

Data Sheet and Service Manual
ECAM630.XX – PRIMADONNA AROMATIC
Date: 03.02.2025



1 Table of Contents

2	TECHNICAL DATA.....	4
3	HYDRAULIC DIAGRAM	5
4	WIRING DIAGRAM	6
4.1	PRACTICAL OUTLINE.....	6
4.2	THEORETICAL OUTLINE.....	7
5	WORKING PRINCIPLE	8
5.1	MICROSWITCHES, SENSORS AND SOLENOID VALVES	8
5.2	HOT COFFEE PREPARATION.....	10
5.3	COLD COFFEE PREPARATION.....	11
5.4	HOT WATER PREPARATION	12
5.5	MILK FROTH PREPARATION	13
6	TEST MODE	14
6.1	EXPLANATION OF THE LOAD TEST MODE BUTTONS AND FUNCTIONS	16
6.2	ZERO STEPPER PROCEDURE	18
6.3	INPUT TEST AND SOFTWARE VERSIONS.....	20
6.4	PEN ALM	21
7	TROUBLESHOOTING	22
7.1	POSSIBLE TESTS WHICH CAN BE EXECUTED FROM THE LOAD TEST MODE	22
7.1.1	COFFEE CIRCUIT FLOW ACTIVATION	22
7.1.2	HOT WATER FLOW ACTIVATION	22
7.1.3	STEAM FLOW ACTIVATION	22
7.2	ELECTRIC CHECKS DIRECTLY ON THE COMPONENTS.....	23
7.2.1	HEATING ELEMENT RESISTANCE CHECK	23
7.2.2	RESISTANCE/TEMPERATURE CHARACTERISTICS FOR THE NTC SENSOR.....	23
7.2.3	GROUND CHECK POINT FOR THE APPLIANCE.....	23
7.3	COFFEE TEMPERATURE TEST	24
7.4	FROTHED HOT MILK CONSISTENCY AND TEMPERATURE TEST.....	25

7.5	FROTHED COLD MILK CONSISTENCY AND TEMPERATURE TEST (*)	26
8	DEMO MODE ACTIVATION	27

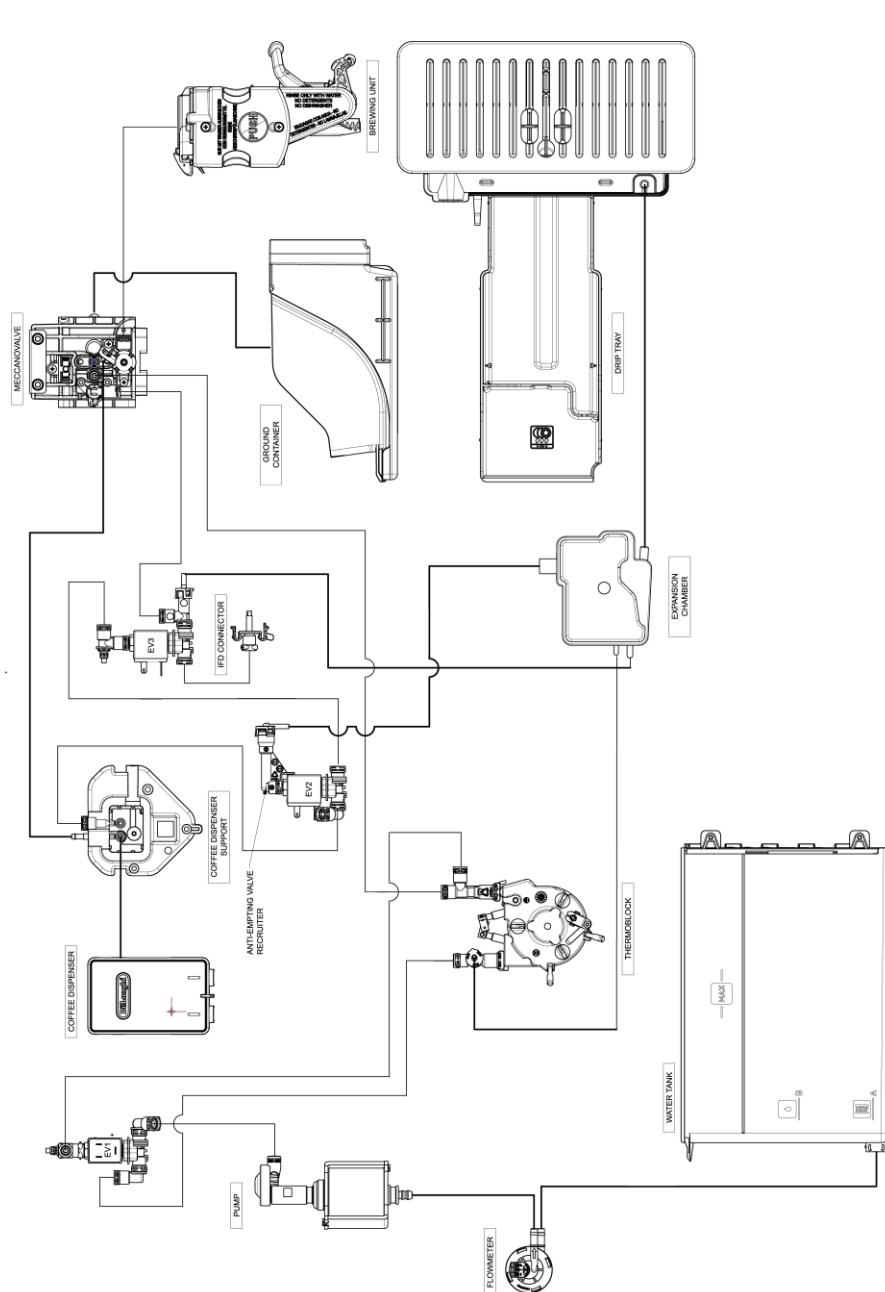
2 TECHNICAL DATA

Voltage – Frequency – Input Power	220-240V ÷ 50-60Hz ÷ 1450 W
Power Consumption in Stand-By	0.3 W (1.0 W when the WiFi module is active)

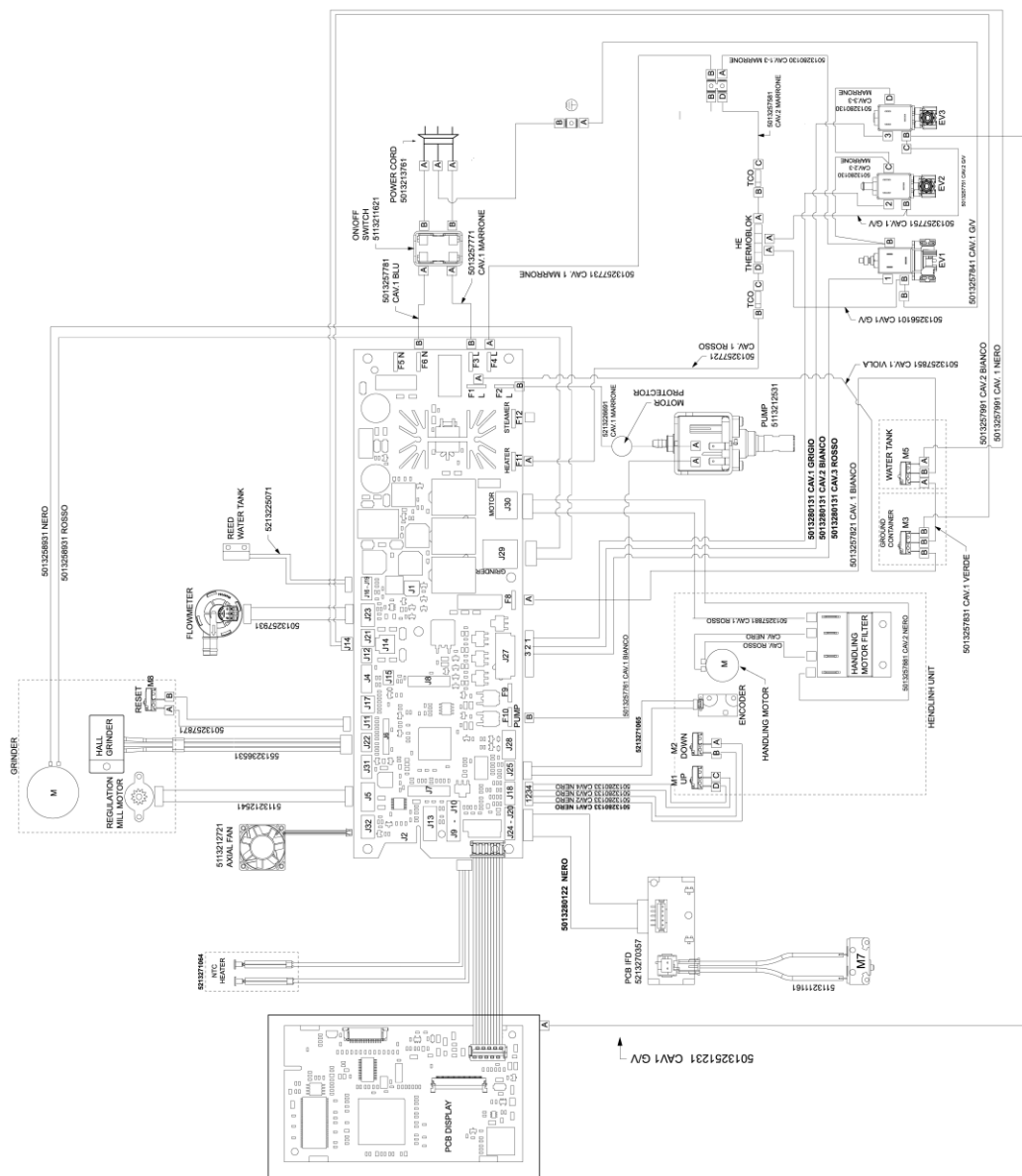
COMPONENTS

Pump	ARS 220-240V ÷ 50Hz ÷ 70W ÷ 19Bar
Grinder motor	230Vdc with position encoder
Grinder adjustment motor	12Vdc step motor with position encoder
Transmission motor	230Vdc with position encoder
Solenoid valves EV1, EV2, EV3	230Vac
Cooling Fan	12Vdc
Thermoblock	
- Temperature probe	Double NTC sensor: set point + hot point
- Thermal fuse TCO	192°C ÷ 15A
- Heating element	230 Vac ÷ 1400W

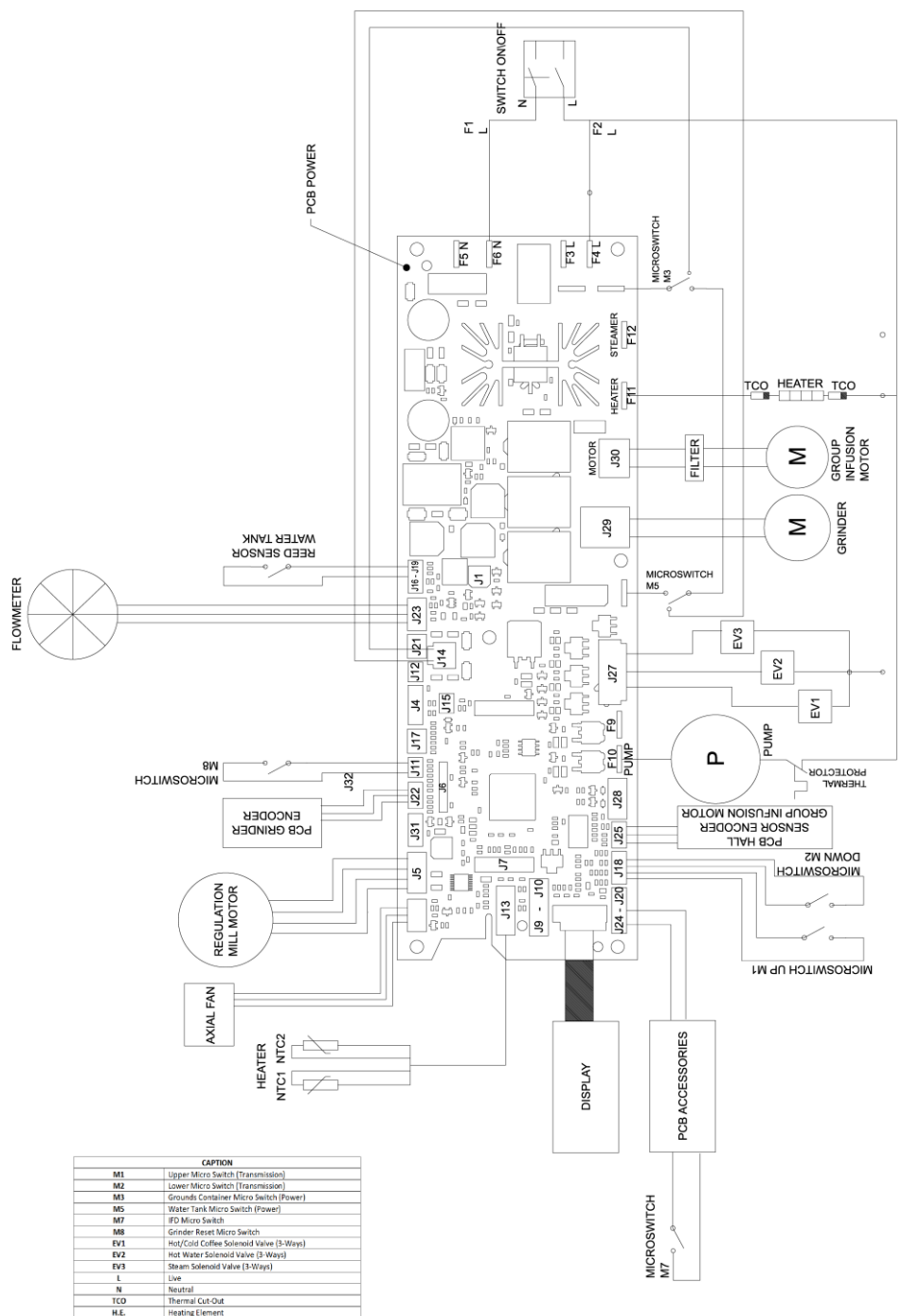
3 HYDRAULIC DIAGRAM



4.1 PRACTICAL OUTLINE



4.2 THEORETICAL OUTLINE



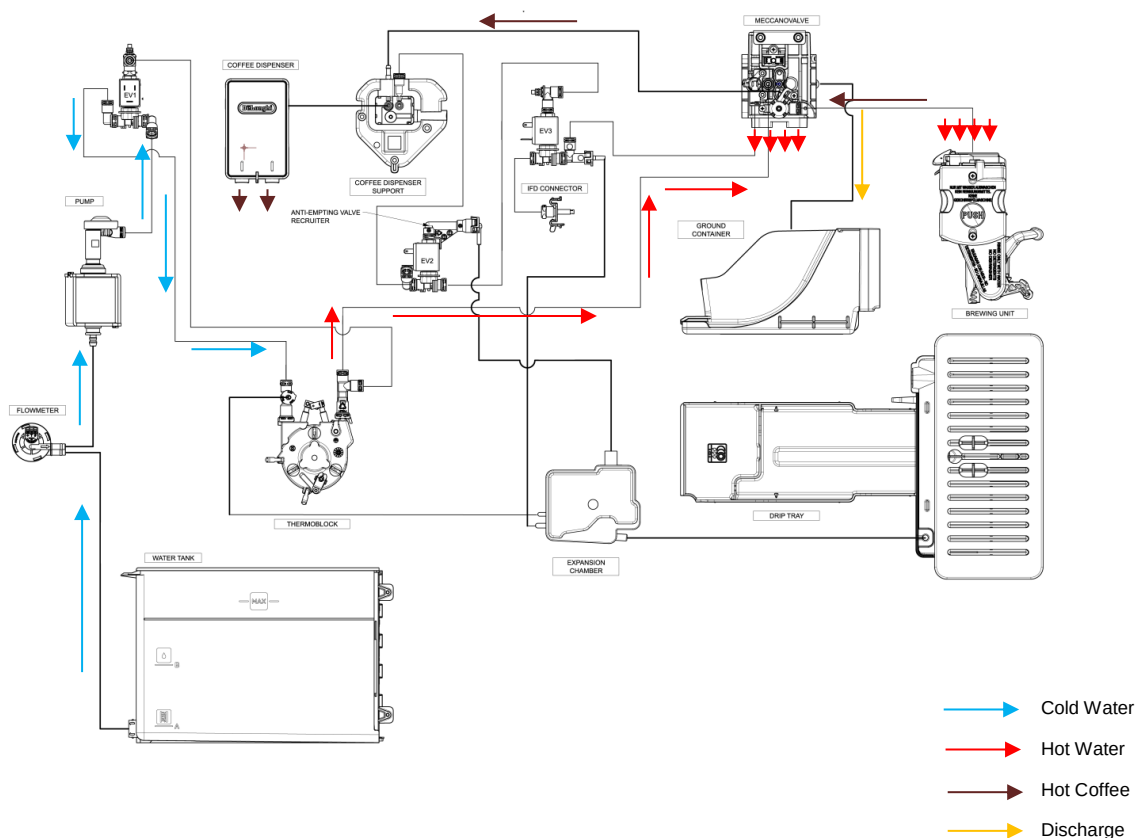
5 WORKING PRINCIPLE

5.1 MICROSWITCHES, SENSORS AND SOLENOID VALVES

MICROSWITCHES	Function	Logic
M1 = UPPER MICROSWITCH	Detects when the infuser is on top position	"NC", it opens when the infuser is in top position
M2 = LOWER MICROSWITCH	Detects when the infuser is on down position	"NO", it closes when the infuser is in down position
M3 = GROUNDS CONTAINER MICROSWITCH	Detects when the grounds container is in correct position	Change-over micro switch. When the grounds container is inserted: - the contact for the grounds container detection is OPEN; - the contact for the transmission motor power supply is CLOSED.
M5 = WATER TANK MICROSWITCH	Detects when the water tank is in correct position	Change-over micro switch. When the water tank is inserted: - the contact for the water tank detection is OPEN; - the contact for the transmission motor power supply is CLOSED.
M7 = ACCESSORY DETECTION MICROSWITCH	Detects when the descaling spout or the milk jug is connected to the nozzle.	"NO", it closes when one of the accessories (descaling spout or milk jug) are attached to the nozzle.
M8 = GRINDER ADJUSTMENT MICROSWITCH	It is used by the coffee machine for the zero stepper procedure of the grinder.	"NO", it closes when pressed by the grinder cam.

SOLENOID VALVE	Function	Logic
EV1 = 3-WAYS SOLENOID VALVE	Allows the water to flow through the Thermoblock for the Hot Coffee preparation or directly to the mechanical valve for the Cold Coffee preparation.	- When open, the water flows through the Thermoblock for the Hot Coffee preparation. - When closed, the water is diverted directly to the mechanical valve for the Cold Coffee preparation.
EV2 = 3-WAYS SOLENOID VALVE	Allows the hot water to flow from the mechanical valve to the coffee/hot water dispenser	- It opens when the hot water must be diverted to the coffee/hot water dispenser. - It closes when the hot water delivery finishes.
EV3 = 3-WAYS SOLENOID VALVE	Allows the steam to flow from the mechanical valve to the steam nozzle	- It opens when the hot water/steam delivery is in progress to make the flow to come out from the nozzle. - It closes when the delivery finishes and the residual pressure is discharged towards the expansion chamber and drip tray.
REED AND ENCODER	Function	Logic
HALL SENSOR ENCODER	Detects rotations of transmission motor	
REED SENSORS FOR ACCESSORIES DETECTION	Allows the machine to detect which accessory (hot water spout, milk jugs) is attached to the machine	

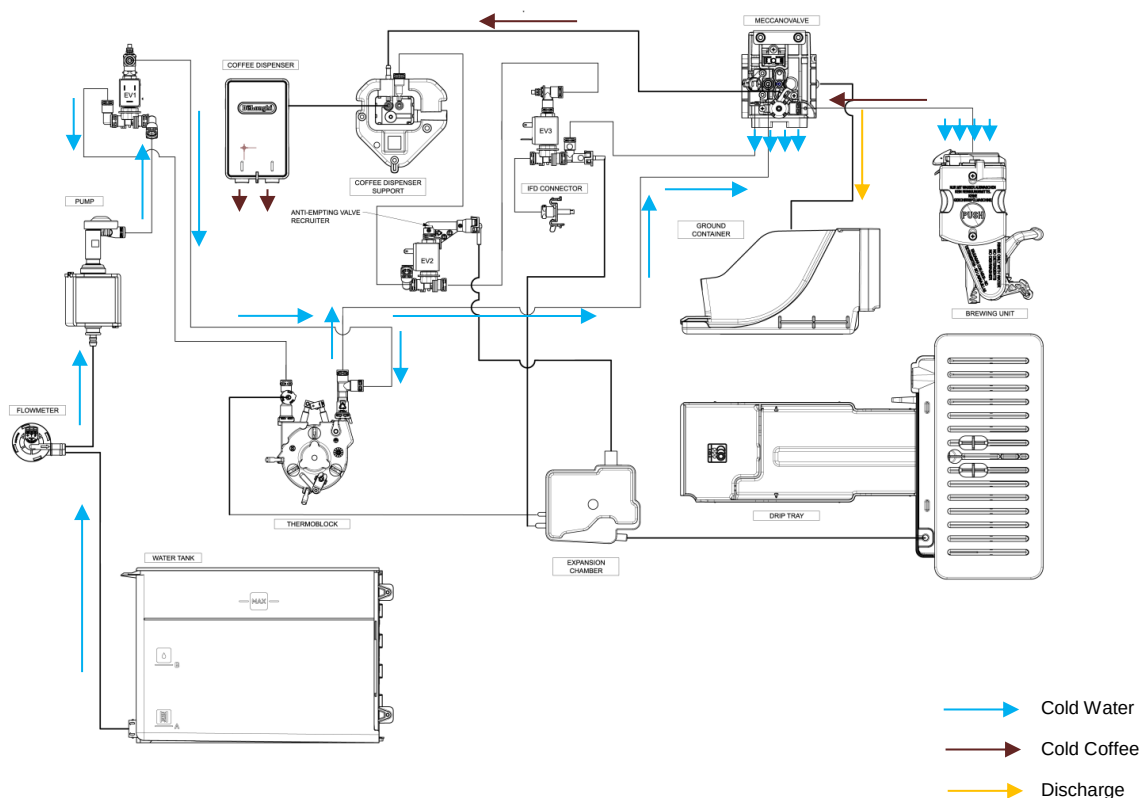
5.2 HOT COFFEE PREPARATION



Hot Coffee Preparation Steps:

1. EV1 is activated.
2. The Thermoblock is activated.
3. The Grinder is activated for a certain timing (base on the coffee taste selection).
4. The Infuser moves to the mechanical valve
5. The Pump is activated for a couple of seconds for pre-infusion
6. The Pump restarts in continuous mode to deliver the espresso coffee
7. The Pump stops, the Thermoblock turns OFF, EV1 closes.
8. The Infuser moves away from the mechanical valve and releases the coffee pod.
9. The Mechanical Valve discharges the excess of water/coffee to the grounds container
10. The Infuser moves back to the "Ready for Coffee" position.

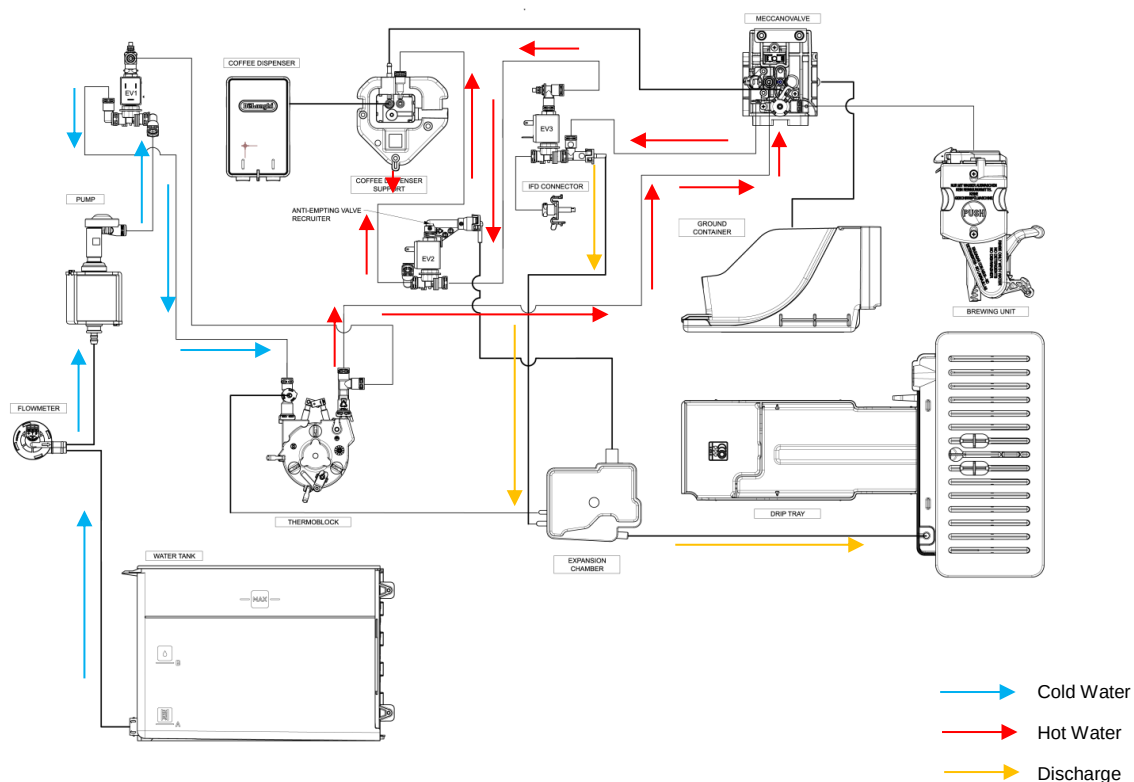
5.3 COLD COFFEE PREPARATION



Cold Coffee Preparation Steps:

1. EV1 and the Thermoblock remain deactivated.
2. The Grinder is activated for a certain timing (base on the coffee taste selection).
3. The Infuser moves to the mechanical valve.
4. The Pump starts in very slow pulsing mode to deliver the cold coffee.
5. The Pump stops.
6. The Infuser moves away from the mechanical valve and releases the coffee pod.
7. The Mechanical Valve discharges the excess of water/coffee to the grounds container
8. The Infuser moves back to the "Ready for Coffee" position.

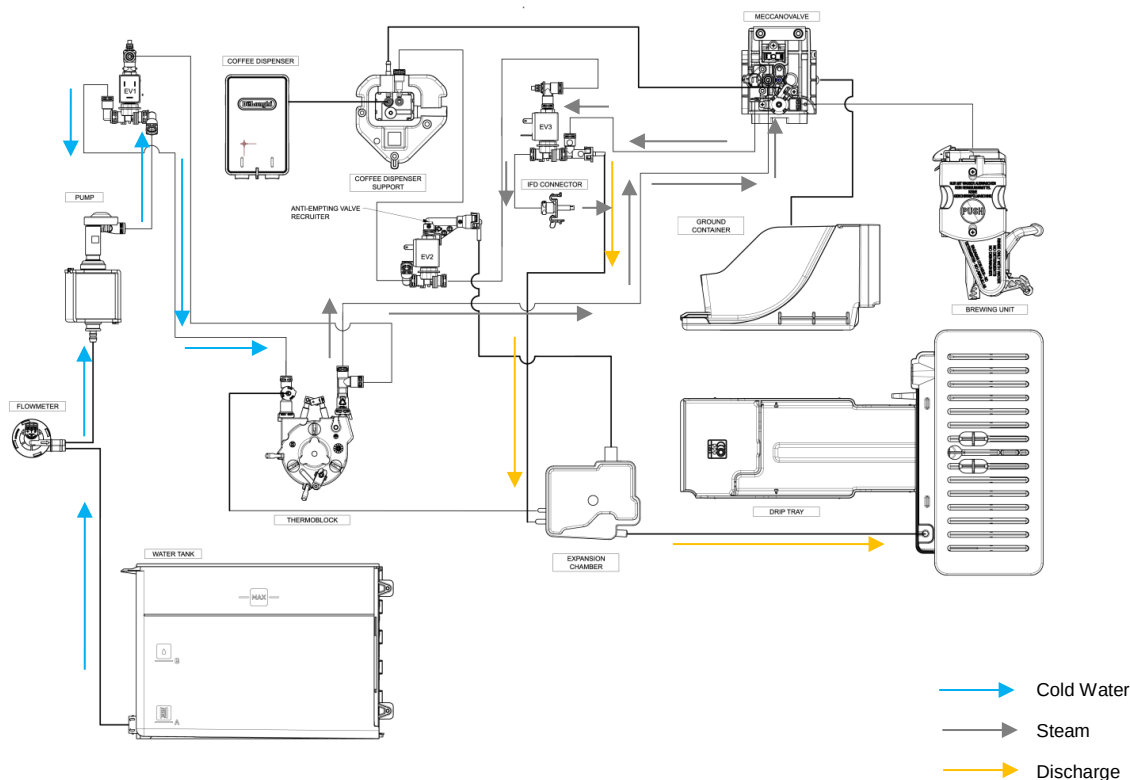
5.4 HOT WATER PREPARATION



Hot Water Preparation Steps:

1. The EV1 and EV2 solenoid valves are activated.
2. The Thermoblock is activated.
3. The Pump is activated in fast pulsing mode for a certain timing.
4. The Hot Water is delivered through the hot water spout of the dispenser.
5. The Pump stops, the EV1 and EV2 solenoid valves and the Thermoblock are deactivated.
6. The residual water is discharged through the expansion chamber into the drip tray.

5.5 MILK FROTH PREPARATION



Milk Froth Preparation Steps (for both LatteCrema Hot and LatteCrema Cold when available):

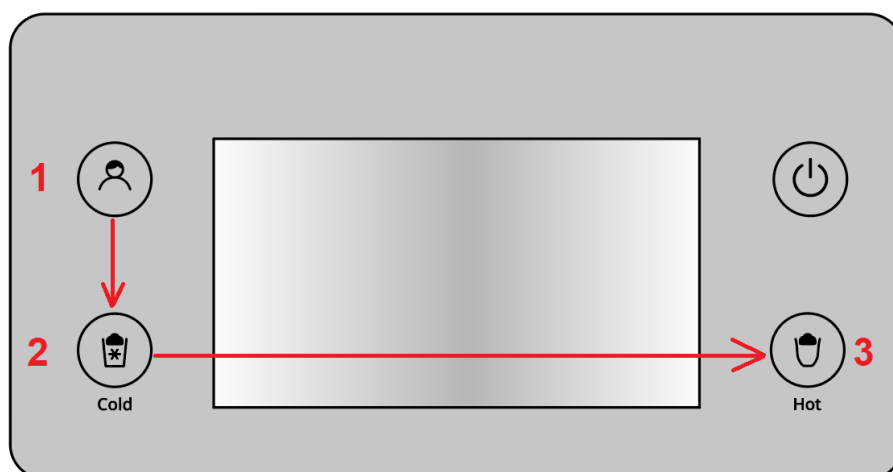
1. EV1 and EV3 solenoid valves are activated.
2. The Thermoblock is activated (**temperature set point above 100°C**).
3. The Pump is activated in **slow pulsing mode** for a certain timing.
4. The Steam is injected from the nozzle into the milk jug and mixed with the air (according to the milk froth knob position) to froth the milk.
5. The Pump stops, the EV1 and EV3 solenoid valves and the Thermoblock are deactivated.
6. The residual steam and pressure is discharged through the expansion chamber into the drip tray.

IMPORTANT NOTICE: This function can be activated **only if one of the milk jugs (LatteCrema Hot or LatteCrema Cold when available) is attached to the nozzle.**

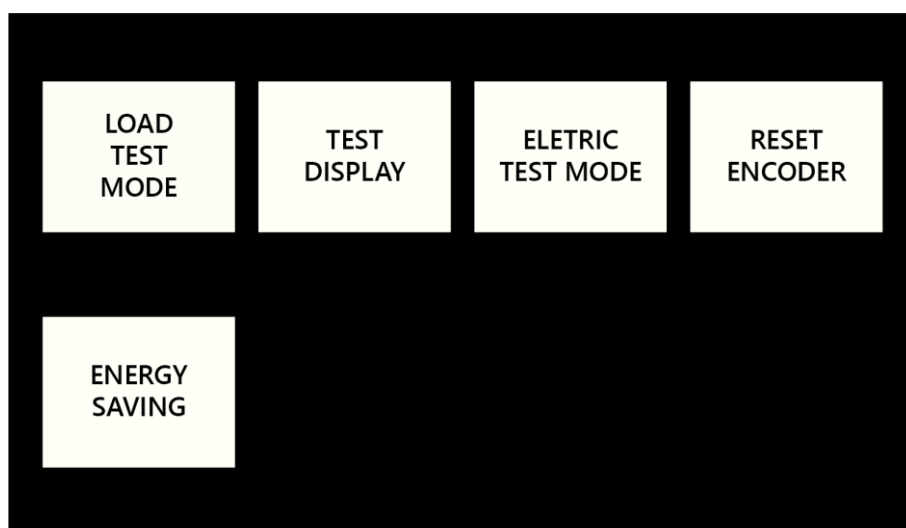
6 TEST MODE

To access the **Test Mode**:

1. The appliance must be connected to the power socket and in stand-by mode.
2. Remove the drip tray and wait until the message “Insert the Drip Tray” will appear on the display.
3. Press in sequence the three buttons as indicated in the below picture:



The below page will be shown on the display:



Within 10 seconds, insert the drip tray and select one of the below functions:

- a. **LOAD TEST MODE:** Allows to manually activate the components of the appliance, to check the operation of the NTC sensors and check the correct operation of the reed and micro switches.
- b. **TEST DISPLAY:** Allows to test the functioning of all the areas of the soft touch buttons and of the TFT display.

IMPORTANT NOTICE: After the execution of the TEST DISPLAY the appliance will be reset to “first use”, i.e. it will reset the water softener filter status, it will ask again to set the language, to set the water hardness and to fill the water circuit.

IMPORTANT NOTICE: In case the machine would be reset to “first use” through the TEST DISPLAY or by replacing the main PCB, it is recommended to provide the customer a new Total Hardness Test indicator paper (spare part no. 5532110300), so he/she will be able to properly set the appliance according to the real water hardness in use with the coffee machine:



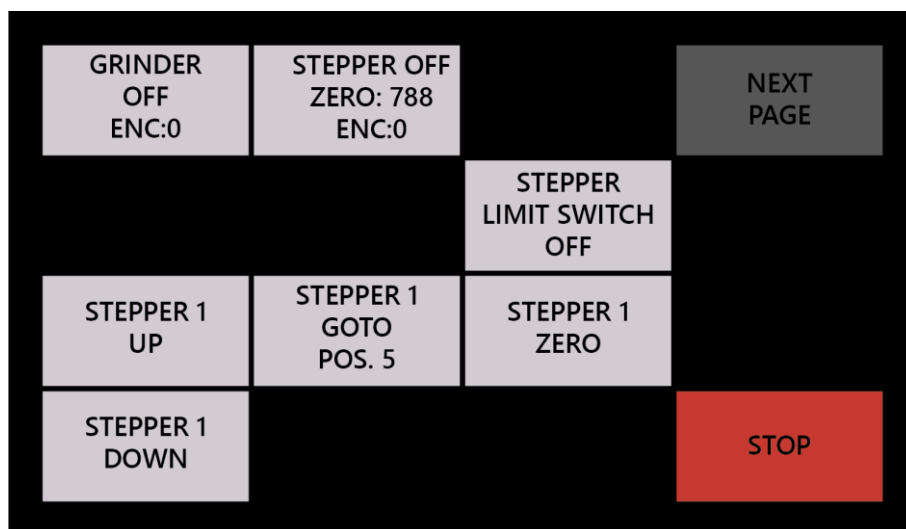
- c. **ELECTRIC TEST MODE:** This feature is used only for tests at the manufacturing plant.
- d. **RESET ENCODER:** It resets the value of the maximum position reached by the infuser.
- e. **ENERGY SAVING:** It allows to change the default status for the energy saving function of the machine.

6.1 EXPLANATION OF THE LOAD TEST MODE BUTTONS AND FUNCTIONS

MOTOR POS:0	EV 1 OFF	EV 2 OFF	NEXT PAGE
EXTRACT MOTOR	EV 3 OFF	HEATER OFF T:20°C POWER:0	VAC:225V FREQ:50Hz
MOTOR UP OFF	MOTOR UP SWITCH OFF	FAN OFF	PEN ALM 0
MOTOR DOWN OFF	MOTOR DOWN SWITCH ON	PUMP OFF FLUX:53 SPEED:0	STOP

MOTOR: Indicates when the transmission motor is active. POS: Encoder value of the Hall sensor.	EV1: Activates the hot/cold coffee solenoid valve.	EV2: Activates the hot water solenoid valve.	NEXT PAGE: Moves to next page of menu.
EXTRACT MOTOR: Moves the infuser to the extraction position.	EV3: Activates the steam solenoid valve. NOTE: Some combinations are forced to avoid damages.	HEATER: Blue when the Thermoblock is active. (*) T: Temperature of the NTC of Thermoblock. POWER: Absorbed power from 0 to 10.	VAC: Current voltage.
MOTOR UP: Blue when the motor is moving towards UP position. If pressed, motor starts.	MOTOR UP SWITCH: Blue when the infuser is in UP position. ON: When pressed (infuser in UP position).	FAN: Activates the cooling fan.	PEN ALM: shows the pending alarms (see the chapter 6.4 PEN ALM).
MOTOR DOWN: Blue when the motor is moving towards DOWN position. If pressed, motor starts.	MOTOR DOWN SWITCH: Blue when the infuser is in DOWN position. OFF: When pressed (infuser in DOWN position).	PUMP: Activates the pump for 200 flowmeter pulses (about 21 sec). FLUX: Indicates how many pulses passed (after 1 cycle of PUMP the number will be around 200). SPEED: Water flow in cc/s	STOP: Interrupts any active load.

(*) By pressing HEATER, the Thermoblock is activated for 5 seconds.



GRINDER: Activates the grinder motor ENC: Encoder value of the grinder Hall sensor.	STEPPER: Blue when the grinder stepper motor is active. ZERO: Set value for position 5 (pulses from the zero position). ENC: Current position value.		NEXT PAGE: Moves to next page of menu.
		STEPPER LIMIT SWITCH: Blue when the stepper motor reaches to the ZERO limit switch.	
STEPPER UP: Increases the current position of the grinder stepper 60 pulses. Main motor is active too.	STEPPER GOTO POS 5: The stepper motor moves to the ZERO position first and then to position 5. The final ENC value is equal to zero value.	STEPPER ZERO: Activates the procedure for the grinder ZERO stepper (see below).	
STEPPER DOWN: Decreases the current position of the grinder stepper 60 pulses. Main motor is active too.			STOP: Interrupts any active load.

NOTICE: The stepper motor is responsible for the mill adjustment. If $ENC < ZERO$, the grinder setting is higher than 5.

NOTICE: The activation of the STEPPER UP and STEPPER DOWN functions could negatively affect the operation of the machine. In case, use the STEPPER GOTO 5 function to restore the default grinder setting.

6.2 ZERO STEPPER PROCEDURE

The ZERO STEPPER procedure must be performed in the following situations:

- all the time a new grinder needs to be installed in the coffee machine;
- all the time a new main PCB needs to be installed in the coffee machine;
- all the time the ZERO value of the STEPPER is equal to zero.

In order to execute the **ZERO STEPPER** procedure, the following steps must be performed:

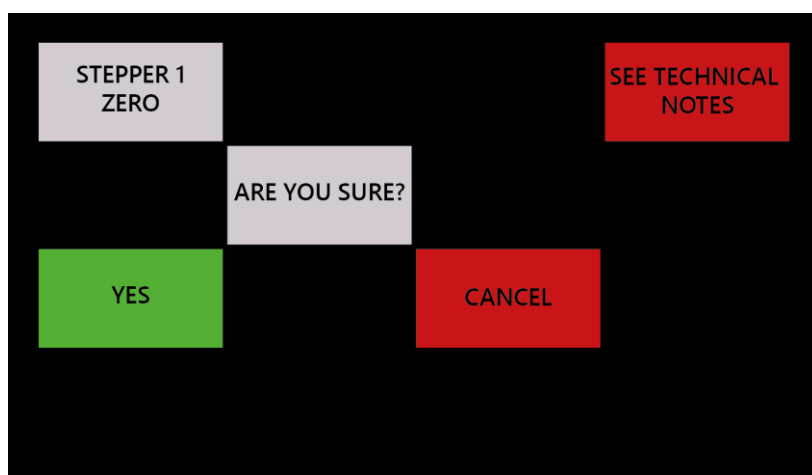
1. In case of used/refurbished grinder, make sure the grinder is perfectly clean from any residue of coffee beans (it must be cleaned perfectly by means of a vacuum cleaner).
2. Make sure the grinder is in position 5; if not, it must be set to position 5 from the GRINDER SETTINGS user menu of the coffee machine. Please note that all the brand new grinders will be dispatched from the manufacturing plant already in position 5.

The grinder is in position 5 when the marker on the white gear of the grinder is matching with the arrow marker on the black plastic part:



If the grinder is not in the position 5 (i.e. the two markers are not aligned as indicated in the above picture), the factory position can be restored by using the **STEPPER UP** or the **STEPPER DOWN** functions available in the load test mode.

3. Access the appliance's LOAD TEST MODE and launch the **ZERO STEPPER** procedure by pressing the corresponding button on the display. The coffee machine displays the following message:



Press the **YES** button to confirm the execution of the **ZERO STEPPER** procedure.

4. The appliance starts the main grinder motor (beans grinding).
5. The stepper motor closes the grinder gear since it will press the ZERO stepper micro switch. At the same time, the appliance counts how many steps there are between the starting POS 5 position and the POS 0 position (i.e., the one at which the micro switch is pressed). This value is recorded in the ZERO parameter of the STEPPER function of the LOAD TEST MODE.
6. Finally, the appliance restores the grinder to position 5.

6.3 INPUT TEST AND SOFTWARE VERSIONS

GRINDER OFF ENC:0	NEXT PAGE
ASSESSORY SWITCH OFF	
ASSESSORY HALL 1 OFF	
ASSESSORY HALL 2 OFF	IN: 80-00-00
ASSESSORY HALL 3 OFF	SW WIFI: 0.17.14
WATER TANK OFF	DIAG: 01-00
TANK EMPTY OFF	SW LCD:0.1.1,GFX:3 BOOT:049
	T:0X5F703E B.COD:97.2
DRIP TRAY OFF	SW POWER:0.1.0,M.COD:1.103
	VER MAIN EE:0x0000

GRINDER - ENC: status of the grinder activation and grinder's encoder reading	NEXT PAGE: Moves to next page of menu.
ACCESSORY SWITCH: status of the accessories micro switch.	
ACCESSORY HALL 1 / 2 / 3: status of the accessories reed sensors.	
WATER TANK: status of the water tank presence micro switch.	RELEASE VERSIONS FOR ALL THE SOFTWARE PACKAGES INCLUDED IN THE APPLIANCE.
TANK EMPTY: status of the empty water tank reed sensor.	
DRIP TRAY: status of the drip tray micro switch.	

6.4 PEN ALM

PEN ALM means **Pending Alarms**. It shows a code for the General Alarm possible causes according to the below table:

Load	Code	Issue
Motor	4	Missing removable brewing unit
	5	Foreign bodies in the removable brewing unit
	7	MAX top limit position overcome when the top limit switch is pressed
	8	The transmission motor movement is slow (> 9 seconds)
	9	The UP and DOWN limit switches are pushed at the same time
	11	The transmission motor is not moving.
	12	The encoder does not detect the position (disconnected) an the infuser stops on the DOWN limit micro switch
Heater	41	Broken Thermoblock NTC (open circuit or short circuit) Temporary overheating of the Thermoblock
	42	Broken TCO (deduced due to missed Thermoblock heating). Triggered after a few seconds
Grinder	81	The grinder movement was interrupted
	82	The ZERO STEPPER procedure failed
	83	Stepper position reading failed
Stepper	121	Stepper motor failure

7 TROUBLESHOOTING

7.1 POSSIBLE TESTS WHICH CAN BE EXECUTED FROM THE LOAD TEST MODE

7.1.1 COFFEE CIRCUIT FLOW ACTIVATION

- Move the infuser to the UP position (MOTOR UP).
- Activate the EV1 solenoid valve.
- Activate the pump.

The water will pass through the flow meter, the Thermoblock, the mechanical valve, the infuser and will come out from the coffee spouts.

7.1.2 HOT WATER FLOW ACTIVATION

- The infuser must not be in the upper position.
- Activate the EV1 and EV2 solenoid valves.
- Activate the pump.

The water will pass through the flow meter, the Thermoblock, the mechanical valve's by-pass and the EV2 solenoid valve. Finally, the hot water will come out from the hot water spout of the coffee dispenser.

7.1.3 STEAM FLOW ACTIVATION

- The infuser must not be in the upper position.
- Activate the EV1 and EV3 solenoid valves.
- Activate the pump.

The water will pass through the flow meter, the Thermoblock, the mechanical valve's by-pass and the EV3 solenoid valve. Finally, the hot water will come out from the descaling spout connected to the accessory nozzle.

IMPORTANT NOTICE: The descaling spout must be connected to allow the manual activation of the EV3 solenoid valve.

7.2 ELECTRIC CHECKS DIRECTLY ON THE COMPONENTS

7.2.1 HEATING ELEMENT RESSISTANCE CHECK

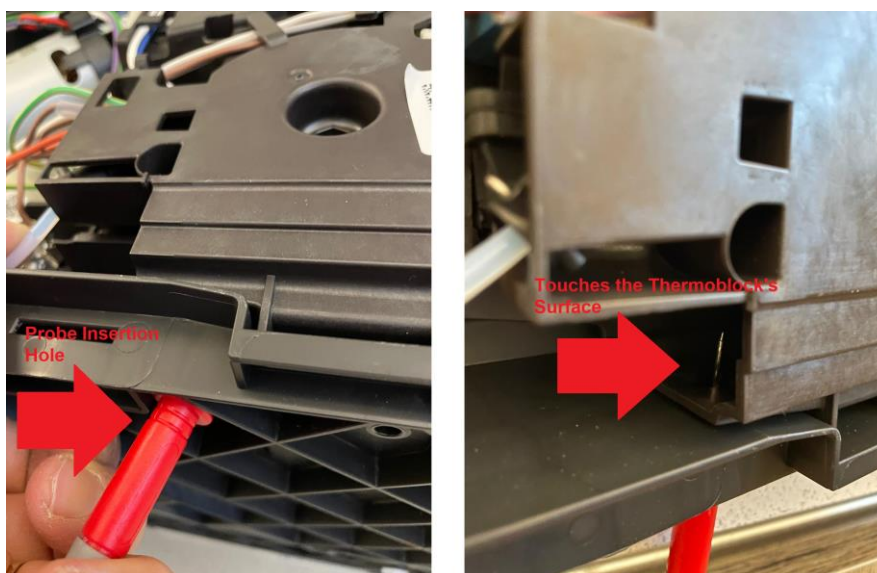
- Thermoblock Resistance Value: ≈ 35 Ohms.

7.2.2 RESISTANCE/TEMPERATURE CHARACTERISTICS FOR THE NTC SENSOR

TEMP. °C	MINIMUM kΩ	NOMINAL kΩ	MAXIMUM kΩ	Temp. Accy °C	Resi.Accy %
0.0	310.0	328.9	348.8	± 1.17	± 6.05
20.0	118.6	124.6	130.9	± 1.10	± 5.00
40.0	50.75	52.85	55.02	± 1.01	± 4.10
60.0	23.82	24.61	25.43	± 0.92	± 3.31
80.0	12.09	12.41	12.73	± 0.81	± 2.62
100.0	6.557	6.691	6.825	± 0.60	± 2.00
120.0	3.664	3.759	3.855	± 0.94	± 2.55
140.0	2.161	2.228	2.296	± 1.22	± 3.06
160.0	1.327	1.375	1.423	± 1.51	± 3.51
180.0	0.8445	0.8781	0.9126	± 1.82	± 3.93
200.0	0.5541	0.5783	0.6033	± 2.14	± 4.32

7.2.3 GROUND CHECK POINT FOR THE APPLIANCE

In order to check the main ground connection of the appliance, insert the ground tester probe from the round hole located under the basement of the appliance on the Thermoblock's side until it will touch the Thermoblock's metal surface, as displayed in the below picture:



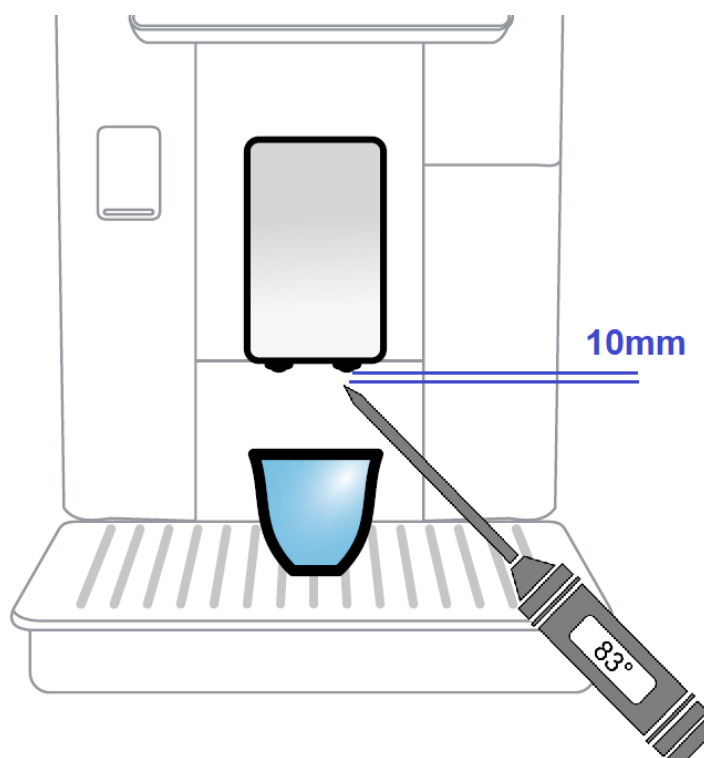
7.3 COFFEE TEMPERATURE TEST

Complaints from end users about coffee temperature are quite frequent. They are mainly due to incorrect appliance adjustments or to an incorrect expectation by the customer.

A **coffee temperature measurement** is required all the times any of these complaints are encountered.

To perform the coffee temperature test, follow in sequence the below steps:

1. Turn the appliance ON.
2. Set the temperature to the MAX level from the settings of the appliance.
3. Run a rinse cycle to warm up the hydraulic circuit.
4. Select to prepare an **XL SIZE ESPRESSO COFFEE** (refer to the user manual for more details).
5. Start the coffee preparation.
6. Wait until at least 20ml of coffee have been delivered into the cup.
7. Measure the coffee flow temperature at about 2÷10mm from the coffee spout, as shown in the below picture:



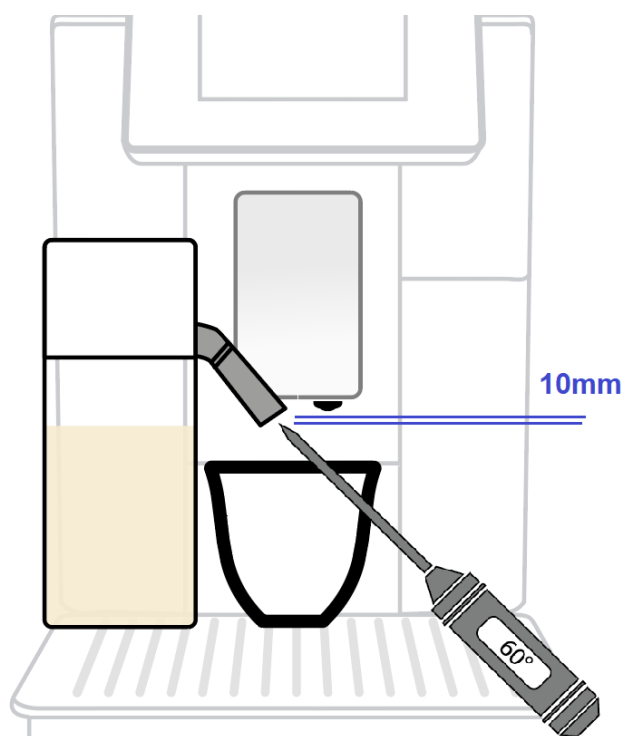
The **optimal indicative temperature measurement** for coffee should be **83°C±3°C**.

7.4 FROTHED HOT MILK CONSISTENCY AND TEMPERATURE TEST

A frothed hot milk consistency and temperature test can be required whenever the Serviceman is getting complaints from the end user about the quality or the temperature of the hot milk beverages.

To perform the frothed hot milk consistency and temperature test, follow in sequence the below steps:

1. Turn the appliance ON.
2. Fill the milk jug with 200ml of **semi-skimmed milk** at a temperature of $5^{\circ}\text{C} \pm 2^{\circ}\text{C}$.
3. Insert the lid to the jug and connect it to the appliance.
4. Set the maximum level of froth by rotating the frothing adjustment knob on the jug lid accordingly.
5. Place a 250ml PIREX graduated container under the milk spout.
6. Select HOT MILK beverage and wait until at least 80ml of frothed milk have been delivered into the container.
7. Measure the milk flow temperature during the delivery at about $2 \div 10\text{mm}$ from the spout, as shown in the below picture:



The optimal condition for the frothed milk (without coffee) should be resumed as below:

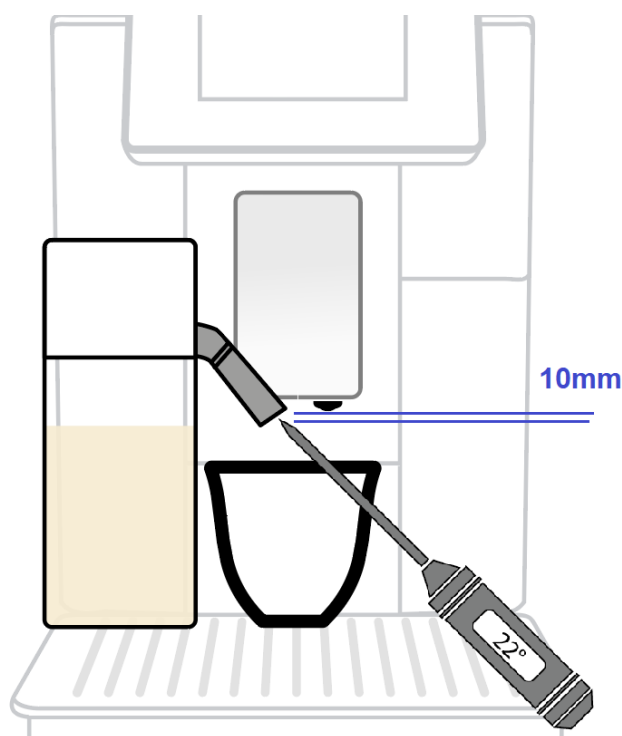
- Froth appearance: small bubbles without splashes.
- Milk temperature: $65^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
- Froth amount: 50% milk and 50% froth.

7.5 FROTHED COLD MILK CONSISTENCY AND TEMPERATURE TEST (*)

A frothed cold milk consistency and temperature test can be required whenever the Serviceman is getting complaints from the end user about the quality or the temperature of the cold milk beverages.

To perform the frothed cold milk consistency and temperature test, follow in sequence the below steps:

1. Turn the appliance ON.
2. Fill the milk jug with 200ml of **skimmed** milk at a temperature of $5^{\circ}\text{C} \pm 2^{\circ}\text{C}$.
3. Insert the lid to the jug and connect it to the appliance.
4. Set the maximum level of froth by rotating the frothing adjustment knob on the jug lid accordingly.
5. Place a 250ml PIREX graduated container under the milk spout.
6. Select COLD MILK beverage and wait until at least 80ml of frothed milk have been delivered into the container.
7. Measure the milk flow temperature during the delivery at about 2÷10mm from the spout, as shown in the below picture:



The optimal conditions for the frothed milk (without coffee) should be as resumed below:

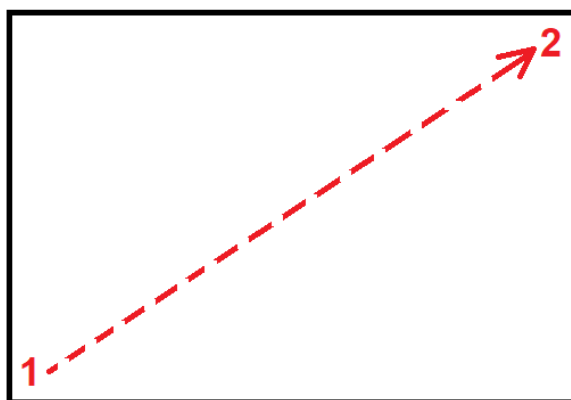
- **Froth appearance:** small bubbles without splashes.
- **Milk temperature:** $24,5^{\circ}\text{C} \pm 2,5^{\circ}\text{C}$.
- **Froth amount:** 50% milk and 50% froth.

(*) When the LatteCrema Cool System is available.

8 DEMO MODE ACTIVATION

The below procedure explains how to start the continuous displaying of the demonstration video on the PrimaDonna Aromatic screen, for instance in case the appliance would be exhibited on the shelf of a shop.

1. The appliance must be plugged-in and in stand-by mode.
2. Remove the drip tray.
3. When the request to insert the drip tray prompts on the display, touch first the bottom-left corner and then the top-right corner of the touch screen:



Insert the drip tray. The demonstration video (DEMO MODE) will start being displayed continuously on the screen until the appliance will be unplugged from the socket.