

Data Sheet and Service Manual

MAGNIFICA EVO

ECAM29034SB, ECAM29043SB USCA

ECAM29063SB, ECAM29084SB USCA

Date: 18.10.2022



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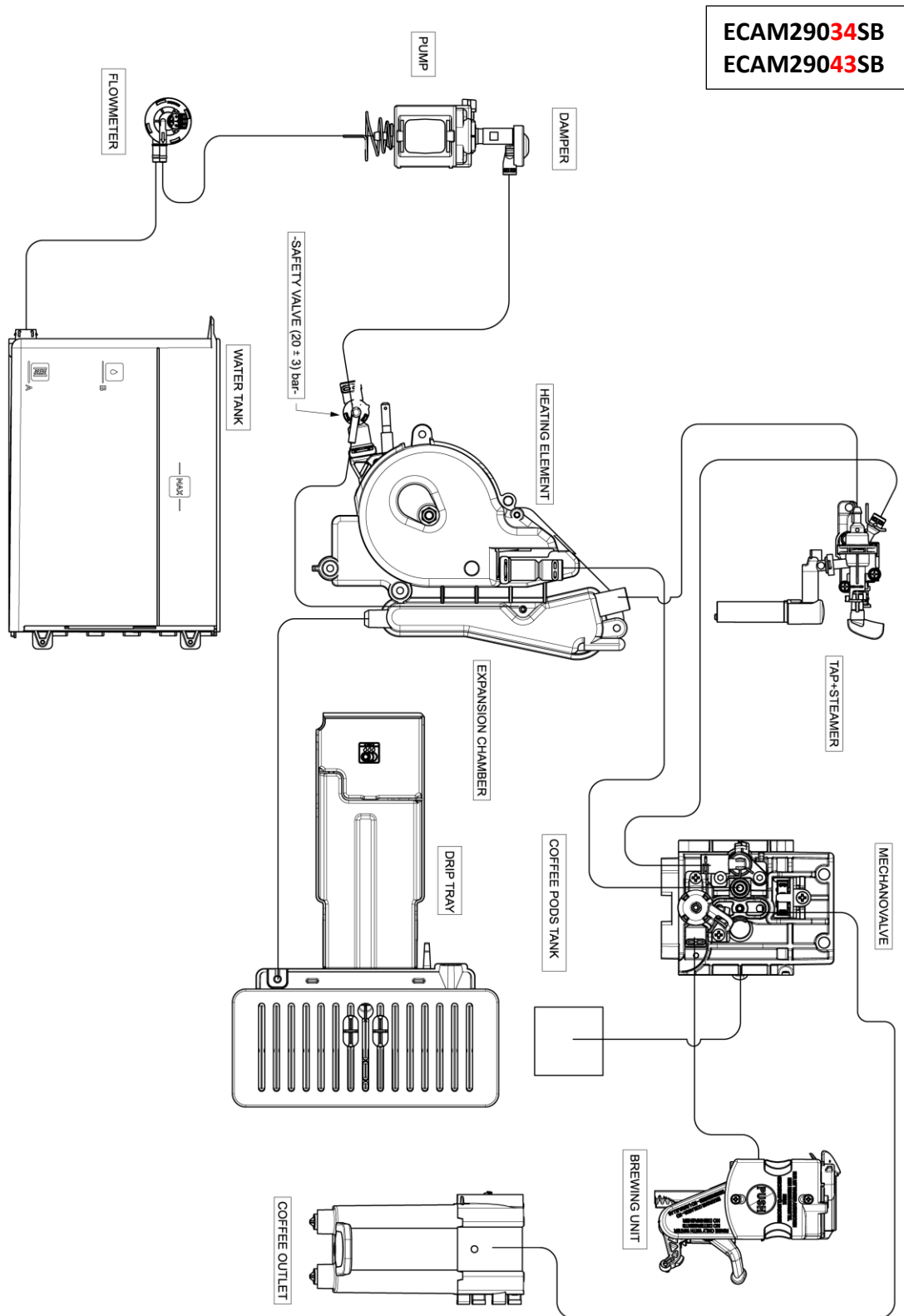
1. TECHNICAL DATA

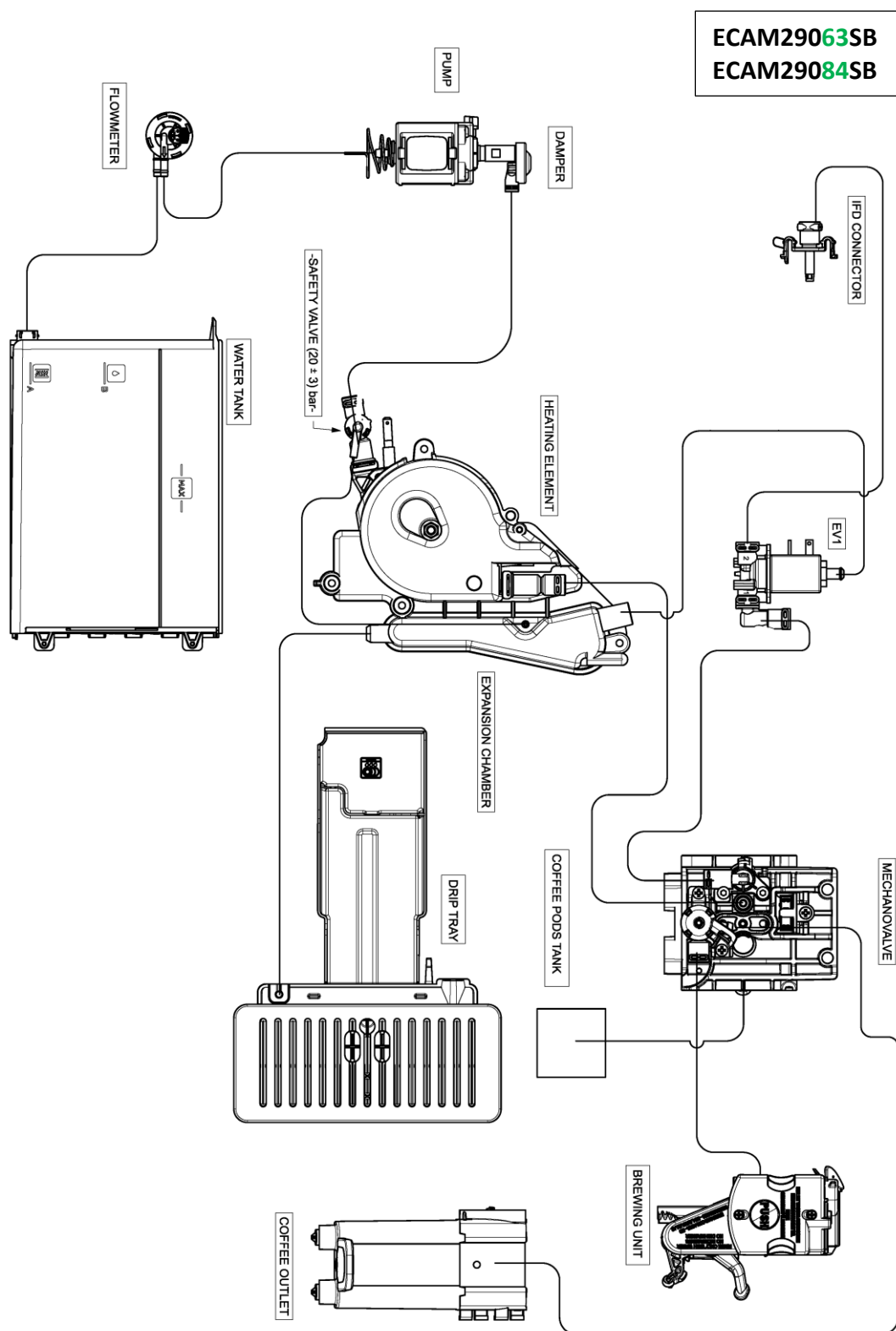
Voltage	120V / 60 Hz
MAX. Input power	1250 W
Stand-by Button OFF	0,25 Wh (plug inserted but machine OFF)

COMPONENTS

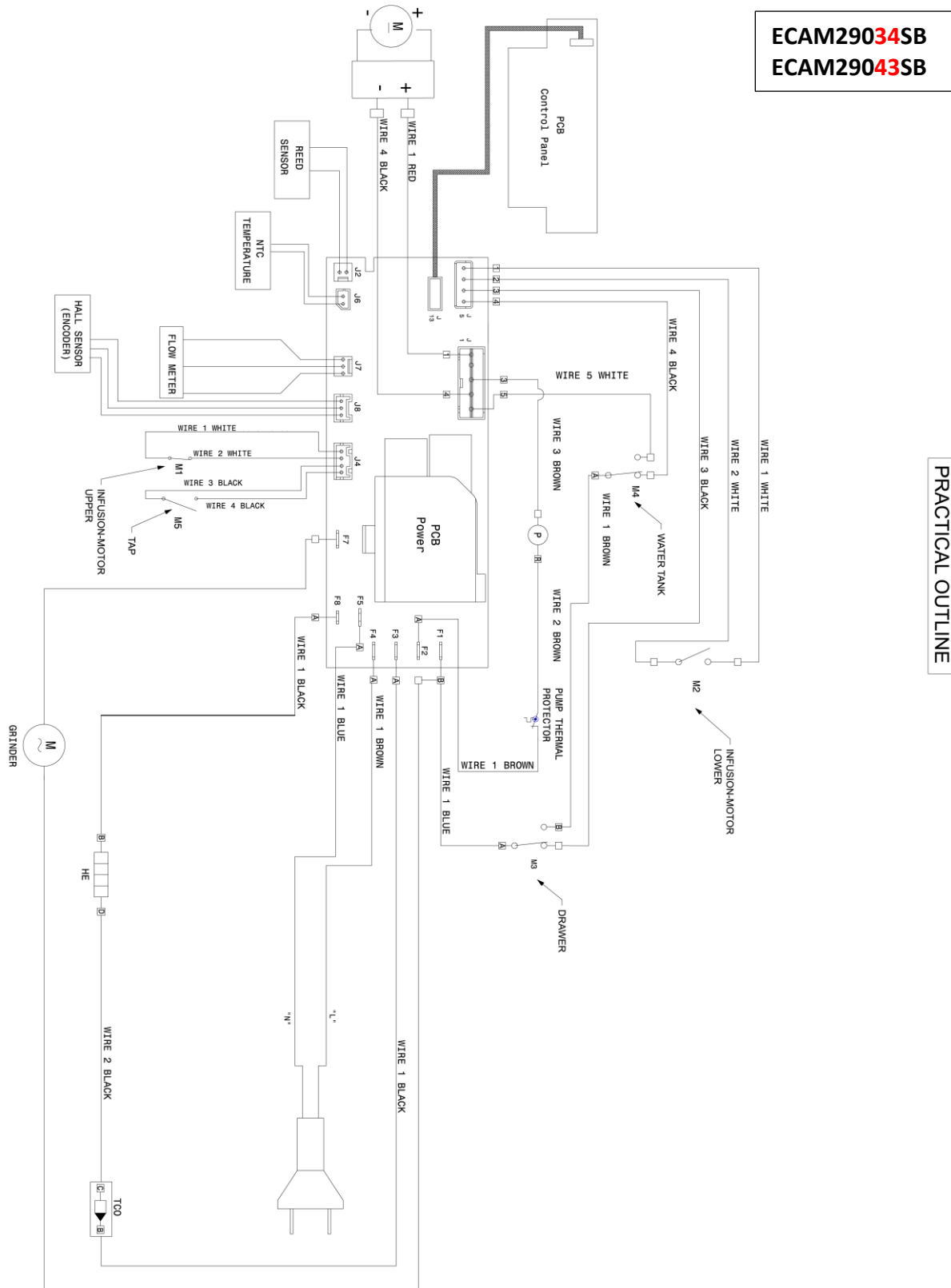
Pump	120V AC - 52 W – Bar 15
Grinder motor	120V AC
Transmission motor	120V DC with position encoder
EV1 solenoid valve	120V AC
Thermoblock	
- Temperature probe	NTC sensor: operating set point
- Thermal fuse TCO	192 °C
- Heating element	120V AC – 1200 W

2. HYDRAULIC DIAGRAM

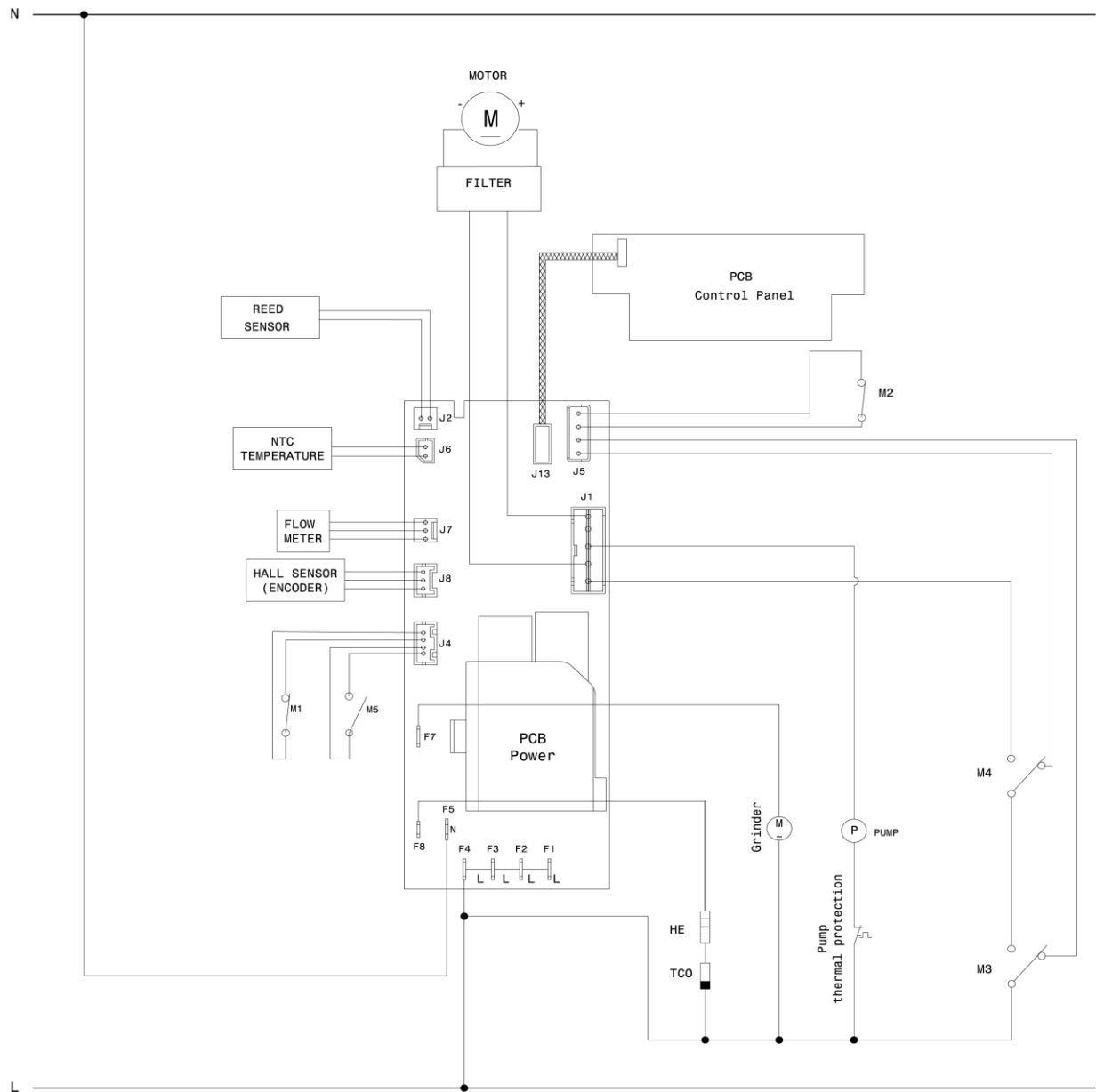




3. WIRING DIAGRAM



THEORETICAL OUTLINE

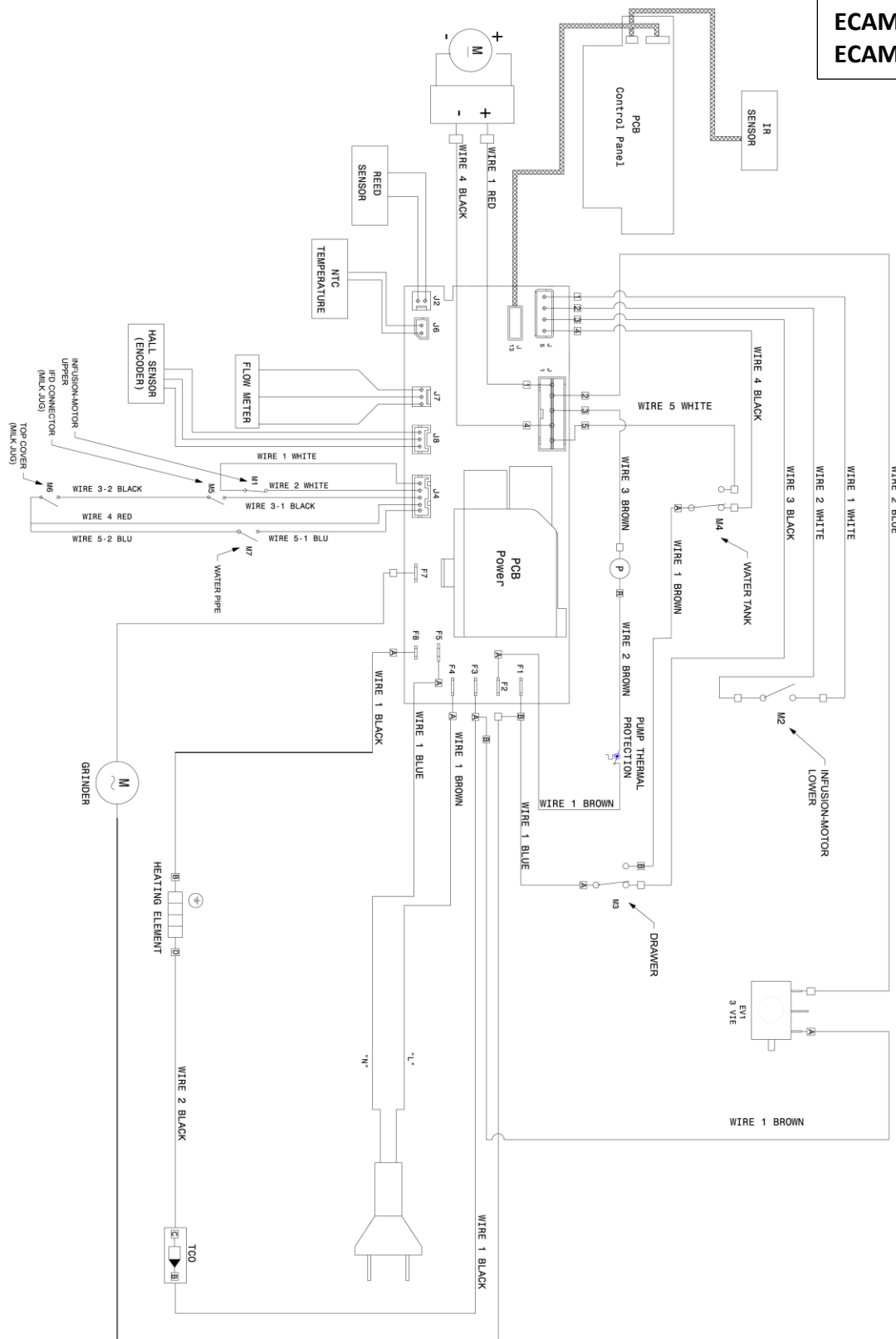


LEGEND:

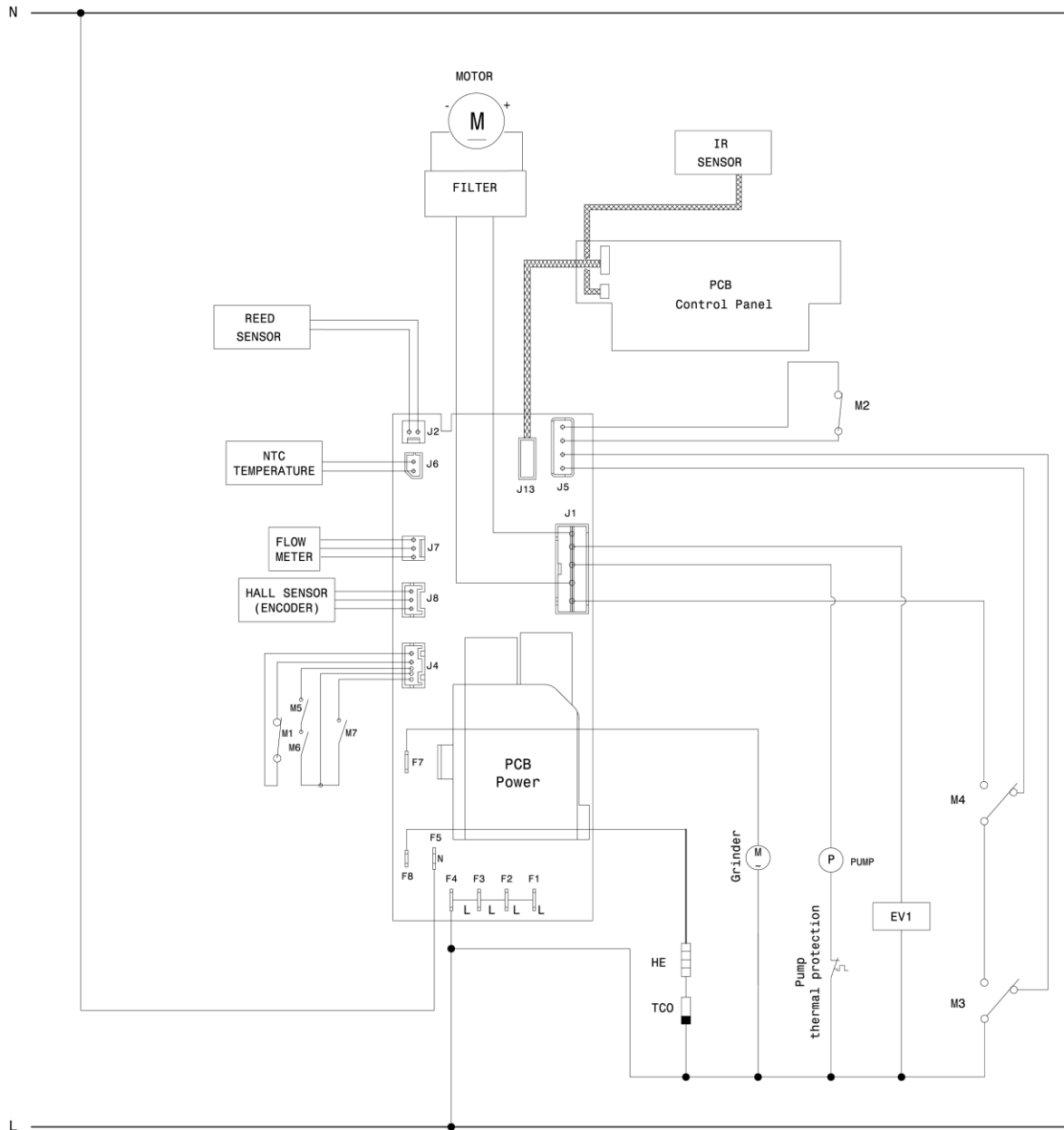
L : PHASE/LINE
 N : NEUTRAL
 TCO : THERMAL CUT OFF/THERMAL LINK
 HE : HEATING ELEMENT
 M1 : MICROSWITCH UPPER (GROUP INFUSION-MOTOR)
 M2 : MICROSWITCH LOWER (GROUP INFUSION-MOTOR)
 M3 : MICROSWITCH DRAWER
 M4 : MICROSWITCH WATER TANK
 M5 : MICROSWITCH TAP

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PRACTICAL OUTLINE



THEORETICAL OUTLINE



LEGEND:

L : PHASE/LINE
N : NEUTRAL
TCO : THERMAL CUT OFF/THERMAL LINK
HE : HEATING ELEMENT
M1 : MICROSWITCH UPPER (GROUP INFUSION-MOTOR)
M2 : MICROSWITCH LOWER (GROUP INFUSION-MOTOR)
M3 : MICROSWITCH DRAWER
M4 : MICROSWITCH WATER TANK
M5 : MICROSWITCH IFD CONNECTOR (MILK JUG)
M6 : MICROSWITCH TOP COVER (MILK JUG)
M7 : MICROSWITCH WATER PIPE

4. WORKING PRINCIPLE

4.1. MICROSWITCHES, SENSORS AND SOLENOID VALVES

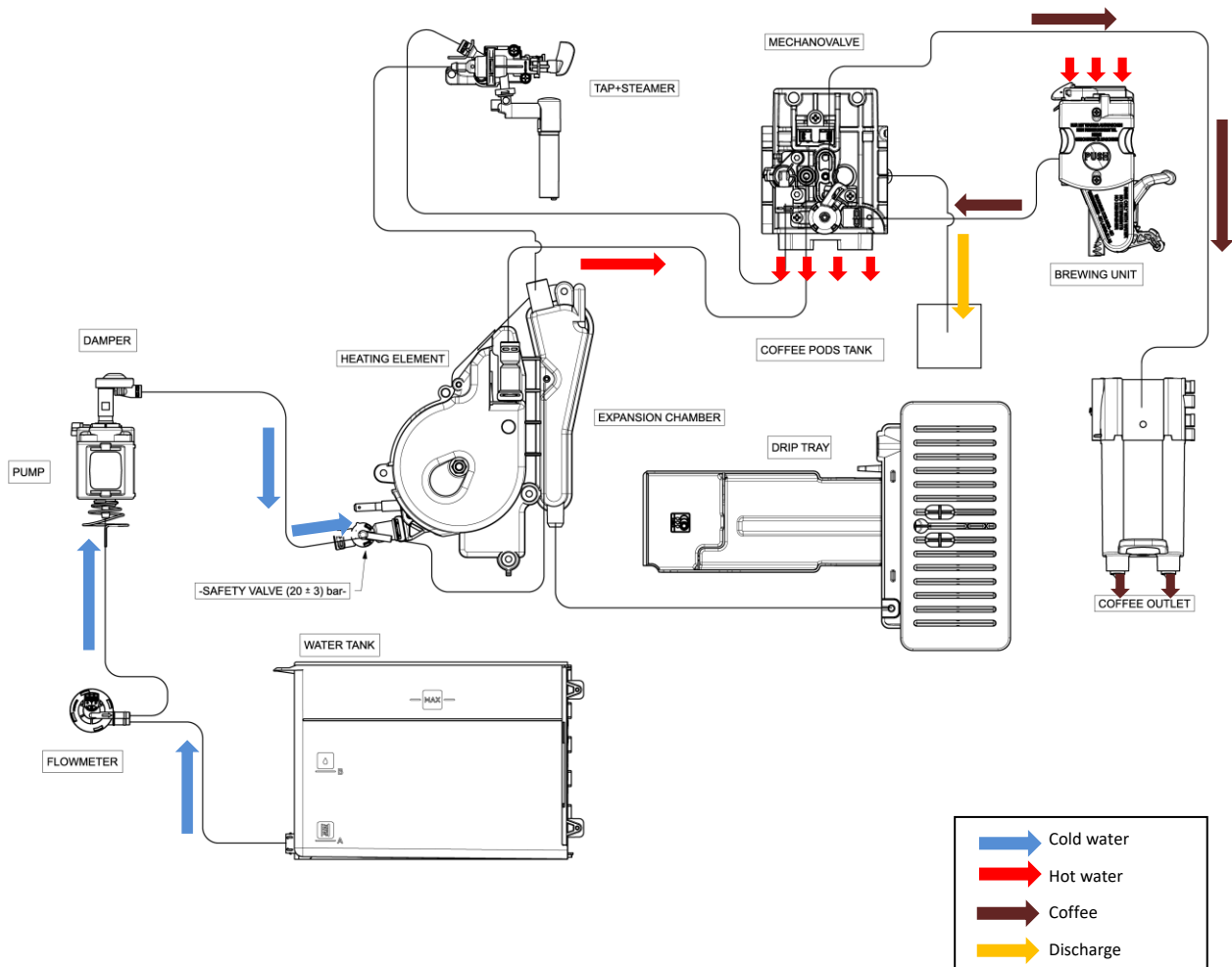
MICROSWITCHES	Function	Logic
M1 = UPPER MICROSWITCH	Detects when the infuser is on top position	"NC", it opens when the infuser is in top position
M2 = LOWER MICROSWITCH	Detects when the infuser is on down position	"NO", it closes when the infuser is in down position
M3 = DRAWER MICROSWITCH	Detects when the drip tray is in correct position	Changeover micro switch. When the drip tray is inserted: - the contact for the drip tray detection is OPEN; - the contact for the transmission motor power supply is CLOSED.
M4 = WATER TANK MICROSWITCH	Detects the presence of the water tank	Changeover 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.
M5 = IFD CONNECTOR MICROSWITCH	Detects when the IFD connector is attached to the machine	"NO", it closes when the IFD connector is attached.
M6 = MILK JUG LID MICROSWITCH	Detects when the milk jug lid is attached to the machine	"NO", it closes when the milk jug lid is attached.
M7 = HOT WATER SPOUT MICROSWITCH	Detects when the hot water spout is attached to the machine	"NO", it closes when the hot water spout is attached.

REED AND ENCODER	Function	Logic
REED SENSOR LOW WATER TANK	Detects when the water level is at minimum	
HALL SENSOR ENCODER	Detects rotations of transmission motor	
MILK PRESENCE OPTICAL SENSOR	Detects when the milk jug contains milk and when it is empty	- When the jug is connected and contains milk, the milk presence blocks the - infrared beam generated by the sensor and the machine enables the milk recipes preparation. - When the jug is connected but it is empty, the infrared beam generated by the sensor is free to pass and the machine disables the milk recipes preparation. In this case <u>only the milk jug cleaning function is active.</u>

SOLENOID VALVE	Function	Logic
EV1 SOLENOID VALVE	3-Ways solenoid valve	It opens to deliver hot water through the hot water spout and steam to the milk jug for milk frothing. When it closes, it allows the discharge of the residual pressure to the expansion chamber and drip tray.

4.2. BEVERAGE DELIVERY CIRCUIT (ECAM29034SB, ECAM29043SB)

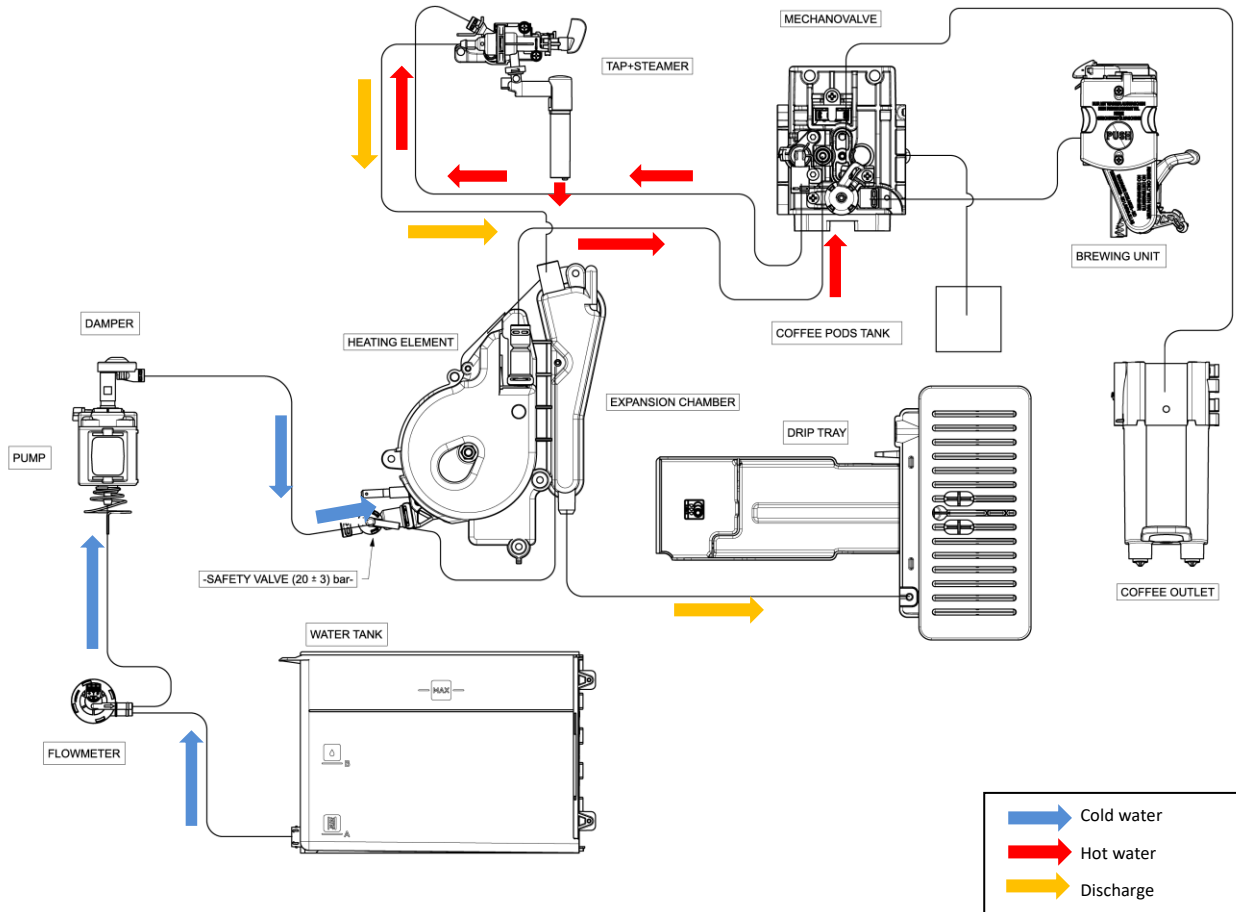
A. COFFEE DELIVERY



Espresso delivery steps:

- Thermoblock is activated
- Grinder is activated for a certain timing (based on the coffee taste selection)
- Infuser moves to the mechanical valve
- Pump is activated for a couple of seconds for pre-infusion
- Pump restarts for coffee delivering
- Pump and thermoblock stop
- Infuser moves away from the mechanical valve and releases the coffee pod
- Mechanical valve discharges excess water/coffee to the grounds container
- Infuser is moved back to the "Coffee Ready" position

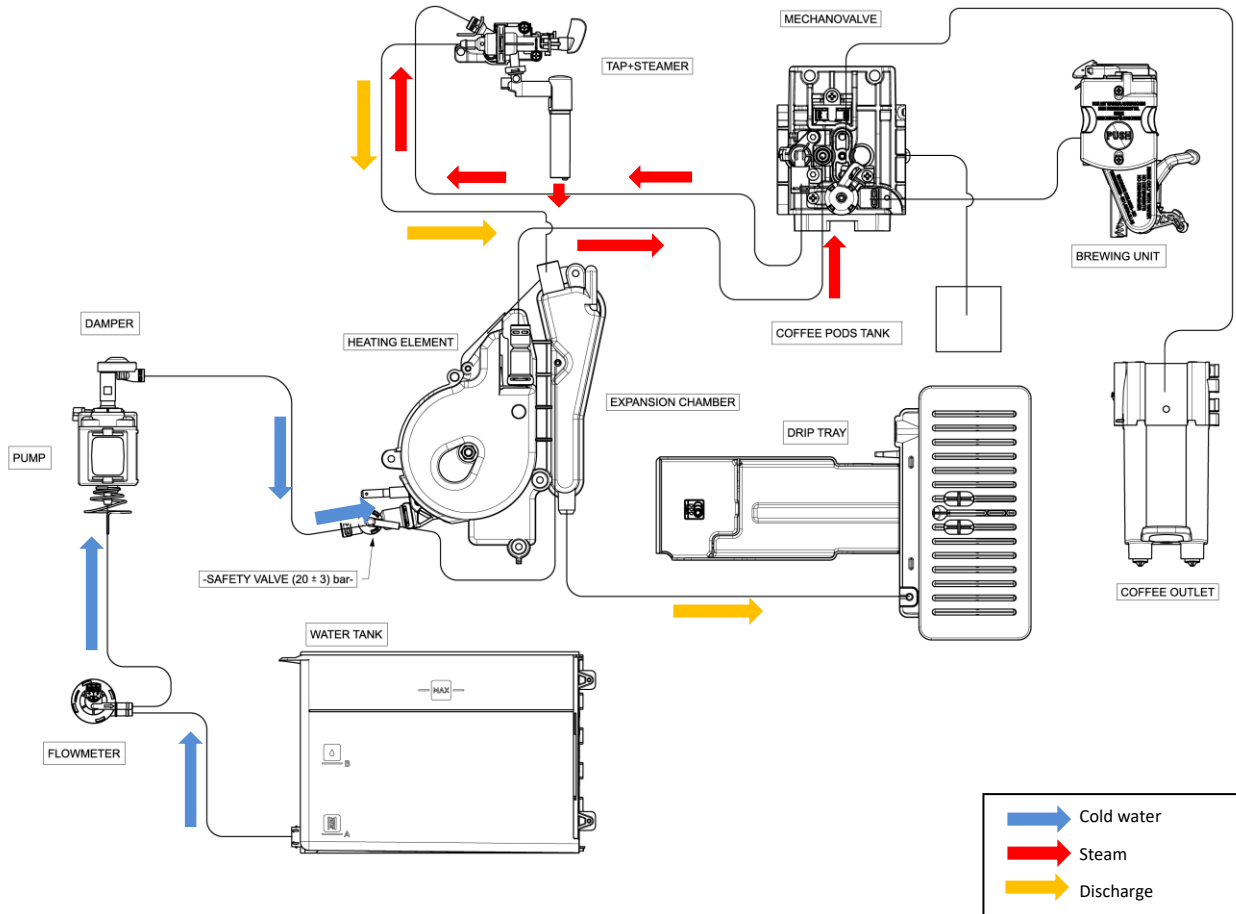
B. HOT WATER DELIVERY



Hot water delivery steps:

- Thermoblock is activated
- Pump is activated in fast pulsing mode for a certain timing
- Hot water is delivered through the tap-steamer output
- Pump stops, Thermoblock is deactivated.

C. STEAM DELIVERY

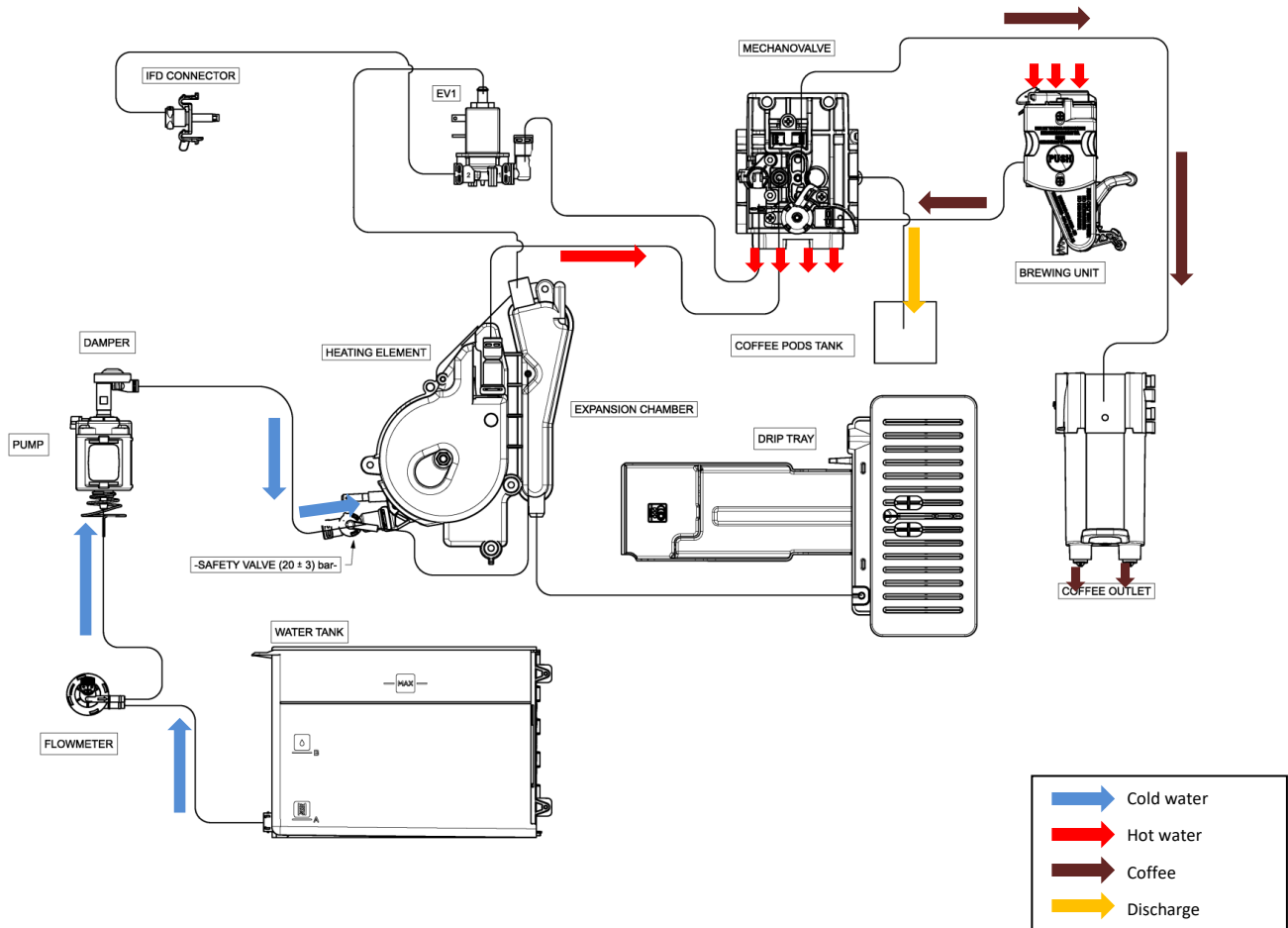


Steam delivery steps:

- Thermoblock is activated (**setting temperature higher than 100°C**)
- Pump is activated in **slow pulsing** mode for a certain timing
- The steam is delivered to the **tap-steamer**
- Pump stops, Thermoblock is deactivated.

4.3. BEVERAGE DELIVERY CIRCUIT (ECAM29063SB, ECAM29084SB)

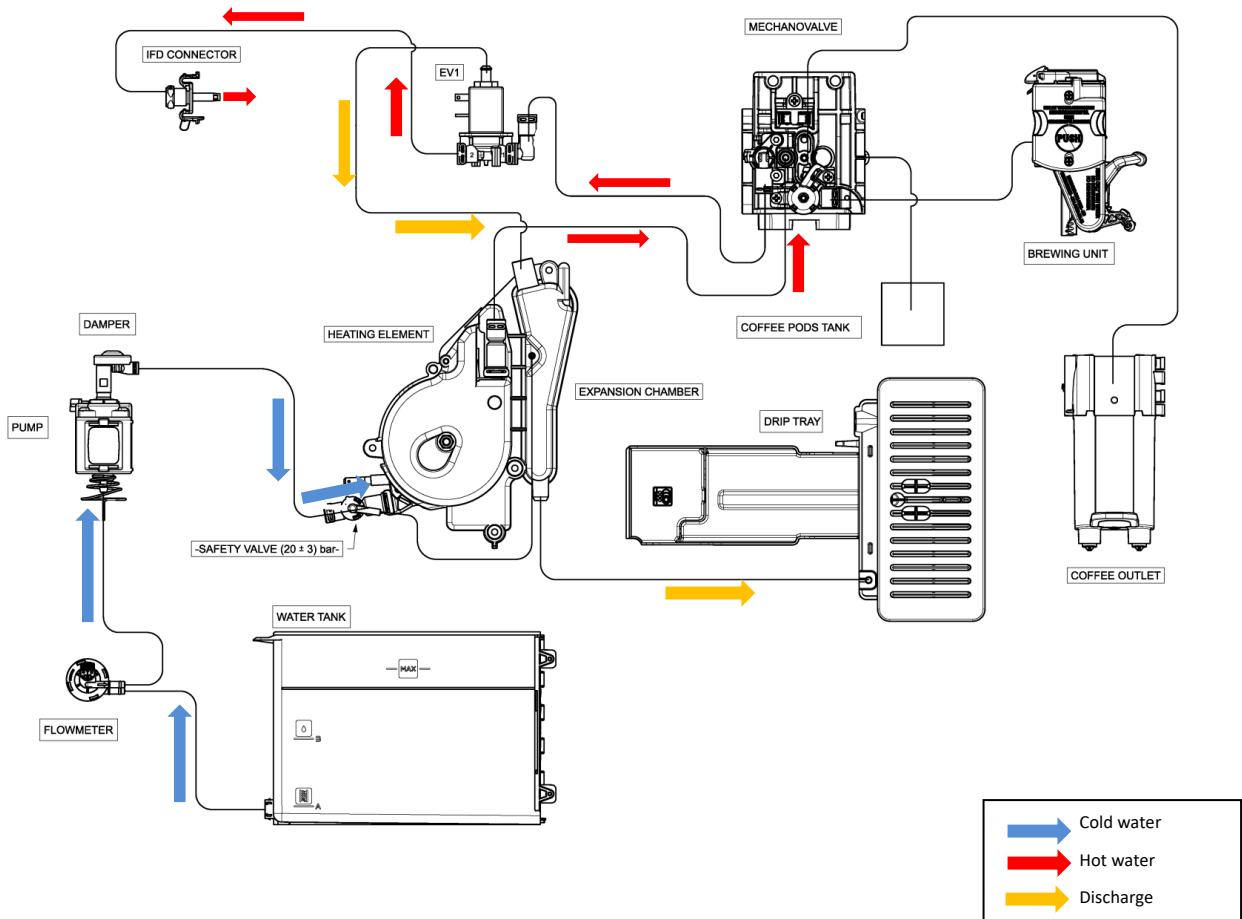
A. COFFEE DELIVERY



Espresso delivery steps:

- Thermoblock is activated
- Grinder is activated for a certain timing (based on the coffee taste selection)
- Infuser moves to the mechanical valve
- Pump is activated for a couple of seconds for pre-infusion
- Pump restarts for coffee delivering
- Pump and thermoblock stop
- Infuser moves away from the mechanical valve and releases the coffee pod
- Mechanical valve discharges excess water/coffee to the grounds container
- Infuser is moved back to the "Coffee Ready" position.

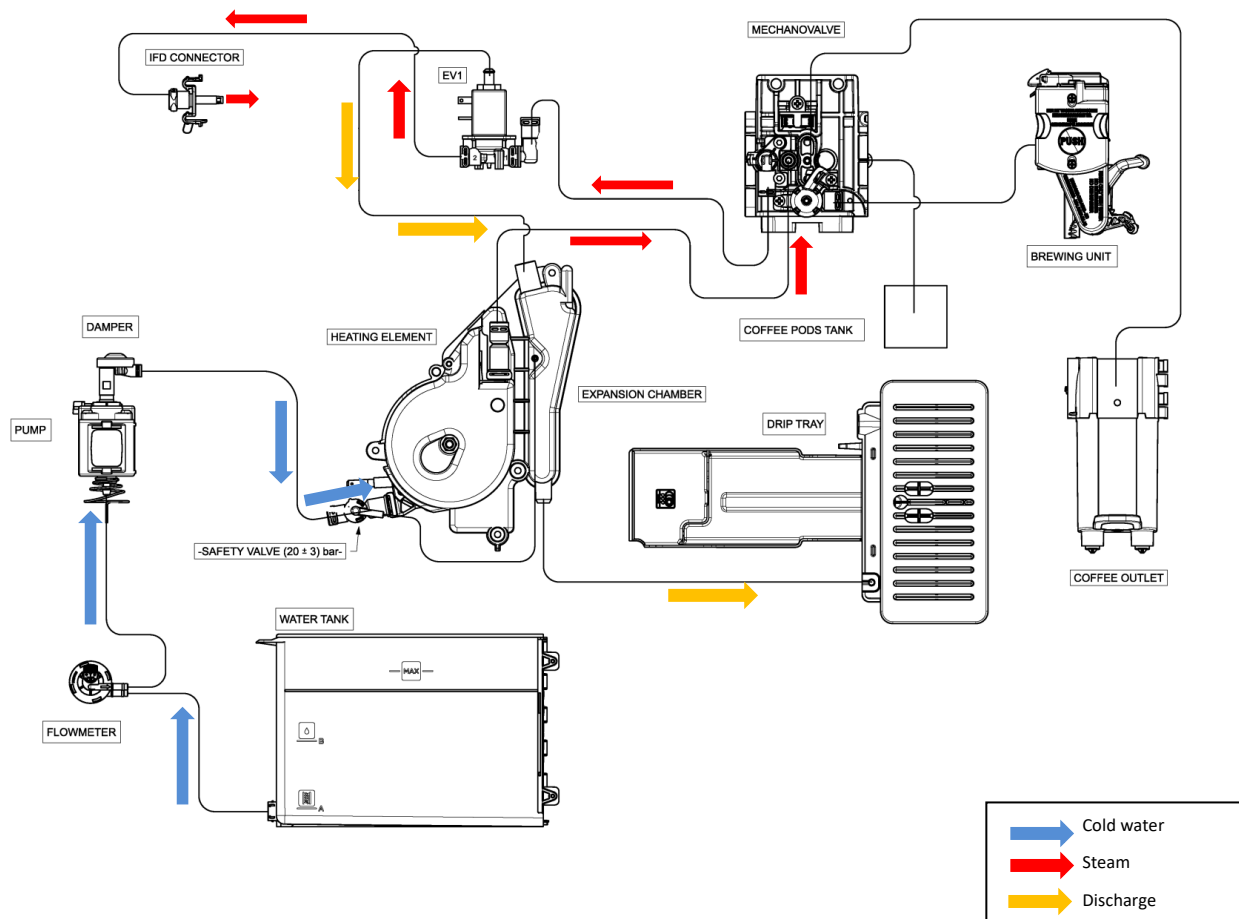
B. HOT WATER DELIVERY



Hot water delivery steps:

- Thermoblock is activated
- EV1 solenoid valve is activated
- Pump is activated in fast pulsing mode for a certain timing
- Hot water is delivered through the hot water spout connected to the accessory nozzle
- Pump stops, EV1 and Thermoblock are deactivated.

C. MILK FROTHING PREPARATION



Milk frothing preparation steps:

- Thermoblock is activated (**setting temperature higher than 100°C**)
- EV1 solenoid valve is activated
- Pump is activated in slow pulsing mode for a certain timing
- The steam is delivered to the milk jug attached to the accessory nozzle. Here it mixes with milk and air to produce hot frothed milk.
- Pump stops, EV1 and Thermoblock are deactivated.

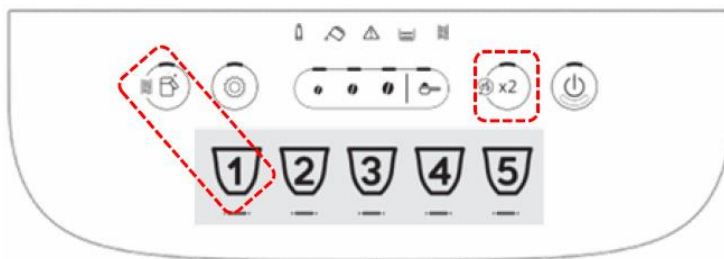
Milk jug cleaning procedure:

- Thermoblock is activated
- EV1 solenoid valve is activated
- Pump is activated in very slow pulsing mode
- Hot water is delivered through the milk jug lid to clean its internal circuit
- Pump stops, EV1 and Thermoblock are deactivated.

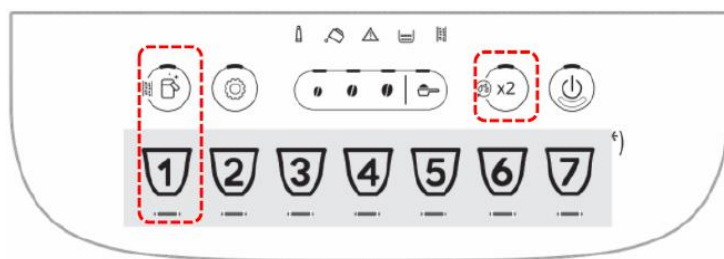
5. TEST MODE

5.1. PROCEDURE TO ACTIVATE TEST MODES

- The appliance must be plugged-in and in stand-by mode.
- Remove the drip tray. The GROUNDS CONTAINER icon will flash
- Hold the combination of the below three button pressed (depending on the model):

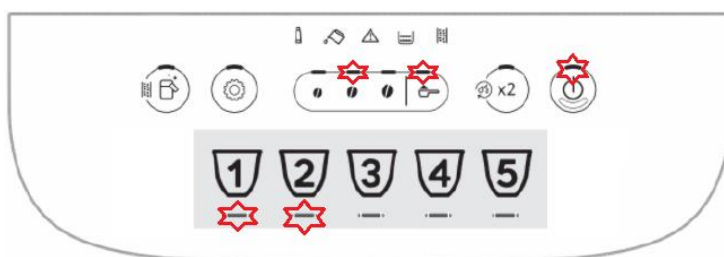


ECAM29X.6Y



ECAM29X.8Y

until the GROUNDS CONTAINER icon will turn OFF and the LEDs of the below buttons (depending on the model) will start flashing:



ECAM29X.6Y



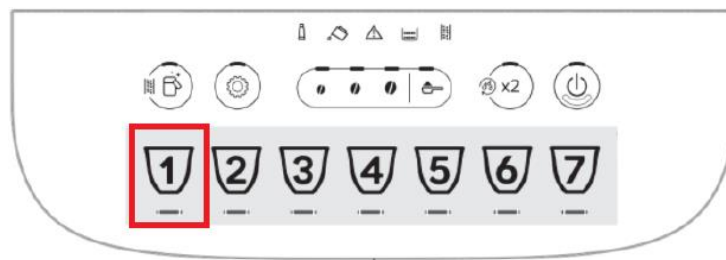
ECAM29X.8Y

- Insert the grounds container and press one of the buttons indicated in the next paragraphs to start the corresponding test function.

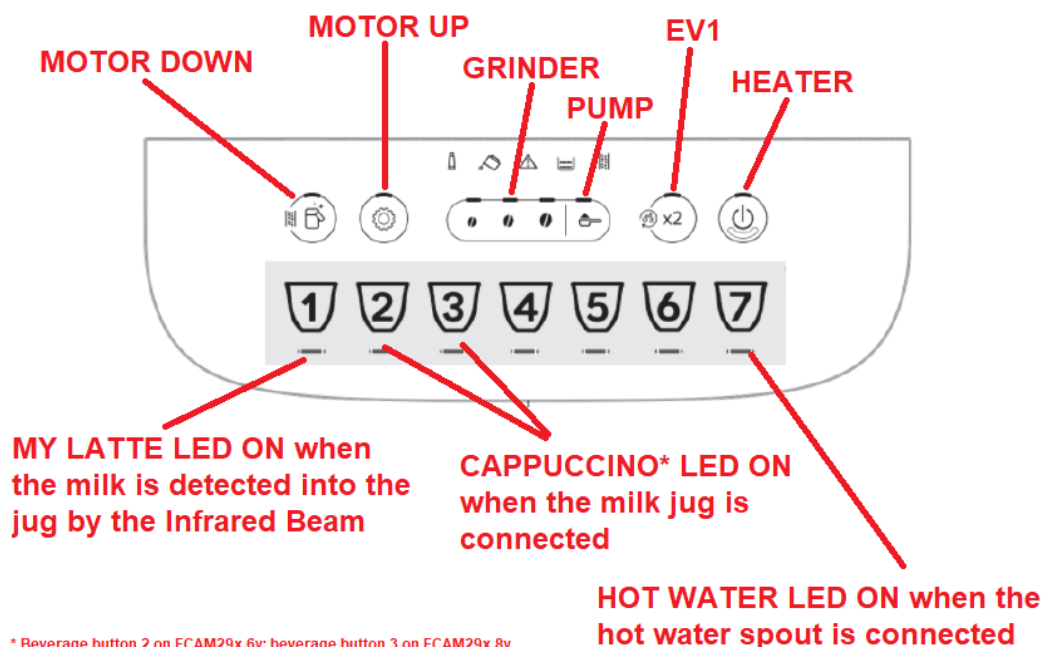
IMPORTANT NOTICE: The access to the desired test function must be done within 10 seconds, otherwise the machine will automatically come back to stand-by mode.

5.2. LOAD TEST MODE

After having accessed the test mode as indicated on paragraph 5.1, press the first beverage icon from the left (**MY LATTE** button) to access the **LOAD TEST MODE**:



The LED of each button linked to the activation of a component will illuminate steadily white. Hold the desired button pressed to activate the corresponding load, the LED of the button will flash slowly to indicate the activation of the load:



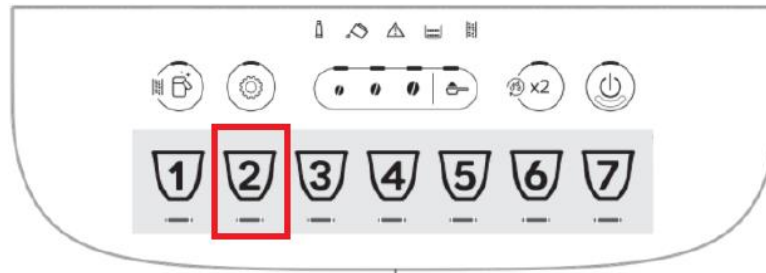
NOTICE: When the **DOWN** micro switch is reached by the infuser, the **MILK JUG CLEAN** LED will blink fast.

NOTICE: When the **UP** micro switch is reached by the infuser, the **SETTINGS** LED will blink fast.

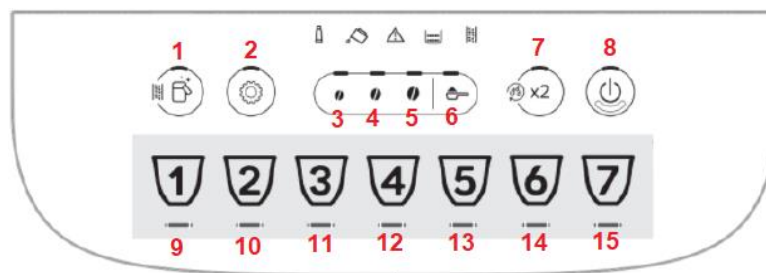
NOTICE: Multiple components can be activated at the same time (e.g. the pump and EV1).

5.3. DISPLAY TEST MODE

After having accessed the test mode as indicated on paragraph 5.1, press the second beverage icon from the left (**CAPPUCCINO** or **LATTE MACCHIATO** button, depending on the model of coffee machine) to access the **DISPLAY TEST MODE**:



During the display test mode all the LEDs are lit up. When a button is pressed, only the LED of that button remains ON, while those of all the other buttons will be turned OFF:



In particular, by pressing **each of the AROMA buttons**, in addition to the button LED, also the two neighbor warning LEDs will illuminate steadily:

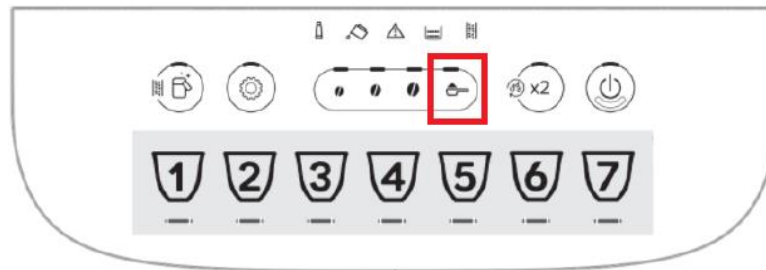


NOTICE: The **DISPLAY TEST MODE** will reset the following settings in the appliance:

- **First run:** the machine will ask again for hydraulic circuit filling.
- **Filter installation:** if the filter installation function was enabled, it will be disabled.

5.4 ENCODER RESET

After having accessed the test mode as indicated on paragraph 5.1, press the **PRE-GROUND** button to perform the **ENCODER RESET**, i.e. the reset of the value of the maximum height of the infuser:



The PRE-GROUND LED will remain steady ON while the reset is in progress, then it will go OFF when the reset is completed.

IMPORTANT: To complete the encoder reset procedure, start the appliance normally and perform a manual rinse with the dedicated button.

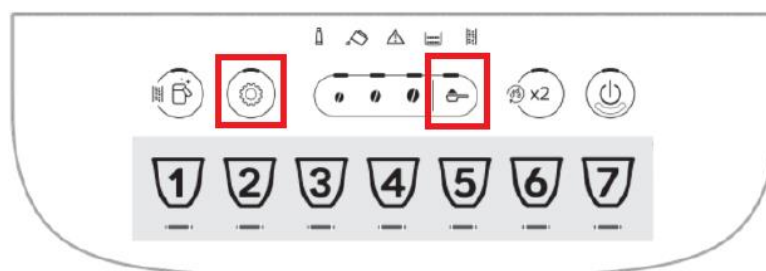
The infuser must be clean and smooth in its movements to allow the encoder reset to be validated correctly.

6. STATISTICS READING

The appliance allows the reading of the statistics data to understand exactly how the machine operated along the time.

To access the **STATISTICS** function:

- make sure the appliance is **ready to use** (i.e. in ready-for-coffee mode);
- hold the **SETTINGS** and **PRE-GROUND** buttons **pressed for at least 5 seconds**:

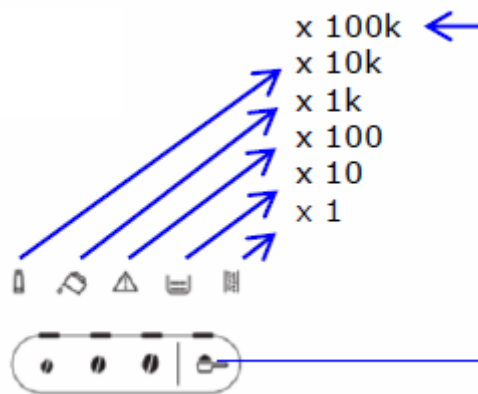


The LEDs of the buttons dedicated to read the statistics values will illuminate steadily.

Press the desired button to display the corresponding statistics data:

BUTTON	STATISTIC DATA
ESPRESSO	Number of Coffee Beverages
MY LATTE	Number of Milk Beverages
CAPPUCCINO	Number of Milk Jug Cleanings
MILK JUG CLEAN/DESCALE	Number of Descaling Processes
X2/RINSE	Litres of Water
MID AROMA COFFEE BEAN	Number of Filters Installed

After having pressed the desired button, the appliance will display the corresponding statistic value with the sequential flashing of the below lights:



Example: To display a total amount of 24 coffee beverages, the appliance will display:

- 4 flashings of the DESCALE light;
- followed by 2 flashings of the GROUNDS CONTAINER light.

NOTICE: To exit the statistics mode, press the **SETTINGS** button again or wait for 120 seconds without operating on the machine. The appliance will come back to the ready to use mode.

7. TROUBLESHOOTING

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

A. COFFEE CIRCUIT FLOW ACTIVATION

- Move the infuser to the UP position (MOTOR UP).
- 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 spout.

B. HOT WATER/STEAM CIRCUIT FLOW ACTIVATION

- Connect the hot water spout to the machine.
- The infuser does **not** have to be in upper position.
- Activate the EV1 solenoid valve by holding the SETTINGS button pressed.
- Activate the pump by holding also the PRE-GROUND button pressed.

The water will pass through the flow meter, the Thermoblock, the EV1 solenoid valve. Finally it will come out from the hot water spout.

7.2. ELECTRIC CHECKS DIRECTLY ON THE COMPONENTS

D. HEATING ELEMENTS RESISTANCE CHECK

- Thermoblock resistance value: $\approx 12 \Omega$

E. RESISTANCE/TEMPERATURE CHARACTERISTICS FOR NTC SENSOR

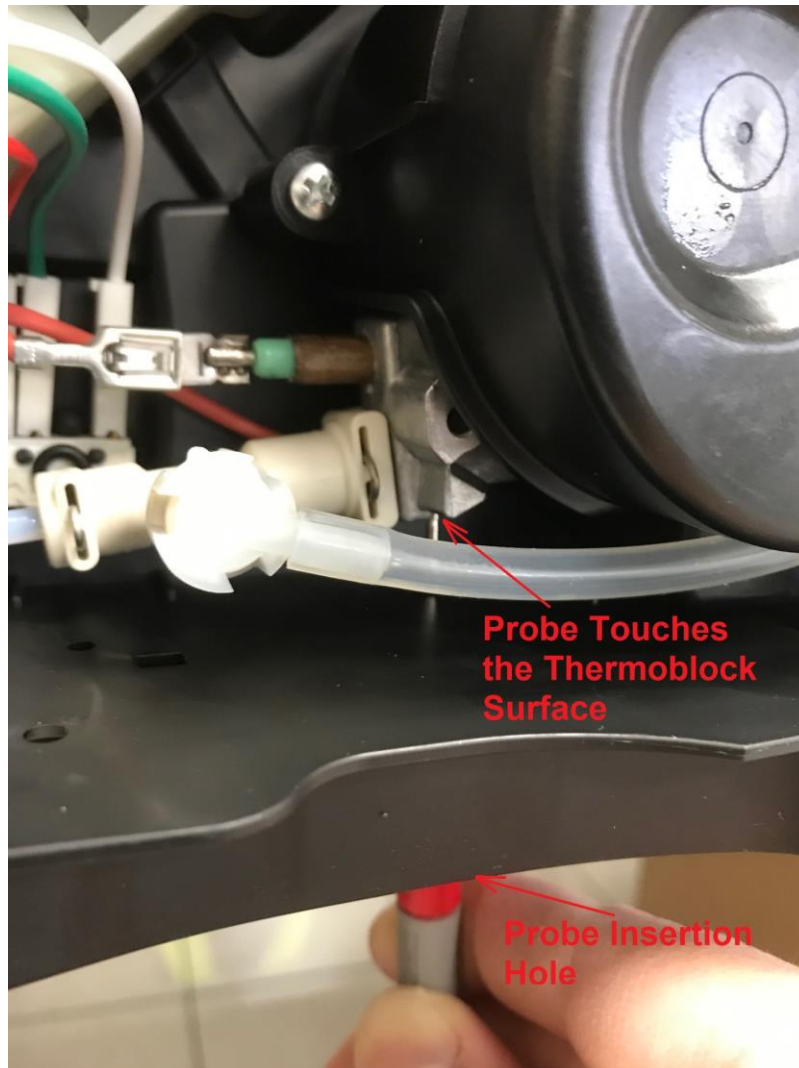
- Resistance/temperature characteristics for the thermoblock NTC:

RESISTANCE - TEMPERATURE CHARACTERISTICS

TEMP. °C	MINIMUM k Ω	NOMINAL k Ω	MAXIMUM k Ω	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

C. 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 on the basement of the appliance on the Thermoblock side until it will touch the Thermoblock metal surface, as displayed in the below picture:



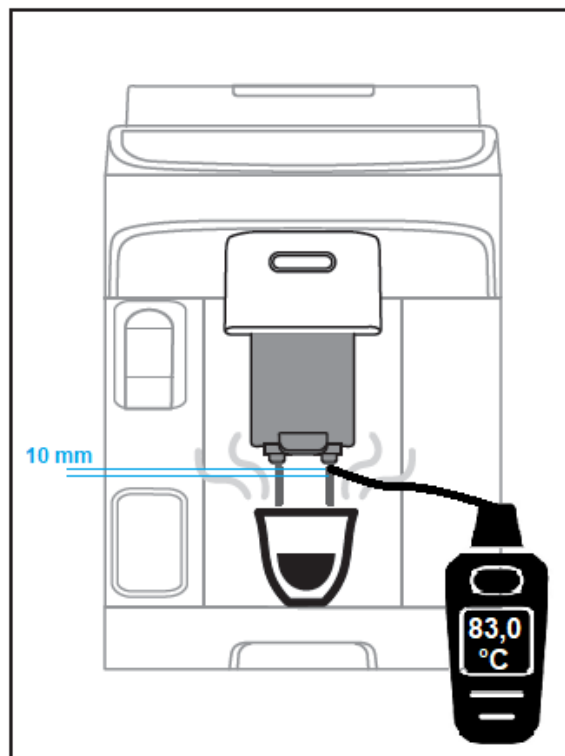
7.3. COFFEE TEMPERATURE TEST

Complains 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:

- Turn the appliance ON.
- Set the temperature to MAX level.
- Run 1-2 rinse cycles, to warm up the hydraulic circuit.
- Select to prepare an **X2 ESPRESSO COFFEE** (2 cups recipe, refer to the user manual for more details).
- Start the coffee preparation.
- Wait until at least 20ml of coffee have been delivered into the cup.
- Measure the coffee flow temperature at about 2÷10mm from the coffee spout, as shown in the below picture:

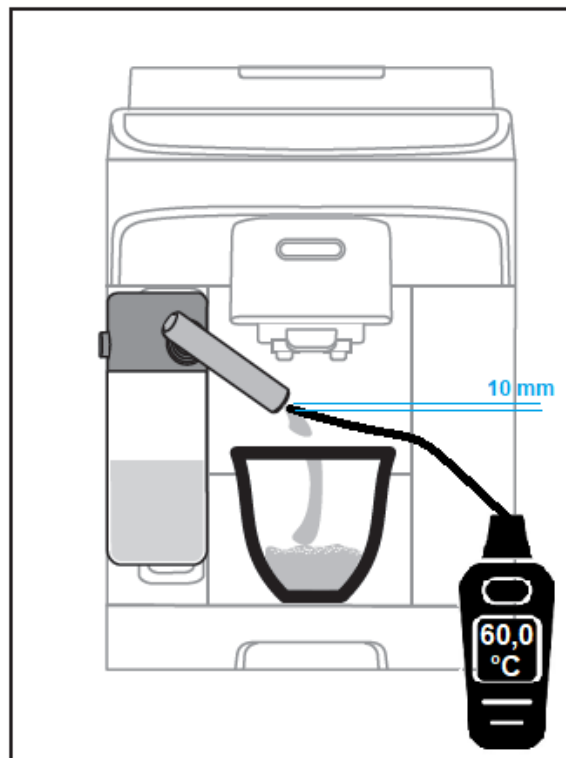


The **optimal indicative temperature measurement** for coffee should be **83°C±3°C**.

7.4. FROTHED MILK CONSISTENCY AND TEMPERATURE TEST

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

- Turn the appliance ON.
- Fill the milk jug with semi-skimmed milk at a temperature of $5^{\circ}\text{C} \pm 2^{\circ}\text{C}$ up to the MAX (2 x LATTE MACCHIATO) level. Insert the lid to the jug and connect it to the appliance.
- Place a 300ml PIREX graduated container under the milk spout.
- Select the **MY LATTE beverage** and wait until at least 80ml of frothed milk have been delivered into the container.
- 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 conditions for the frothed milk (without considering the coffee in cup) should be resumed below:

- Froth appearance: small bubbles without splashes.
- Milk temperature: $60^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
- Froth amount: finally the container must have 50% milk and 50% froth.