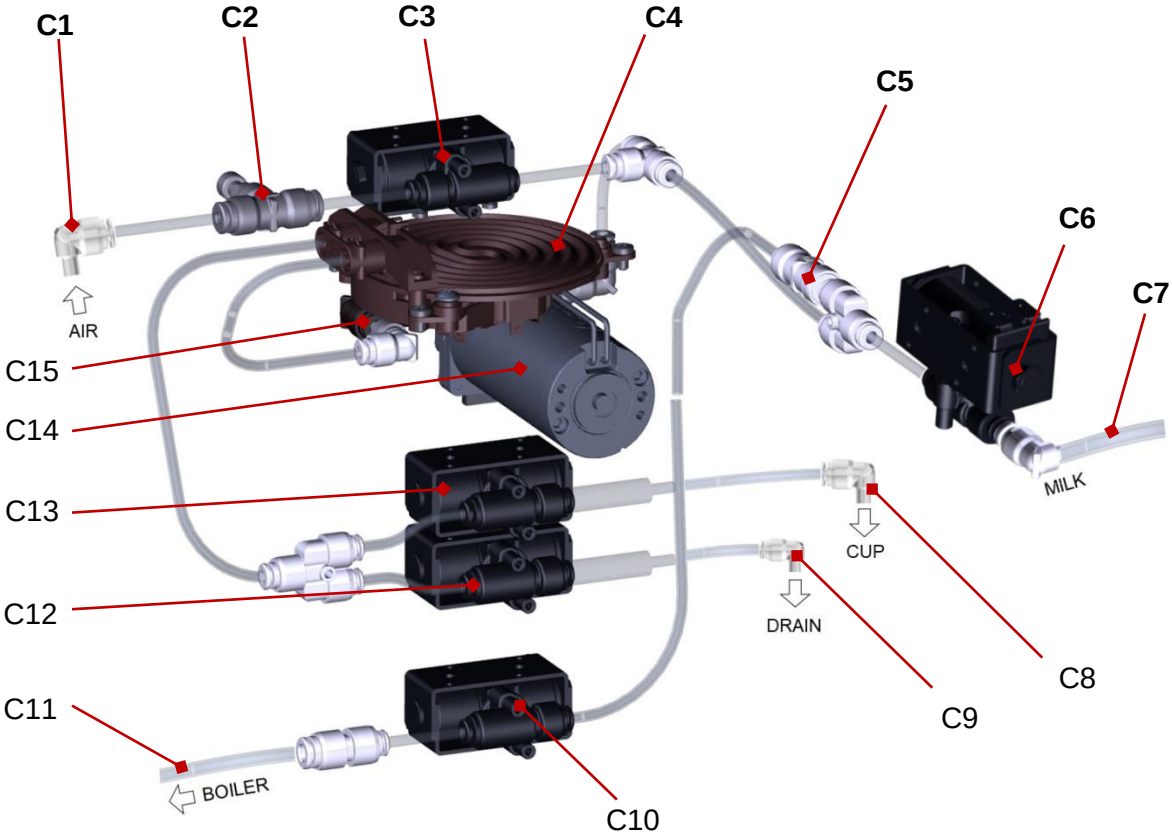
C13 – Control EV milk delivery to the cup

C14 – Milk pump

C15 – 0.6 mm accelerator limiter

C16 – I2C control PCB of the Fresh Milk module

Hydraulic components



C14. Milk pump

Main features:

- Power supply: 24 VDC
- It is used to supply milk during service.
- The amount of air required is injected in the milk flow for the milk-cream services. The pump supply procedure and the subsequent reduction of the conduit's cross-section using a 0.6 mm ∅ accelerator turns the mix into a consistent cream.
- It is used with hot water + detergent in the module's cleaning cycles.
- The pump speed is controlled from the main PCB, according to the process in progress, using PWM control.

C3 – C6 – C10 – C12 – C13. Coaxial 2-way electrovalves

- Manufacturer: Römer.
- 5 of these valves are used in the fresh milk module.
- They are controlled by the module's PCB through CAN commands communicated by the main PCB.
- Industrial grade components for a lengthy useful life.
- Power supply voltage: 24 VDC.
-

Functions:

C3 – Air inlet

- Air inlet. Need to froth milk Opens or closes the milk inlet.

C6 – Milk inlet

- Milk inlet. Controls the supply of milk from the refrigerator.

C10 – Hot water inlet

- Controls the hot water for cleaning processes, supplied by the 700cc boiler.

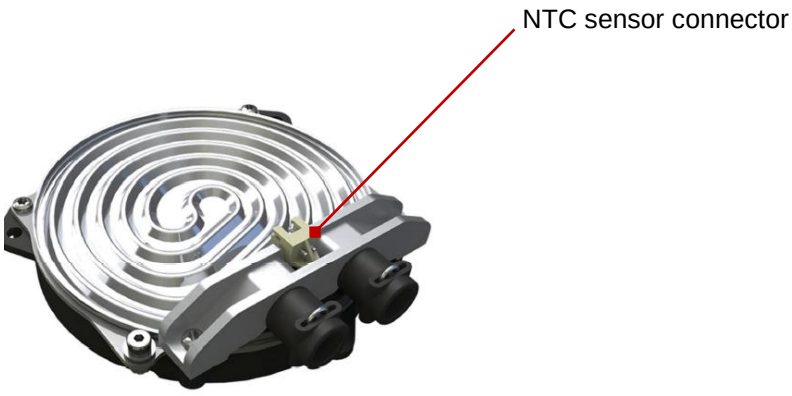
C12 – Waste outlet connected to the drain

- Used to drain the milk circuit and send its contents to the waste tray. It is activated during the cleaning cycles and is controlled by the module's PCB, being activated/deactivated according to the stages of these cycles.

C13 – Milk delivery to service

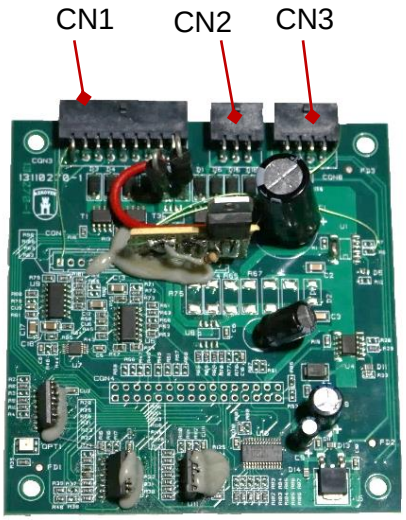
- Milk outlet used to supply milk at the service conditions to the cup.

C4 – Heater resistor



- High-performance heating element used to heat the natural milk instantaneously, according to the recipe's specifications.
- It features a 50k NTC (negative resistive sensor) to measure the fluid's temperature and make the control complete the service, as established in the recipe's specifications.
- Nominal voltage: 230 VAC
- Nominal power: 2,300 W

C16 – Control PCB of the Fresh Milk module



CN1 – Hydraulic components and external refrigerator

CN2 – Milk outlet EV

CN3 – Power supply and I2C / CAN communications

- Control PCB of the Fresh Milk module
- It features different devices with I2C communications that allow different system elements to be controlled and the temperature to be monitored.
- It governs the elements used in the milk module's processes, using the commands received from the machine's main PCB via CAN communications.
- It is used as the I2C interface between the main PCB and the external refrigerator.

2.3.2 Technical datasheets

Dimensions

Dimensions (mm) and weight (kg)	
VM5 - Width	590
VM5 - Height / Height with base	775/1630
VM5 - Depth	590
VM5 - No load weight	55
F16i DGT - Width (Outer/Inner).	230/173
F16i DGT - Height (Outer/Inner).	390/277
F16i DGT - Depth (Outer/Inner).	510/278
F16i DGT - No load weight	15

Electrical features

Electrical specifications	
Voltage	130 VAC - 230 VAC ± 10% / 50Hz
Maximum power consumption	1800W
Max. P. with the fresh milk module	2400W
FG16i DGT refrigerator	220-240 VAC / 50 Hz

Electromechanical components

Electromechanical components	
Grinder M03 / flat grinder bits	230 VAC 50 Hz / 400 W / 1,250 rpm /
ULKA EX5 Brewing pump	230 VAC 50 Hz / 48 W
Espresso group gear motor	230 VAC 50 Hz / 85 W / 7.3 rpm
Espresso boiler resistor	230 VAC 50 Hz / 1,400 W / ∅ 74 mm
Soluble extractor gear motor	24 VDC / 40 rpm
Water network electrovalve	230 VAC 50 Hz
Beaters / mixers (3x)	34 VDC / 20 W / 15,000 rpm
Boiler 2/2 electrovalves (4x)	24 VAC / 10 W unit
Espresso 3/2 electrovalve	24 VAC / 15 W
Module 2/2 coaxial EV (4x)	24 VDC
Fresh milk heater	230 VAC / 2,300 W / PTC
FM Module pump	24 VDC

Hydraulic features

Hydraulic specifications	
Sanitary network water connection	Standard in all models
Type of inlet connection	¾" M fitting
Alternative supply (optional kit)	Operating capacity, with external tank
Network pressure range	0.098 MPa – 0.98 MPa
Water connection hose	Not included in the unit supplied

Environmental conditions

Environmental conditions and environment in which the machine is used	
Temperature range	+1°C to +40°C
Maximum relative humidity	65% rH
IP Degree of protection	For indoor use only
Maximum tilt, any axis	2°
Sound level	<80 db(A)

Load capacity/selections

Capacity/Volume	
Coffee bean container capacity	2.6 kg
No. of containers of powdered product	4
Powdered product container capacity	3 l
Sugar container	No
Milk container	7.5 l
Liquid waste tray	4.7 l
Connection to drain/external tank option	Yes
Solid waste container (coffee cakes)	800 g
External waste disposal option	Yes
Boiler volume	700cc
Air tank volume	500cc
Service volumetric control	Yes (espresso only)

No. selection keys	12 or 20 capacitive keys
Selection - 12 keys	8 selections + 4 pre-selections
Selection - 20 keys	19 selections + 1 inactive

Connections and user interface

Connections / Access interface / Telemetry	
Connections / Interface	USB via RS232 interface
Application SW / service	AZK beverage configurator
OS Compatibility	Windows 10 and previous versions
Protocol of Payments Systems / Telemetry	EXE/MDB (native and self-detecting), EVA/DTS
Compatible hardware types	Validation and change of currency, cashless system, electronic payment system, cloud-based payment systems, remote monitoring systems, etc.

3 INSTALLATION

3.1 PRELIMINARY INSTALLATION CONDITIONS

- The installation and start-up procedures require previous planning.
- The owner/operator will responsible for completing all work required to connect the electrical, hydraulic and waste connections. These tasks must be carried out by authorised technicians, in compliance with the local regulations, and must be completed before the machine is installed.
- The Technical Service will install the machine, start it up and provide training on use of its basic functions.

CAUTION

- Risk of material damage to the machine and installations.
- Risk of injuries due to lifting heavy weights.
- Pay special attention to all tasks while you are carrying them out and identify the risks to which you may be exposed.
- 2 persons are needed to install the machine.

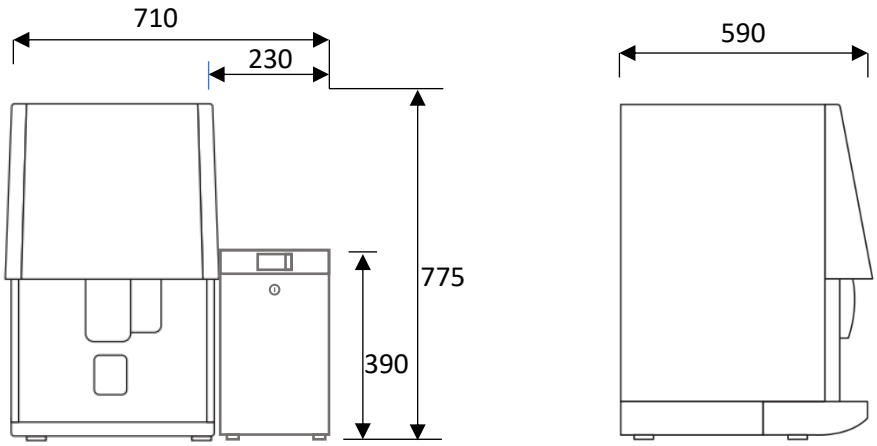
3.1.1 Location

- The support surface must be stable, ensuring it is not deformed by the weight of the machine and that it can withstand a total weight of 120 kg.
- The surface must be level, not exceeding an inclination of 2º.
- Place the machine in an area that can be monitored by qualified staff at all times.
- Do not install the machine on hot surfaces or near direct sources of heat.
- The electrical, hydraulic and drainage connections must be at a maximum distance of 1 metre from the machine.
- Leave enough space on the top to easily fill the machine with coffee beans and soluble products (see 3.1.4. Maximum dimensions).
- Leave space on the rear, at least 10 cm between the rear panel and the wall to facilitate refrigeration due to air convection (see 3.1.4. Maximum dimensions).

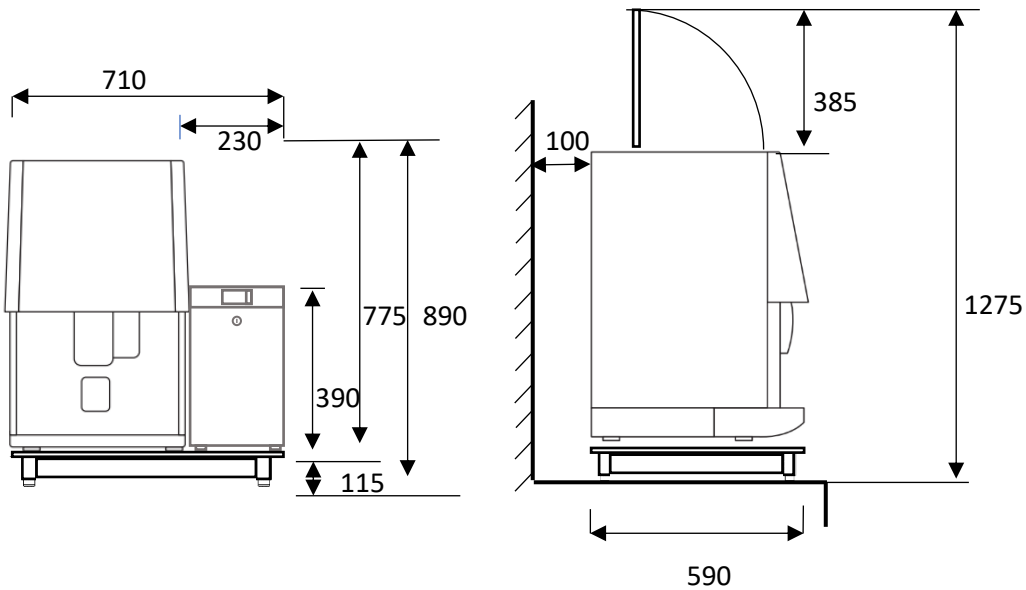
3.1.2 Environmental conditions

- The equipment must be installed indoors and not subject to outdoor conditions (frost, rain, etc.).
- Ambient temperature, between +10ºC and 40ºC
- Maximum relative humidity of 65% Rh.

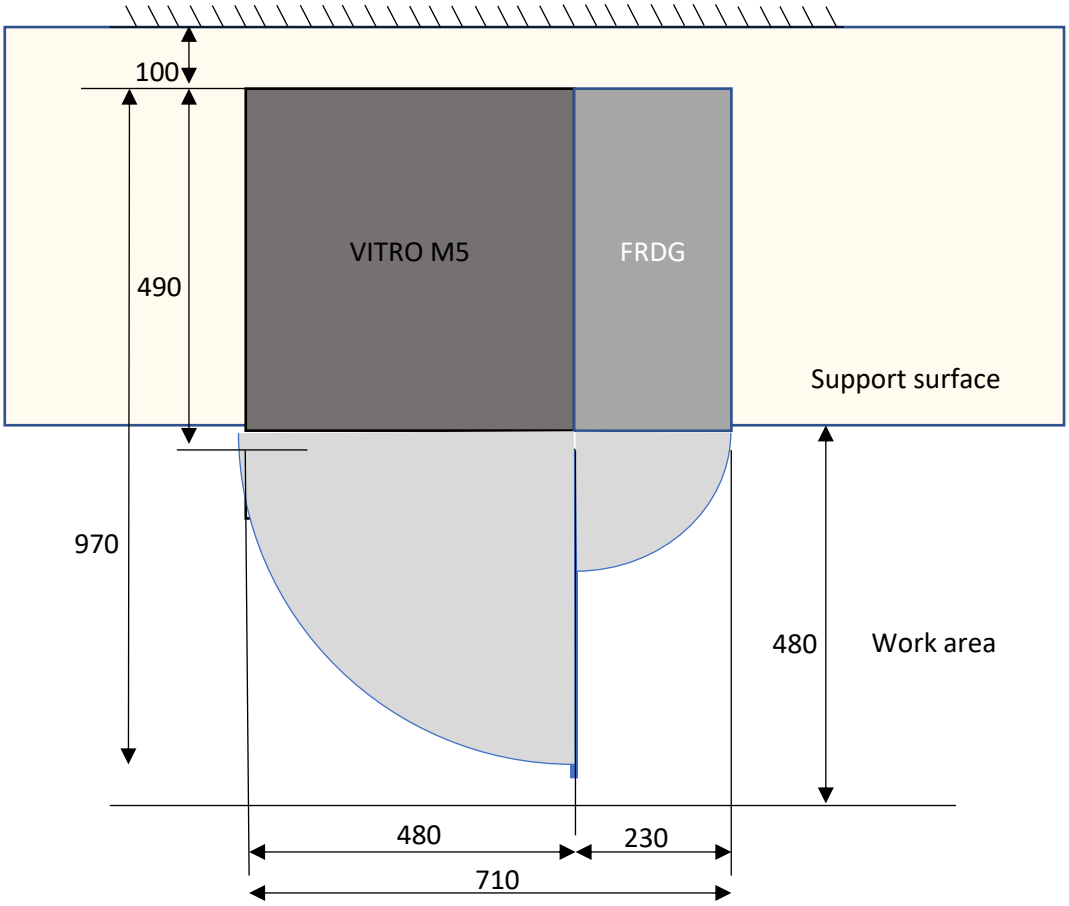
3.1.3 Volumetric dimensions



3.1.4 Maximum dimensions



3.1.5 Work area



Notes: Refrigerator installed with the VM5

- The refrigerator can be installed **on the right side, left side or under the counter**.
- Refrigerator options:
  - Azkoyen supplies the **FG16i DGT** refrigerator as an accessory. This model is designed for the installation of a refrigerator as an accessory and it features different functions, such as sanitary temperature control and minimum level detector to control the level of milk in the container.
  - Select the position of the refrigerator with respect to the machine (left side, right side or under the counter); in any case, it must be as close as possible to the machine.
  - The factory configuration establishes that the most suitable and comfortable installation location is to the right of the machine, with the sight glass facing the

selection panel. This option requires the least preparation work: pre-drilled panel, suction tube connected and with the correct dimensions. No additional adaptation work is required.

- The F16i DGT model monitors the sanitary temperature and the level in the milk tank at all times. These options can be activated or deactivated by selecting the F333 programming function. Analyse and assess all options and programme the F333 refrigerator option in accordance with this (Refrigerator YES/NO → With additional features / Without additional features). The F333 refers to whether these additional options are desired or not. Use of a refrigerator is required to maintain the milk cold chain when the container has been opened.
- **Refer to the start-up chapter for more information on adjusting the refrigerator's parameters in the Vitro M5 settings.**

- **Function 333**

  Step 1 - REFRIGERATOR YES/NO

  Used to define whether the refrigerator recommended by Azkoyen is used or not.

  - **If you select YES:**

    The machine will start to control the corresponding parameters and states via a series I2C connection: the sanitary temperature monitor and milk level control will be activated.

  - **If you select NO:**

    The machine does not control these parameters and the operation is guided with the system's built-in sensors.

  Step 2 - LEFT / RIGHT / UNDER THE COUNTER

  Indicate the refrigerator's position. This parameter and the next must be defined, regardless of whether this is the model recommended by AZKOYEN or not.

  Step 3 - MAXIMUM LENGTH OF THE TUBE

  Length of the suction tube, 3 available lengths: 100, 120 and 150 cm.

CAUTION

Do not exceed the maximum length of the suction tube. Failing to observe this could cause permanent damage to the milk pump and not guarantee the effectiveness of the cleaning cycles. The warranty does not cover damage caused by this.

3.1.6 Electrical connections

DANGER

CAUTION

- The electrical connections must comply with the local regulations of the country where the machine will be installed.
- The mains voltage must be the same as that shown on the machine's dataplate.
- Please bear in mind the following:
    - The phase must feature ***fuse protection*** with the nominal capacity according to the electrical data of the dataplate installed on the machine, next to the serial number.
    - The ***machine can be disconnected*** from the mains ***on all poles***.
    - The room's electrical installation must ***comply with the IEC 364 regulations***. To increase the safety levels, the power plug must be connected ***to an earth leakage protection device with a nominal current of 30 mA (differential), according to EN 61008***.
    - ***Never*** operate the machine with a ***damaged power supply cable***. Contact the technical service to solve this problem.
    - ***Do not pull from the power cable*** to disconnect it from the socket.
    - ***Do not touch*** mechanisms with ***wet hands or feet***.
    - ***Do not connect or touch the machine if you are barefoot***.

- Azkoyen does not recommend the use of socket extenders. If these need to be used, the cables must have a minimum cross-section of 1.5 mm^2 and the manufacturer's recommendations must be observed
- ***Guide the power supply cable*** so it ***is not in contact with sharp surfaces or ensure it cannot become snagged*** by nearby objects. Keep the power supply cable far from sources of heat.

3.1.7 Power consumption

- Maximum consumption of Vitro M5 with the Fresh Milk module: 2,400 W
- Maximum consumption of the FG16i DGT refrigerator: 100 W
- 2 sockets with a grounding connection are required to connect both modules (VM5 + Refrigerator), according to the electrical safety regulations.

⚠ **CAUTION**
Risk of causing material damage by flooding due to problems in the water installation.

3.1.8 Water connection

The machine may suffer damage and its useful life may be reduced if the following work conditions are not respected.

- The network water must be free from contaminating substances and the **chlorine content must not exceed 50 mg/litre**.
- Do not connect the machine to a reverse osmosis unit or other types of hard water supplies.
- The network water **hardness** must be between **6 – 9 Dkh** (German hardness scale).
- The water connections must comply with the local regulations of the country where the machine will be installed.
- According to the Low-Voltage Regulations, the distance between the water socket and any electrical socket base must be of at least 1 metre.

Network connection characteristics

- Machine connections: 3/4” male.
- The water connection must feature a shut-off valve, allowing it to be closed.
- Admissible network pressure: 0.098 MPa – 0.98 MPa
- Minimum flow rate: 5 l/min.
- The water connection hose is not supplied with the machine.
- A particle filter must be installed to supply the water within the indicated hardness and pH parameters.
- Alternatively, the water can be supplied by a self-contained unit. Check the available kits on the technical website.

3.1.9 Installing a particle filter

- The machine must be equipped with a water filter to guarantee the proper operation of the fresh milk module and to reduce the hardness of water and avoid the build-up of calcium deposits in the circuit. The water filter is usually installed on the base of the machine, but it can also be installed between the water connection and the machine’s inlet.

- The filter must be regulated with the following values:

	CaCO3 (mg/l)	**dH (DE)**	**Fh (FR)**	**eH (GB)**
Maximum	160	9	16	11
Minimum	110	6	11	7

- To guarantee proper operation, particle filters must be maintained and changed at regular intervals. We recommend taking water samples and analysing them at regular intervals.

3.1.10 Connection to the drain pipe

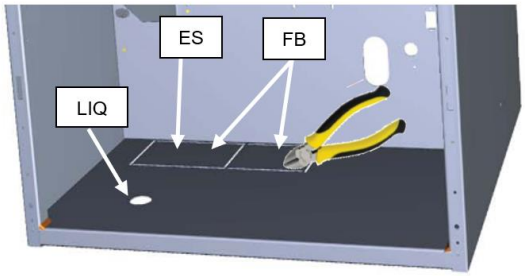
- If the liquid waste is drained through the local drain, keep in mind that the necessary inclination is required from the machine's evacuation point, using the waste tray at an angle and reaching the drain.
- We recommend installing a tap between the machine outlet and drain.
- The drain connection hose is not supplied with the machine. In any case, it must withstand the normal operating temperatures of waste in this type of machine.
- The drain hose must be firmly attached to the tray outlet connection.

3.2 WASTE MANAGEMENT

- Different containers are found inside the machine to manage waste: waste collection tray, with a 4.7 litre capacity and the ground coffee container, with a maximum capacity of 800 g.
- As an option, the machine can be adapted to evacuate waste to the outside from its base.
- External containers will be hosted under the counter/tabletop.
- Azkoyen can supply a cabinet-stand as an accessory, which can be integrated with the machine to store the waste and increase the machine's operating range.

Evacuating waste through the counter/tabletop

- The base of the Vitro M5 cabinet features holes to evacuate waste from the bottom. The solid waste evacuation area features holes, but additional ones can be opened with pliers. Liquids are evacuated through the ∅ 28 mm hole found under the tray's pre-drilled outlet.
- If this installation is required, contact the After Sales Department to receive more information about the most adequate solution.



ES - Outlets for ESPRESSO models

FB - Outlets for Fresh Brew models

LIQ - Outlets for liquids (ALL)

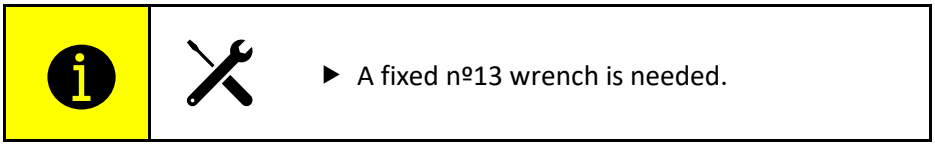
3.3 INSTALLATION AND START-UP

3.3.1 Pre-condition checks

- Check that the installation requirements described in point 3.1 are met.

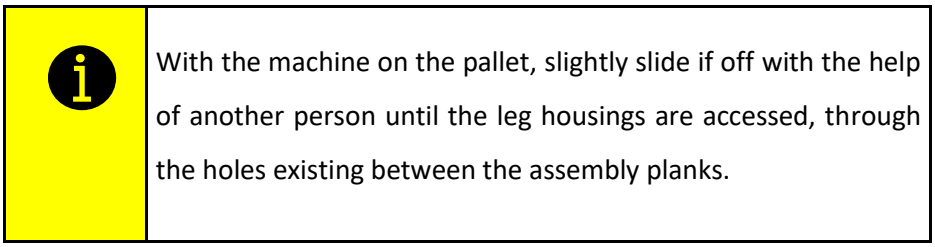
3.3.2 Removing the packaging from the equipment

- Remove the packaging from the machine and its accessories.
- Remove the protective materials and save the accessories and documents for subsequent steps.
- Dispose of the packaging materials in accordance with the local waste recycling regulations.
- Remove the 4 M8 hex bolts anchoring the machine to the wood pallet.



- A fixed nº13 wrench is needed.

- Mount the levelling legs in the positions of the bolts that were removed.



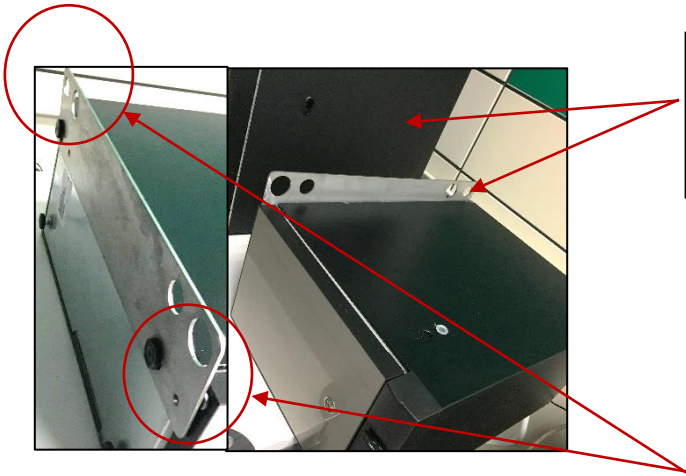
With the machine on the pallet, slightly slide if off with the help of another person until the leg housings are accessed, through the holes existing between the assembly planks.

3.3.3 Placing the machine on the support surface

- Place the machine on the support surface with the help of another person.
- Place the refrigerator on the surface, remove the container or any other elements stored inside.
- Establish the final location of the refrigerator (left, right or under the counter). Fit the fastening flange onto the refrigerator, turning it over on one of its sides, according to the assembly side. The interface is not assembled when it is mounted under the counter.

3.3.4 Machine-refrigerator fastening flange

- The fastening flange ensures that both units are fastened together, preventing the milk suction tube from being damaged or trapped, thus preventing the product from being supplied.
- The joint is fastened using the refrigerator legs. Release those on the corresponding side and fasten the flange as indicated in the image. Do not fasten the units together yet.



In the example, the refrigerator is placed to the right of the machine.

The machine is fastened by inserting the legs on the same side through the flange holes.

3.3.5 Location, levelling and non-electric connections

- Place the machine in its final installation location, level it using the adjustable legs and connect the water and drainage connections.
- We recommend connecting the electrical connections at the end of the process, right before start-up. If water leaks are detected, ensure that the machine is disconnected from the mains to guarantee a safe operation.
- Follow the recommendations in sections **3.1.0** to **3.2.**
- Fasten the refrigerator to the machine using the interface or fastening flange supplied with the machine inside the packaging.

3.3.6 Milk suction tube

- Fit the milk suction tube towards the refrigerator, which will be connected to the machine at the factory. Use the two side holes on both units.

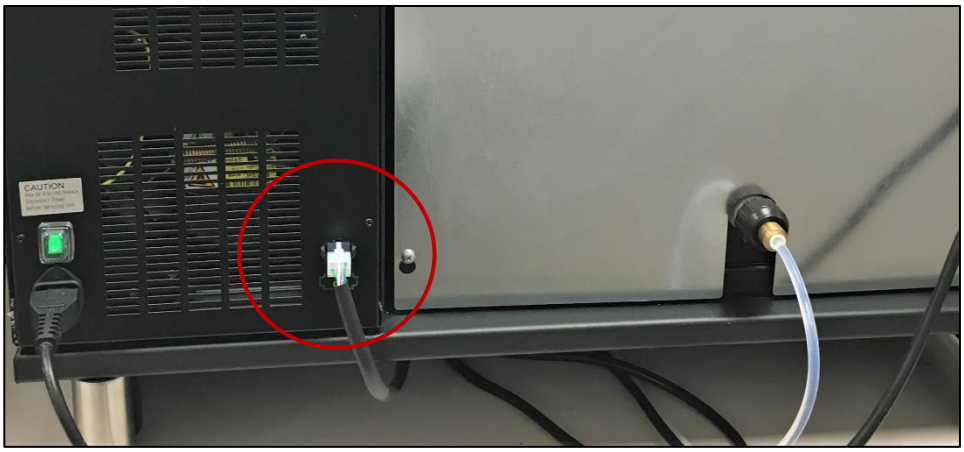
- The default factory configuration is with this tube mounted on the right side of the machine, when viewed from the front.

- Make sure that the tube is not bent or snagged.

- Make sure that the filter mounted on the end is inside the milk container.

3.3.7 Machine-refrigerator I2C bus connection

- Connect the I2C serial cable connecting the machine to the refrigerator through the rear connections. The cable is connected to the fresh milk module and it is 50 cm long, ending in a 2x3-way male Minifit connector.

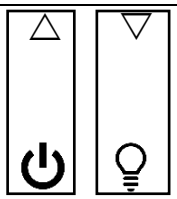


3.3.8 Connecting and configuring the refrigerator

- Connect to the refrigerator's power socket. Switch it on from the rear switch, next to the 220 VAC mains input hose.

- Configure the refrigeration temperature setpoint. The machine's programmable thermostat is found on the front panel. Proceed as explained below.

3.3.9 Adjusting the cold temperature setpoint

1	SET	Hold down for 3 seconds to access the programs
2		Press the keys indicated here to increase or decrease the desired Temperature setpoint value.
3	SET	Press once to adjust the temperature value

Considerations

1) If the display is off, hold down the ON/OFF button for a few seconds to activate the thermostat.

2) The Set key can be used to open and close the programming menu.

3) When the programming menu is opened: the on button is used to increase the value and the button with the light bulb icon is used to decrease the value.

4) Target temperature setpoint: 4ºC. Do not programme a value below this setpoint, since the milk might freeze.

5) Hold down Set until the display starts to flash.

6) The display will show the current temperature programmed.

7) Press the ON/OFF button to increase the temperature by 1 unit intervals and the light bulb button to decrease it.

8) Press Set to exit after the desired temperature has been configured.

3.3.10 Connecting the machine to the mains and configuring the panel

- Connect the machine to the mains and press the ON/OFF switch.
- Configure the selection panel with the desired products.
- If needed, change the labels in the selection panel, accessing from the inside of the door, extracting the Keyboard-Display PCB and replacing the desired connections.
- F300 – Associate selected options with channels, so they correspond to the replaced labels.

3.3.11 Configuring the refrigerator

- F333 – Refrigerator. Set YES/NO to control the sanitary temperature and milk level of the refrigerator.
- If you set it to YES, the refrigerator location will be requested (left side-right side or under the counter). The milk suction tube length can also be configured from the available options.
- Programming F333 in the presence of the refrigerator provides the activation of 2 alarms integrated into the refrigerating unit:
    - The sanitary temperature alarm is triggered if the cold chain is interrupted due to a power outage or malfunction. The machine will block as a safety measure when this occurs.
    - Minimum milk level in the container. The volume of milk detected varies from 0.5 to 1 litre. We recommend working clearly over this level to prevent interruptions. A low milk level would leave the machine out of service if the alternative soluble milk supply is not activated, provided that one of the soluble product containers is available.

3.3.12 Calibrating the frothing level F030

- Calibrating the frothing function. The dispenser arm features the control to adjust the cream consistency.
- It is adjusted at the factory for a level that is suitable in most cases. If the customer would like to change the consistency, open or close the valve for no more than ½ of a turn each time until the desired quality is achieved.
- The air inlet and milk outlet circuit can be calibrated to check that the system is operating at the optimum levels:

- **F030 Machine test -> Run the first Output Milk test**. The machine will supply water through the milk outlet EV for 10 seconds, showing the value in the display in cubic centimetres.

  → The standard value is within the 85 to 90 cc range.

  → The possible range of values is 65 cc – 100 cc. A value below 65 cc might be due to an obstruction or leakage of suction products or due to a damaged pump that cannot operate at the minimum operating flow rate. It must be inspected before proceeding with the test.

- **F030 Machine test → Run the Air Input test.** In this case, the test involves measuring the flow rate of the air conduit, passing water through it and measuring a volume in cubic centimetres. The desired value is approximately 60% of the value of the first test.
  - <u>For example: for a value of 86 cc:</u>

    → A correct value would be around 51.6 cc. A high value is associated with excess air and a low value is associated with insufficient air/obstruction or damage to a point or component in the circuit

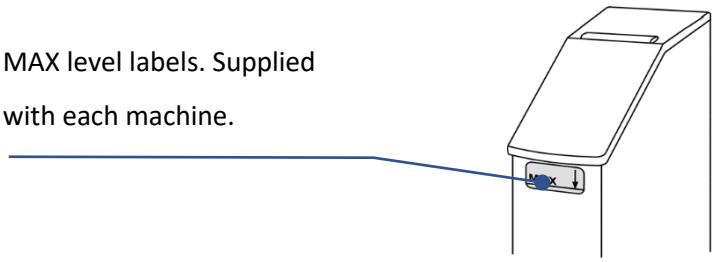
3.3.13 Filling the machine with soluble products

- Check the expiry dates before filling the machine with any product.
- Fill the hoppers with soluble products. Do not overload them if the product is not going to be used immediately.
- To fill the machine with soluble products and coffee beans, lift the machine´s top lip.

- Freeze-dried products have a limited useful life after storage. Only fill the machine with the amount of product you wish to consume, ideally, for that same day.

- You can attach the maximum level labels included in the accessory bag to mark these levels. Therefore, you can indicate the most suitable filling level, according to the expected consumption level.

MAX level labels. Supplied with each machine.



- If the hopper is empty, after filling it, complete a service so that the spindle can be filled and deliver the programmed amount.

3.3.14 Regular cleaning of the milk system

- A full cleaning process of the circuit will be executed before the initial milk filling procedure.
- Refer to the section on Cleaning the fresh milk module.

Cleaning solution for fresh milk module

3.3.15 Filling with fresh milk

- The installation tests should be carried out with refrigerated milk (5ºC). Milk at ambient temperature may not produce the desired frothing results and the effect of temperature might be confused with deficient operation.
- The machine must be filled with refrigerated milk in this case.
- We recommend using a container that has not been opened or that was opened within the past 24 hours.
- Open the refrigerator. Partially remove the milk container. It must be clean and dry.

- Carefully pour the milk to prevent splashing.
- Insert the suction tube into the container through the hole on the lid used for such purposes.
- Place the container inside the refrigerator. Close the lid. Close the refrigerator.
- The milk filling process must be carried out in an aseptic environment to prevent the container from being contaminated by dirt or foreign elements during this process.

- We recommend using ultra-heated UHT milk to guarantee the safety levels with regards to the proliferation of germs. The container must be opened for a maximum of 24h before this process to guarantee that a high-quality cream is served. Milk at ambient temperature may not produce the desired frothing results and the effect of temperature might be confused with deficient operation.

3.3.16 Espresso service grinder settings

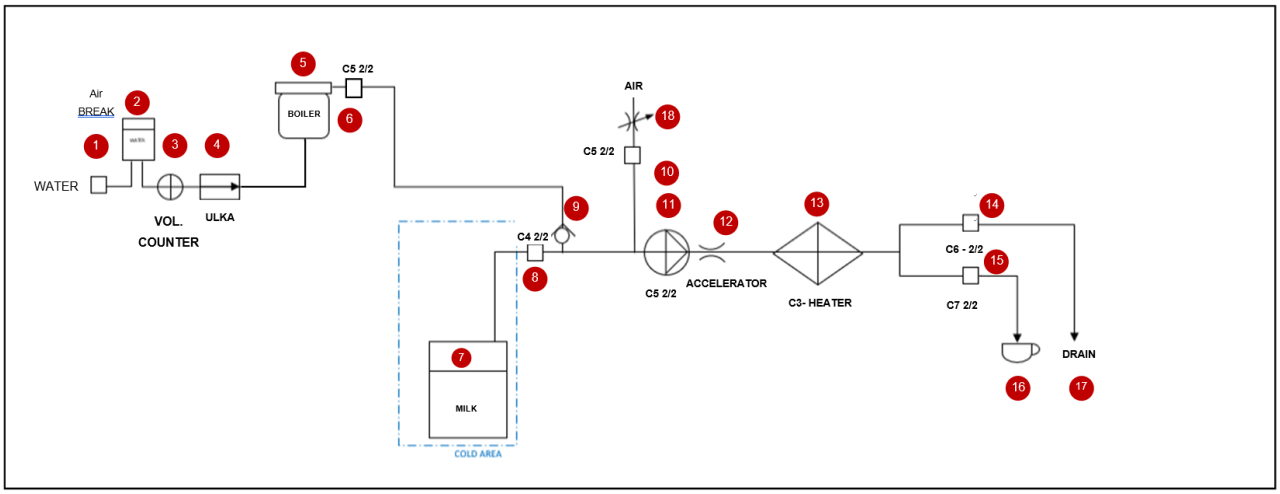
- The section on Espresso services recommends carrying out the grinder test (F030 Grinder test) to calibrate the grinding thickness, using the adjustment lever and weighing the quantities dispensed.
- The balance between the optimum grinding level and the quantity in grams defined to prepare the beverage must be achieved.

3.3.17 Filling the hot water boiler

- The hot water boiler is filled automatically when the machine is connected.
- The following processes are carried out in espresso coffee machines:
  - The cold-water tank will be filled if it is empty.
  - The correct operation of the volumetric meter will be checked and the boiler will be filled with the EVs closed, filling it when the volumetric meter stops rotating. Next, the soluble product EVs are opened to bleed any air that might have remained inside the boiler.

	If the volumetric meter does not rotate for 10 seconds without stopping during the automatic boiler filling process, the machine may be set out of service due to a low water level. To reset the machine, simply open and close the programming menu or switch off and turn on the machine.

3.4 HYDRAULIC FRESH MILK CIRCUIT



General operation

- The main functions of the module are:
  - Supply of liquid or frothy milk, at the ambient temperature or hot.
  - Cleaning the water circuit after each service, automatically.
  - In-depth cleaning of the circuit with detergent on a daily basis; this procedure is activated by the user.
- When the liquid milk service is requested, the EV (8) is opened, the pump (11) sucks in milk from the container and drives it through the accelerator (12) and heater (13), which will increase the temperature in the case of hot milk services. The outlet EV (15) will open to pour milk into the cup (16).
- When a milk cream service is requested, in addition to the steps followed for liquid milk, the air inlet EV (10) will be activated and air will be injected into the milk conduit by the suction action of the pump.

4 CLEANING AND MAINTENANCE

Regular cleaning of the Vitro M5 and its accessories is vital to guarantee food safety and the highest quality of the beverages served.

The regular cleaning tasks are described in this chapter. Under no circumstances can these actions be omitted. Food safety for users is a priority when managing the Vitro M5 and its accessories.

4.1 RECOMMENDED CLEANING PRODUCTS AND PROCEDURES

General cleaning

- You can use hot water with neutral soap to clean all inner and outer surfaces of Vitro M5.
- Before manual cleaning of the machine, switch it off or disconnect it from the mains. There is a risk of electric shock if the machine's metal parts are touched with damp hands while it is on.
- Always use a cloth dampened in a soapy solution. Wring it out before use and be careful not to dampen the machine's surfaces too much during the cleaning procedure. Pay more attention to areas with connections and wiring and where electronic PCBs are found.
- Complete the operation by drying thoroughly with a dry cloth.

Milk system

- The system requires the use of the cleaning solution supplied by AZKOYEN and to perform a complete automatic cycle by using the F030 FRESH MILK CLEANING function or by pressing the D key on the programming control.
- The inside of the refrigerator and milk container can be cleaned with cleaning product dissolved in lukewarm water, adding neutral soap.
- Natural milk waste quickly turns into a source of bacteria and germs, so it is mandatory to wash it on a daily basis.

Espresso group

- The espresso group can be cleaned automatically from the programming menu, using the specific tablets supplied by AZKOYEN for such purposes.

- It can also be easily and quickly removed to clean the outer surfaces, for example, under a tap.

Waste containers

- The liquid waste collection tray can be extracted with the coffee grounds container to clean it under a tap.
- We recommend using a garbage bag inside the coffee grounds container, so the container does not have to be washed after it is emptied.
- We also recommend using the cleaning solution supplied by AZKOYEN to clean all milk remains thoroughly. A small dose of 20 ml can be diluted in 5 l of lukewarm water.

External surfaces

- In the case of stainless-steel surfaces, it is recommended to use the surface cleaner supplied by AZKOYEN, since this is a quick and effective solution to clean and disinfect surfaces. This product is supplied as a spray and can be used on any surface of the machine; it not only cleans but acts as an anti-bacterial/germicide agent.
- The front glass panel can be cleaned with the surface sprayer or with any other glass cleaning product, preferably thinned down with water by 50%

Plastic elements in contact with food

- The best way of cleaning these components, such as hoppers, beaters, product elbows, milk container, etc. is to use lukewarm water with neutral soap.
- The removable elements can be soaked if they have too much dirt stuck onto them.
- The soluble product and coffee bean hoppers can be cleaned with a cloth dampened in soapy water, thoroughly cleaning them with a clean and dry cloth.
- Oil coming off coffee beans can make coffee taste stale when it oxidises. The inside of the coffee bean hopper should be cleaned once every 15 days.

Recommended cleaning products

Fresh milk module cleaning solution.	Espresso group cleaning tablets.	Disinfectant spray for HoReCa surfaces.
Ref. 41250180	Ref: 09725700	Ref: 09725710

4.2 CLEANING TASK FREQUENCY

- The table below shows the elements that require regular cleaning and the cleaning frequency. These intervals must be strictly observed.
- The machine will be cleaned during the routine maintenance tasks; this is a mandatory procedure to guarantee a lengthy useful life and comply with the current health standards in relation to beverages served.
- The following refer to the minimum cleaning intervals. All elements can be cleaned at shorter intervals if desired.

System	Element	daily	weekly	As needed
Milk	Fresh milk module	●		
	Milk container	●		
	Milk suction tube	●		
	Milk tap	●		
	Refrigerator		●	
Espresso	Coffee bean container		●	
	Brewing group		●	
	Espresso tap		●	
Soluble ingredients	Instant product containers		●	
	Instant product beaters	●		
	Instant product taps	●		
Waste containers	Coffee grounds container	●		
	Liquid waste tray	●		
	Liquid waste door			●
	Tray level detector			●
Cabinet	Front Service Area Panel		●	
	Display-Keyboard Glass		●	
	Machine enclosure			●

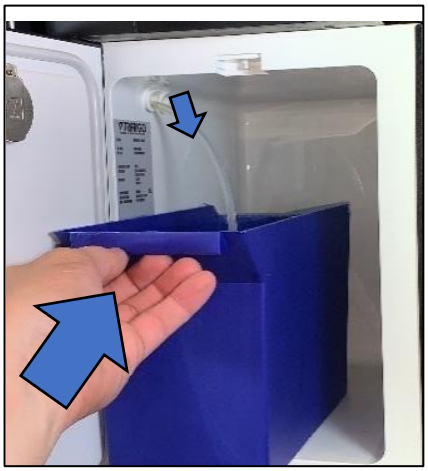
4.3 MAINTENANCE SELF-CLEANING PROCESS

- 5 minutes after completing the last service, the machine will rinse the entire milk circuit and system. The circuit will be filled with water to prevent the formation of solid deposits in the milk circuit. Before starting the next service, the system will drain all water inside the circuit.
- The presence of milk mixed with water in the liquid waste tray is normal.
- The maintenance self-cleaning process is complementary to the daily cleaning and includes the use of a disinfectant cleaning solution

4.4 FRESH MILK MODULE CLEANING INSTRUCTIONS

- Remove the milk tank. Drain. Wash with water and neutral soap and let dry.

- Place the blue cleaning tank inside the refrigerator and place the suction tube inside it.



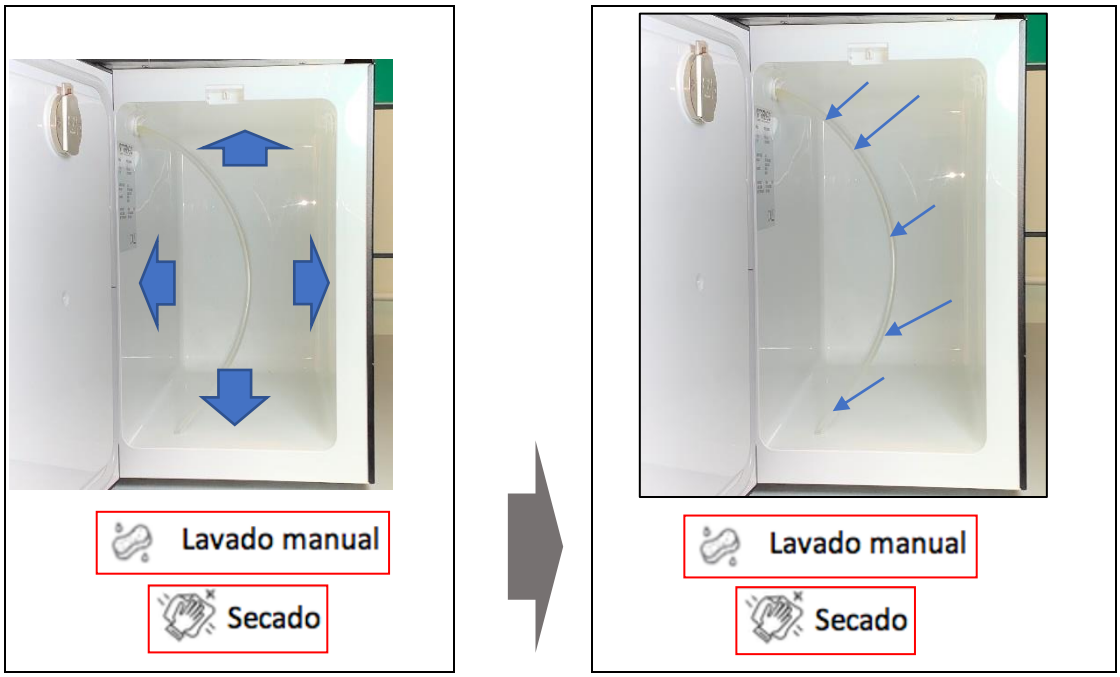
- Press D on the programming control.
- The system will start the first rinsing process.
- **After a few seconds, empty** the waste from the blue container.
- Place the new blue container inside the refrigerator. Pour 20 ml of cleaning solution inside. Press D to restart the cleaning process.

▶ Container removed to add the cleaning solution.	▶ Fit the dosing device onto the cleaning element. ▶ Open the cover in the vertical position and press the bottle to dose the desired amount (20 ml).	▶ Pour the dose into the blue container. ▶ Place the container in the refrigerator and press “D” to continue with the cleaning cycle.

▶ The cleaning process will take 10 minutes to complete. Press D and confirm.

Cleaning confirmation message

- Remove the cleaning tank.
- Use a cloth dampened in water and the cleaning solution to clean the following: 1) the inner surfaces of the refrigerator and 2) the outside of the suction tube; dry all surfaces with a clean and dry cloth.



- The refrigerator must be on at all times. The door must be left open if there is no milk inside.

4.5 CLEANING THE MILK TAP

- Use a fine tube brush to clean the milk tap, inserting it through the machine's front panel.

- Clean the outlet area with a cloth dampened in neutral soap.
- Thoroughly clean the front panel.