Coffee Machine

Service
Service
Service

XSmall

ServiceManual

Rev. 03 October. 2015

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CHAPTER 1

INTRODUCTION

1.1 Documentation required

The following documentation is needed for repair procedures:
- Instruction booklet for specific model
- Technical documentation for specific model (diagrams, exploded view, sympton cure and service manual)

1.2 Tools and resources

As well as the standard equipment, the following is required:

Qty.	Description	Notes
1	Screwdriver	Torx T 10
1	Pliers for Oetiker clamps	
1	CC -A - Vdc tester	
1	Digital thermometer	Scale limit > 150°C
1	SSC (Saeco Service Center)	Programmer

1.3 Material

Description	Notes
Thermal paste	Heating element > 200°C
Descaler	Saeco Entkalker
Grease solvent	Personal preference
Silicone grease	Safe to use with food

1.4 Safety warnings

We recommend you consult the technical manual of the machine before performing any maintenance work.
Observe all applicable standards relating to the repair of electrical appliances.
Always disconnect the power plug from the mains before beginning repair work.

Always disconnect the power plug from the mains before beginning repair work.

Simply turning off the main machine power switch is not an adequate safety precaution.
This domestic appliance is rated as insulation class I.
On completion of the repair work, insulation and dielectric rigidity tests must be performed.

Disassembling the machine, the operator must pay attention to hot and under Pressure parts: boiler, pin-boiler, valves, dispensing, steam tube, brew unit, connections and pipes to avoid burns. Please refer to specific hydraulic circuit (Image1) to know the parts in detail.
The machine hydraulic circuit can reach maximum pressure of 16/18 bar.
To operate in safety condition is recommended to perform the Steam Out procedure in order to remove the pressure and hot water inside the hydraulic circuit.

When the machine arrives at the Service Center in descaling mode interrupted, or making Descaling , be very careful not to come into contact with the Descaler.
After the product has been repaired, it should function properly and has to meet the safety requirements and legal regulations as officially laid down at this moment

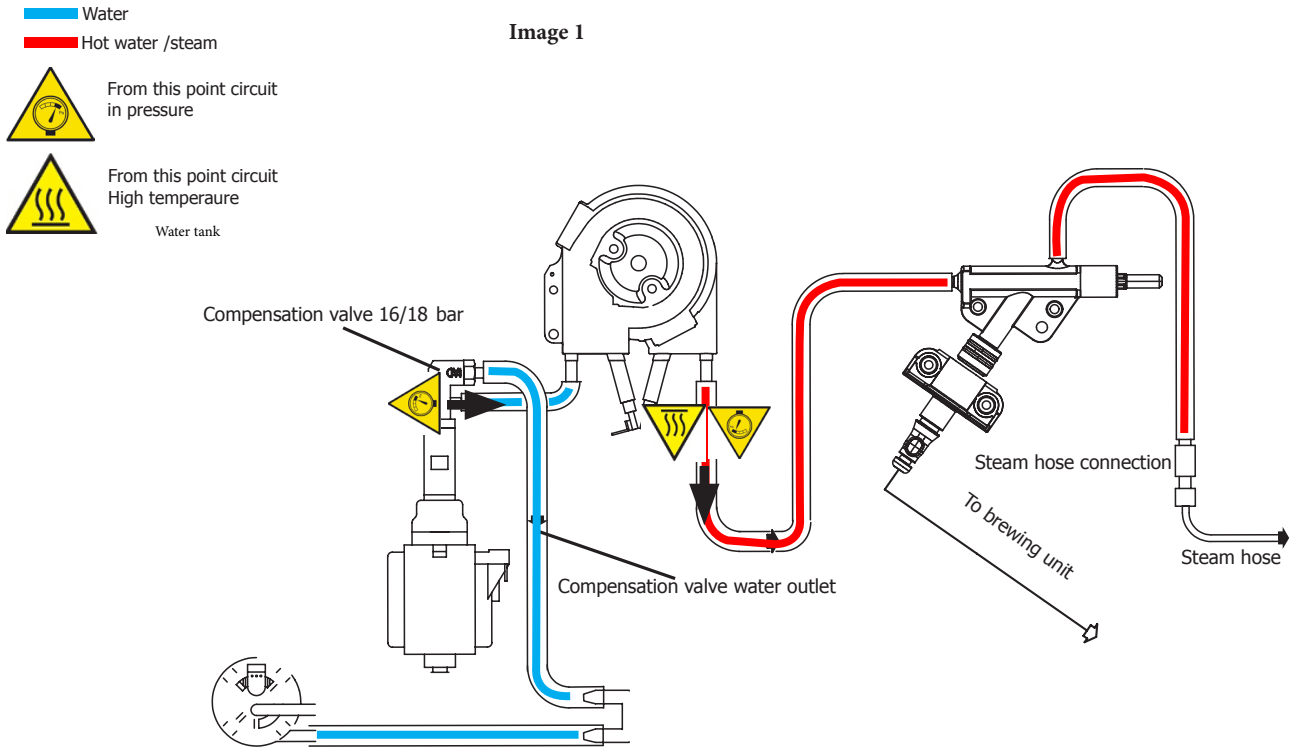


Image 1

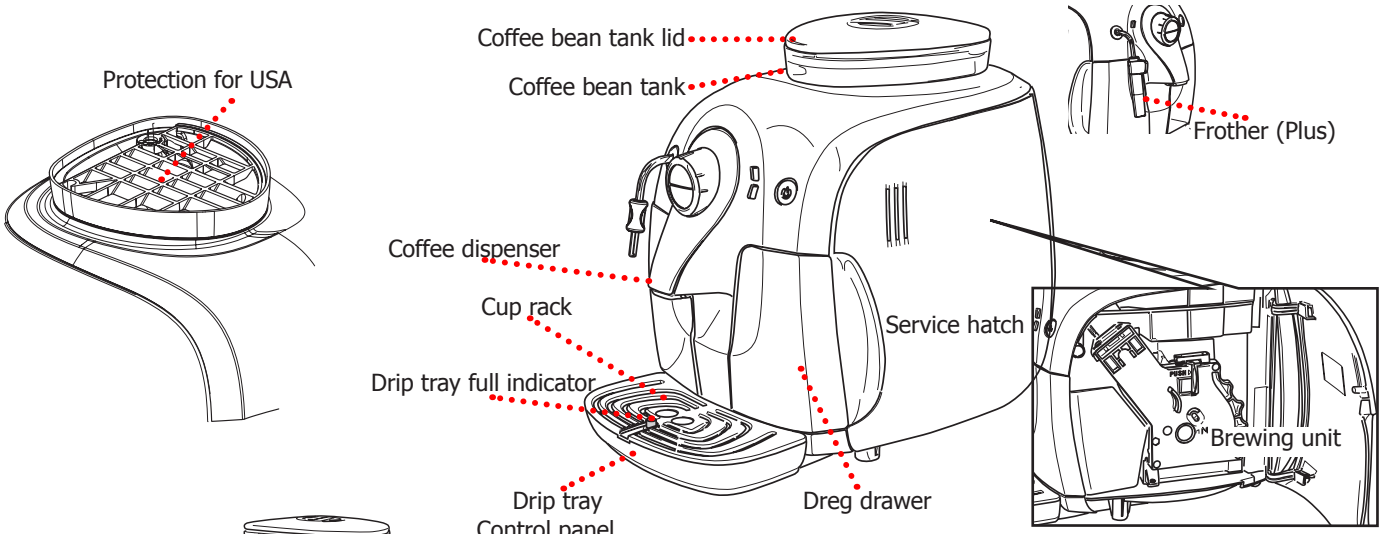
1.5 Service POLICY grid as used for coffee machines

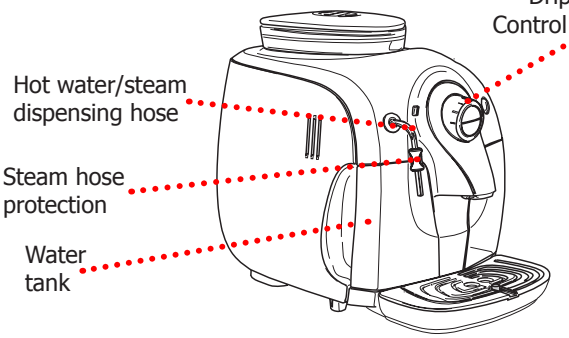
For IN WARRANTY repairs is raccomanded to use when and where possible the single components, available in the exploded views of the coffee machines or of the specific components. If you find the information "SEE THE EXPLODED VIEW E....." in the assembly description field, it means that the single components of the assembly are available in the other pages of the exploded view. It's possible to use the assembly only if there is a specific Symptom Cure that include this possibility or when the single components are not available for the order.

List of principal assembly present in all our coffee machines

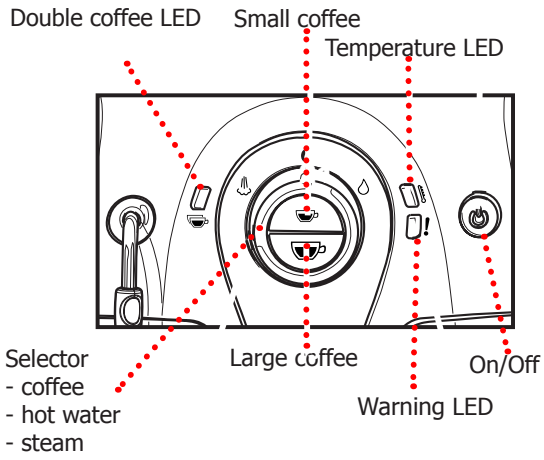
Components	Assembly use	Single components available
COFFEE GRINDER	**Only for OOW repairs**	**YES**, to consult the specific exploded-view of the machine or of the Coffee Grinder on website
BREWING UNIT	**Only for OOW repairs**	**YES**, to consult the specific exploded-view of the machine or of the Brewing unit on website
BOILER	**Only for OOW repairs**	**YES**, to consult the specific exploded-view of the machine on website
GEAR MOTOR	**Only for OOW repairs**	**YES**, to consult the specific exploded-view of the machine on website
FILTER HOLDER	**Only for OOW repairs**	**YES**, to consult the specific exploded-view of the machine on website
MILK CARAFE	**Only for OOW repairs**	**YES**, to consult the specific exploded-view of the machine on website
THERMAL CARAFE	**Only for OOW repairs**	**YES**, to consult the specific exploded-view of the Thermal Carafe on website
MILK ISLAND	**Only for OOW repairs**	**YES**, to consult the specific exploded-view of the Milk Island on website

1.6.1 External machine parts

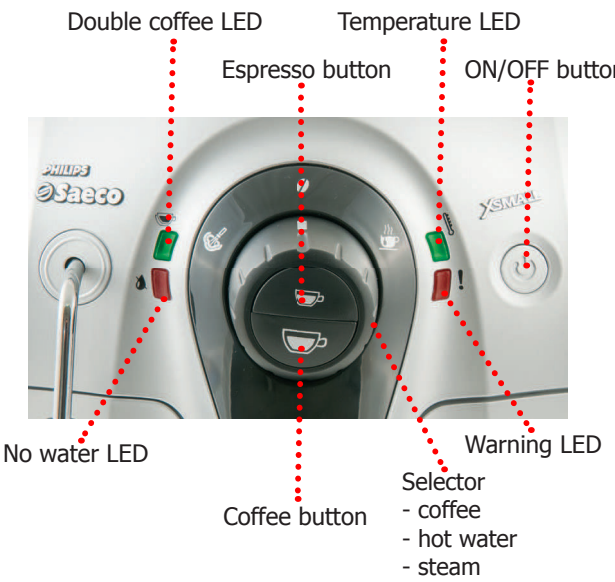




3 LED



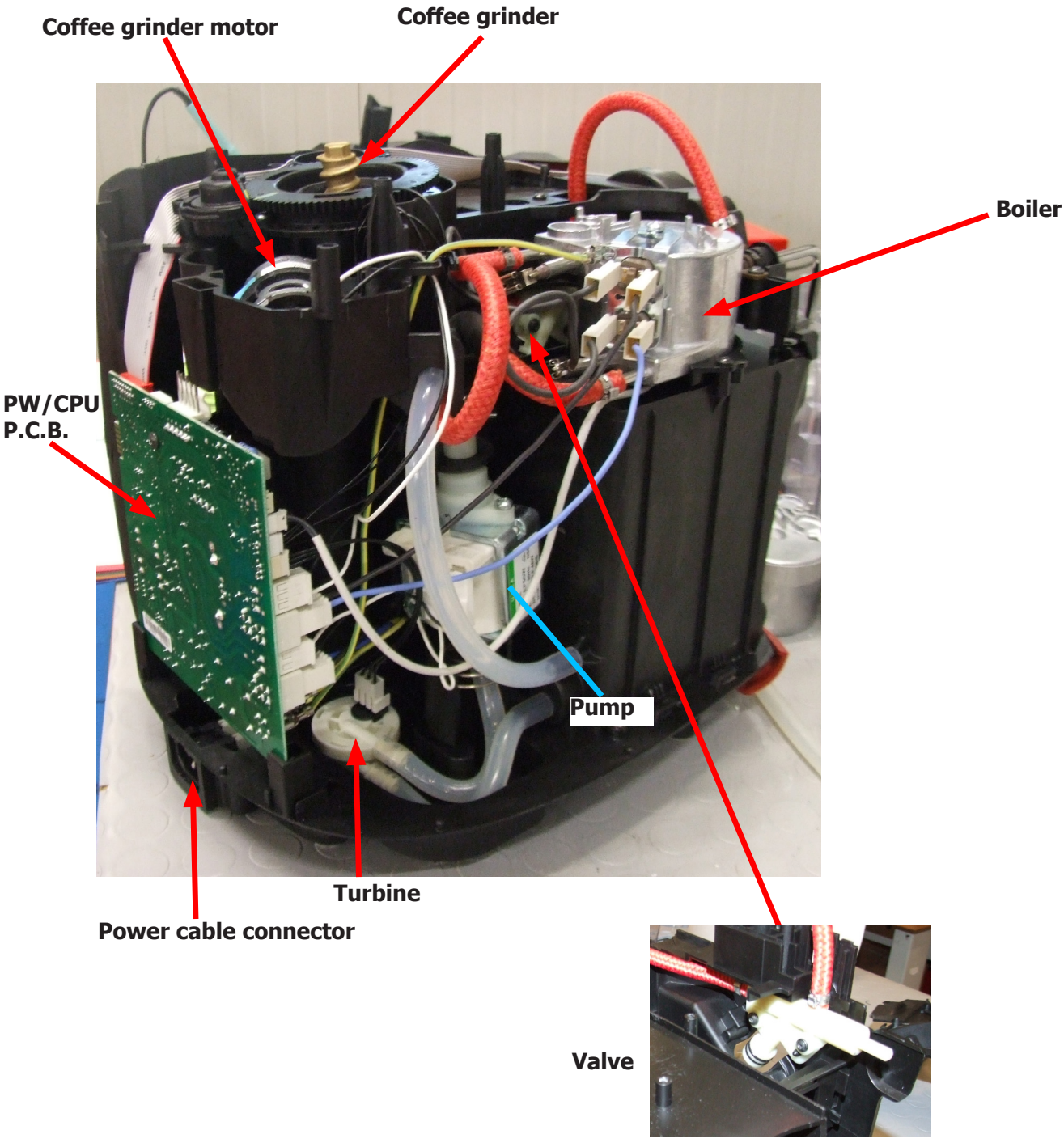
EVO



PURO

VAPORE

1.6.2 Internal machine parts



CHAPTER 2

TECHNICAL SPECIFICATIONS

2.1. Technical specifications

Power supply and output:	230 V~ 50/60 Hz 1500 W - 120 V~ 60 Hz 1500 W - 100 V~ 50/60 Hz 1300 W
Temperature monitoring:	Variable resistor sensor (NTC) - transmits the value to the electronic P.C.B.
Safety system:	2 manual reset or one-shot thermostats (175°C)
Coffee heat exchanger output: Stainless steel	(230/120 V~) 1300 W - (100 V~) 1100 W for coffee, hot water and steam dispensing
Gear motor:	33VC with 2 rotation directions; power supply 24VC
Pump:	Ulka with reciprocating piston and 100°C cutout 48 W, 230 V, 50 Hz, Type EP5 approx. 13-15 bar 120 V, 60 Hz 100 V, 50/60 Hz
Overpressure valve:	Opens at approx. 16-18 bar
Water filter:	In tank
Coffee grinder:	Direct current motor with flat ceramic grinders
Hot water/steam valve	Presblock
Automatic dosage	Dose adjustment controlled by the electronic system
Power consumption:	During the heating phase - approx. 5.6 A
Dimensions: W x H x D in mm:	295x325x420 (data may vary depending on the model)
Weight:	6.9 kg
Water tank capacity:	1.0 litres
Coffee container capacity	185 g coffee beans
Coffee dreg drawer capacity	08
Heat exchanger capacity:	Approx. 10 cc
Water circuit filling time:	Approx. 15 seconds for first filling cycle
Heating time:	Approx. 45 seconds
Dispensing temperature:	Approx. 84 ± 4°C
Grinding time:	Approx. 8-10 seconds

2.2. Machine parameters and performance

AMOUNT OF PRODUCT	Mini-mum amount (Puls.)	Default amount (Puls.)	Maximum amount (Puls.)	Programm. by the user	Programm. by Produc-tion/Service department
Espresso *	70	165	600	Yes	No
Medium coffee	No	No	No	No	No
Large coffee	70	440	600	Yes	No
Pre-ground	No				
Hot water	Continues until the water supply has been exhausted (fill circuit status)				
Steam for frother	Continues until the water supply has been exhausted (fill circuit status)				

* No XSmall Puro

2.3. Specification for the measurement of the coffee products temperature.

The temperature is influenced by the flow from the dispenser and stratification of temperatures in the glass. In order to consider these phenomena and to introduce measures that allow comparisons in controlled conditions, below guidelines must be followed:

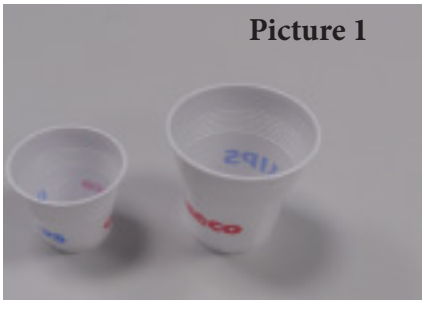
Conditions:
a) Water temperature in tank: 23°C (+/-2°C).
b) It must be used a plastic cup (see picture N°1).
c) It must be used a thermocouple thermometer (e.g. type K - see picture N°2).
d) The coffee machine is tested without any change of parameters or calibrations, which may affect the temperature of products, so the measurement of temperature must be done with machine in default factory setting.

Procedure:
1. The temperature must be measured in the cup, immediately after dispensing. Cup has to be placed on a non-metal surface using a thermocouple thermometer (Picture 1).
2. The temperature in the cup is measured by immersing the probe of the thermometer up to touch the bottom. The probe then must be moved in a circular motion for 5/6 rotations. At the of the rotations, stop in the center of the cup (Picture 2).
3. The highest temperature measured during the rotations is the value we are searching for, and that must be reported;
4. Test measurement: from end of dispensing to the end of rotations must be completed within 12 seconds.
5. the distance of the probe from the bottom of the glass is a function of the quantity of coffee dispensed: 10mm for 35gr - 17mm for 60gr - 35mm for 120gr and superior (Picture 3).

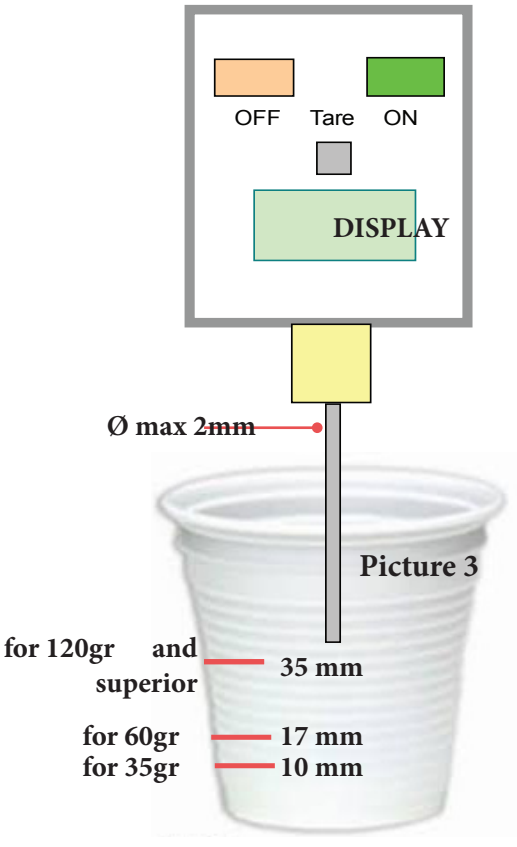
Limits of acceptability
The acceptance limits are divided by features and products and are the following:

Espresso Coffee Italy Q.ty 25/40 gr.
Temperature of 1st product 69°C ≤ 85°C
Temperature of 2nd product 72°C ≤ 85°C

Coffee Q.ty 70/120 gr.
Temperature of 1st product 69°C ≤ 85°C
Temperature of 2nd product 72°C ≤ 85°C


Picture 1


Picture 2



Picture 3

2.3.1. Specification for the measurement of the Milk products temperature.

Milk evaluation

To carry out the test, a partially skimmed UHT milk with a percentage of grease between 1.5-1.8% at a refrigerator temperature **T**refr. (between 4 to 10°C) must be used.
The milk product must be checked on a beaker of 250 ml of capability and with an inner diameter of 70mm, brewing 100gr of product.

Parameters to be respected:
The parameters to be respected are: milk temperature and height of the cream. Each of these parameters, however, must be evaluated depending on the type of system used for the production of hot milk.
Actually three types of devices are present on the appliances:

- Manual system (pannarello)
- Semi-Automatic system (cappuccinatore)
- Automatic system (carafe, Pinless wonder system, etc.)

Height of the milk cream in the beaker:
Manual system (pannarello) ≥ 15mm on 100gr. of brewed product

Semi-automatic system (cappuccinatore) ≥ 20mm on 100gr. of brewed product

Automatic system: carafe, cappuccinatore, Pinless wonder (New Royal, Energica Pure, Intelia EVO latte) ≥ 20mm on 100gr. of brewed product

How to measure the temperature of the milk.

1. The measurement is carried out in the beaker, immediately after the end of milk brew, positioned on a non-metallic surface, using a thermocouple thermometer (eg. Type K). Stop the preparation of mixed product: at the end of milk brewing, where “One Touch product” function is present.

2. The temperature is measured by immersing the probe of the thermometer, positioning the probe inside the beaker at about 10mm from the bottom of the container, then the probe moves in a circular motion for 3-5 turns, stopping at the end, at the center of the beaker. It detects the maximum temperature reached in a time of relief between 3 to 5 seconds. It is important the mixing of milk before the measurement at 10mm from the bottom of the beaker. If the mixing is correct, temperature, for a few fractions of a second, during the measurement should not oscillate.

How to measure the milk cream.
The temperature (Trefr or Tamb) of the milk doesn't affect as much the test result on measuring the milk cream; by convection is assumed to always use milk at refrigerator temperature **T**refr..

Manual systems (Pannarello)
Pour 100cc. of milk at Trefr. in a beaker of 250 ml of capacity and with a inner diameter of 70 mm; with machine in steam mode:

1. Open the steam knob to discharger water circuit for 4 sec, then close the knob.
2. Place the beaker with the frother dipped in milk, open the steam knob to maximum and start the chronometer.
3. After about 30 to 60 seconds, close the knob and check the result on milk.

Semi-automatic systems (cappuccino)
Pours milk at Trefr. in a container ; with the machine in steam mode:

1. Open the steam knob to discharge water circuit for 4 sec. then close the knob.
2. Insert the silicone tube in the milk container, placing a beaker of 250 ml capacity and with an inner diameter of 70 mm under the cappuccino maker and open the steam knob.
3. After having provided 100gr. of product, close the knob and check the result obtained on milk. Note: The same applies to machines which have a steam key on the user interface and a solenoid valve in place of the steam tap.

Automatic: Carafe, Cappuccino Pinless wonder (New Royal, Energica Pure, Intelia EVO Latte), etc..
After setting the machine to delivery of 100gr. of product:

1. Launch the "hot milk" function.
2. Collect the product in a beaker with a 250ml of capacity and with an inner diameter of 70 mm, and verify the result obtained on milk. Carry out the test using milk at a **T**refr..

In case the machine allows modify of the emulsion through the menu, use the machine with the emulsion set to the default value.

Related to the above testing procedure derives the following table of acceptability:

Manual, Semi-Automatic and Automatic's Milk System	
Grams of Product	Minimun Height of the milk cream
≥ 130	≥ 30mm
120	≥ 25mm
110	≥ 22mm
100	≥ 20mm
90	≥ 16mm
80	≥ 13mm
70	≥ 11mm

NB: To verify more accurately the height of the cream, a practical expedient dictated by experience is to add to the product just delivered a small amount of coffee. The addition of coffee immediately put in evidence the surface of separation between liquid and cream.

2.4. Machine parameters and performance

PRODUCT QUANTITY	Minimum amount (Puls.)	Default amount (Puls.)	Maximum amount (Puls.)	Programm. by the user	Programm. by Production / Service
Espresso*	70	165	600	Yes	No
Medium coffee	No	No	No	No	No
Long coffee	70	440	600	Yes	No
Hot water	Continues until the water supply has been exhausted (capacitive sensor)				
Steam for frother	Continues until the water supply has been exhausted (capacitive sensor)				
*	No XSmall Puro				

RINSE	Initial rinse	Final rinse
When performed	It is activated when the machine is in Power-Off for more than 15 minutes	When the machine is switched off electronically, manually or automatically after 30minutes, if at least one coffee has been dispensed, before switching off
No. of pulses	150	80
Stopping option	Yes, by pressing any key	Yes, by pressing any key
User disable option	No	No
Production/Service department disable option	No	No
No. of pulses user adjustment option	No	No
No. of pulses Production/ Service department adjustment option	No	No
Pulse range (Min. - Max.)	No	No

Descaling cycle frequency			
Hardness	**Water hardness**	**Without water filter**	**With water filter**
1	Soft (up to 7°dH)	240 litres (480,000 pulses)	480 litres (960,000 pulses)
2	Medium (7° - 14°dH)	120 litres (240,000 pulses)	240 litres (480,000 pulses)
3	Hard (15° - 21°dH)	60 litres (120,000 pulses)	120 litres (240,000 pulses)
4	Very hard (over 21°dH)	30 litres (60,000 pulses)	60 litres (120,000 pulses)

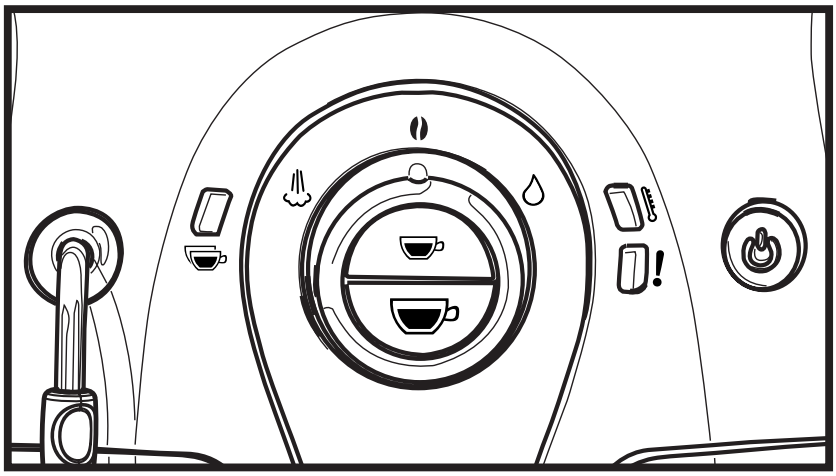
The default water hardness level is 4. Each litre of water corresponds to approximately 2,000 pulses.
In the machines where is not possible change the water hardness the default hardness level is 3.

CHAPTER 3

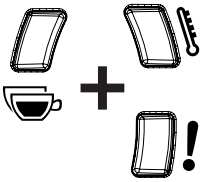
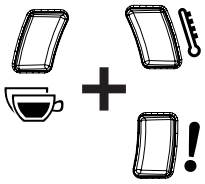
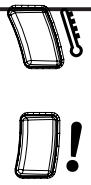
BRIEF INSTRUCTIONS

3.1. Customer menu XSmall 3 led

Control Panel



Indications	Causes	Solutions
Fixed	Machine at correct temperature - for coffee dispensing - for hot water dispensing - for steam dispensing	
Blinks slowly	Machine in pre-heating phase for coffee, hot water and steam dispensing.	
Blinks quickly	Machine overheated; the machine cannot dispense coffee in this mode.	The water must be drained out into a recipient by turning the selector clockwise to the "💧" point, until the green correct temperature LED remains lit in a fixed manner. The flow of water dispensed should then be stopped.
Blinks slowly	The machine is being programmed with the coffee cup fill level	
Fixed	Machine dispensing coffee	

Indications	Causes	Solutions
Fixed 	Coffee bean container empty Dreg drawer full	Fill the coffee bean tank. Empty the dreg drawer while the machine is switched on. If the drawer is emptied before the indication appears and the drawer remains out of position for at least 5 seconds, the dregs counter will still be reset.
Blinks quickly 	Water circuit drain	Fill the tank with fresh drinking water and fill the water circuit of the machine by turning the selector to the "  " point; wait for a continuous jet of water to come out of the steam hose.
Blinks slowly 	Brewing unit not present Dreg drawer not present Service hatch open Valve position NOT suitable for machine operation	To stop the red blinking light, make sure that all components are inserted or closed correctly.
Blinking in an anti-clockwise sequence (cyclically) 	The machine is performing its rinse / automatic cleaning cycle - When the machine is switched on (the boiler is cold) - After filling the circuit (the boiler is cold) - Before the machine enters Standby mode (if it has dispensed a coffee) - During the shutdown phase, after the ON/OFF key has been pressed (if the machine has dispensed a coffee)	The machine ends the cycle automatically. The cycle may be stopped by pressing one of the two coffee keys.
Blinking simultaneously 	The machine is experiencing a fault and will not dispense coffee, water or steam	Switch the machine off, wait for 30 seconds and switch it back on again. Repeat 2 or 3 times. If the machine does not start, enter test mode.
Blinking in alternating fashion 	The brewing unit has experienced a fault	Try to carry out a coffee dispensing cycle again.

3.2. Customer menu XSmall 4 led

Indications	Causes	Solutions
 **Steady on**	The machine has warmed up and is now ready: - For coffee brewing; - For hot water dispensing; - For steam dispensing	
 **Slowly flashing**	The machine is warming up to brew espresso or dispense hot water or steam.	
 **Quickly flashing**	Overheating protection active. You cannot brew coffee yet.	You need to dispense some hot water first to cool down the machine.
 **! Flashing quickly and light steady on**	You need to descale the machine!	**Not descaling will ultimately make your machine stop working properly. This is NOT covered by your warranty!**
 **! Flashing quickly and light steady on**	The machine is in descaling mode. Complete the descaling procedure till the very end.	Turn the control dial to the "☕" position.
 **! Flashing quickly and slowly flashing.**	The machine is in descaling mode.Complete the descaling procedure till the very end.	Turn the control dial to the "⧄" position.
 **! Flashing quickly and light steady on**	The machine is in descaling mode.Complete the descaling procedure till the very end.	Rinse the water tank and fill it up to the MAX level.

Indications	Causes	Solutions
 **Slowly flashing**	The machine is programming the amount of coffee to brew .	Release the button as soon as the desired amount of coffee is reached.
 **Steady on**	The machine is brewing a double coffee.	
 **Steady on**	Low water level.	Fill the water tank with fresh water. After reinserting the filled water tank, the indicator light turns off .
	The coffee bean hopper is empty.	Fill the coffee bean hopper with coffee beans and start the procedure again.
 **Steady on**	The coffee grounds drawer is full.	With the machine turned on, empty the coffee grounds drawer. If the coffee grounds drawer is emptied with the machine turned off the coffee cycle counter is not reset. Wait until the " ! " light starts to & ash before pla-cing back the coffee grounds drawer.
 **Quickly flashing**	The water circuit is empty.	Fill the water tank with fresh water and dispense hot water as described in Section "Using the Machine for the First Time".
 **Slowly flashing**	Brew group is not inserted. Coffee ground drawer is not inserted. Service door is open. Control dial is not in correct position.	Make sure that all components have been correctly inserted and closed. The & ashing " ! " light will now turn off.
 **Flashing in counter-clockwise direction**	The machine is performing the rinse/selfcleaning cycle.	The machine ends the rinse/self-cleaning cycle automatically. You can interrupt the rinse/self-cleaning cycle by pressing "☕" either "☕" buttons

Indications	Causes	Solutions
 **Flashing alternately**	A fault has occurred in the brew group.	Try again to brew another espresso or a coffee.
 **Flashing simultaneously**	The machine is out of order.	Turn the machine off. After 30-seconds, turn it back on. Try this 2 or 3 times. If the machine does NOT start, contact the Philips Saeco hotline.

3.3. Customer menu XSmall Vapore and Puro

 **Steady on**	The machine has reached the right temperature and is ready.
 **Flashing slowly**	The machine is warming up. It will perform a rinse/selfcleaning cycle. It is dispensing a product.
 **and steady on**	You need to descale your machine! **Not descaling your machine will ultimately make it stop working properly.** **I this case repair is not covered by your warranty!**

The XSmall Vapore machine is in the descaling mode.
Complete the descaling procedure till the very end.

Turn the control dial to the position.

Flashing slowly and light steady on.

Turn the control dial to the position.

and flashing slowly.

Rinse the water tank and ll it with fresh water up to the MAX level.

Flashing slowly and light steady on.

The XSmall Puro machine is in the descaling mode.
Complete the descaling procedure till the very end.

Machine is dispensing descaling solution
(descaling cycle)

Flashing slowly

Machine is dispensing water (rinse cycle)

Double flashing

Rinse the water tank and fill it with fresh water up to the MAX level.

Flashing slowly and light steady on.

The machine is brewing a double coffee.

Steady on and light ashing slowly

Empty the coffee ground drawer with the machine turned on.

and light fashing slowly

Fill the water tank with fresh water.

Steady on

Empty the coffee ground drawer with the machine turned on.

steady on

Fill the tank and prime the circuit.

Flashing quickly

Check that all parts (brew group, coffee grounds drawer, water tank, control dial) have been correctly placed and that the door is closed.

Flashing slowly

Fill the coffee bean hopper.

⚠ and ⏻ steady on

Brew group malfunction: try to brew another espresso.

⚠ and ⏻ flashing slowly

The machine is out of order. Turn o the machine. Turn it back on after 30 seconds. Try this 2 or 3 times.
If the machine does NOT start, contact the Philips Saeco hotline.

All lights are flashing at the same time

3.4. Operation, cleaning and maintenance

Operating the machine		
1	Fill the water tank	
2	Fill the coffee bean container	
3	Switch on the appliance	
4	Fill the circuit	Place a recipient underneath the steam hose and turn the selector towards the "  " symbol; wait until the LED  stops blinking.
5	Press the coffee key	Press once for one coffee; twice for two coffees.

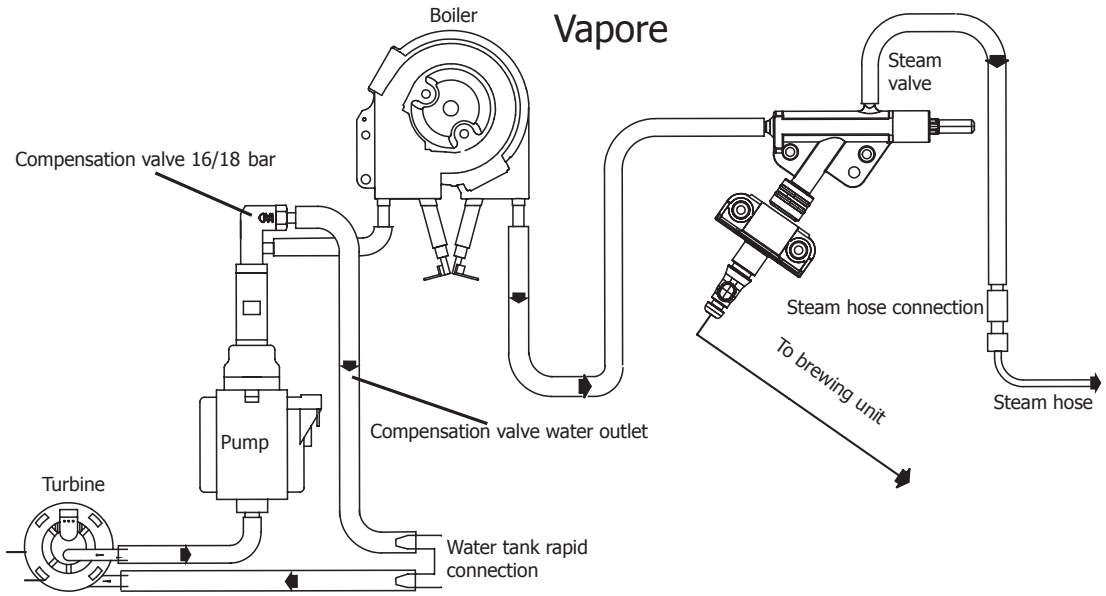
CLEANING AND TECHNICAL SERVICING		
A	Empty the coffee dreg drawer	When indicated
B	Empty the drip tray	As necessary or when indicated
C	Clean the water tank	Weekly
D	Clean the coffee bean container	As necessary
E	Clean the casing	As necessary
F	Clean the brewing unit	Every time the coffee bean container is filled, or weekly, or
	Lubricate the brewing unit	Once a month or every 500 dispensing procedures
	Clean the unit housing	Weekly
H	Perform descaling	Every 1 or 2 months, or when you notice a reduction in the water flow rate

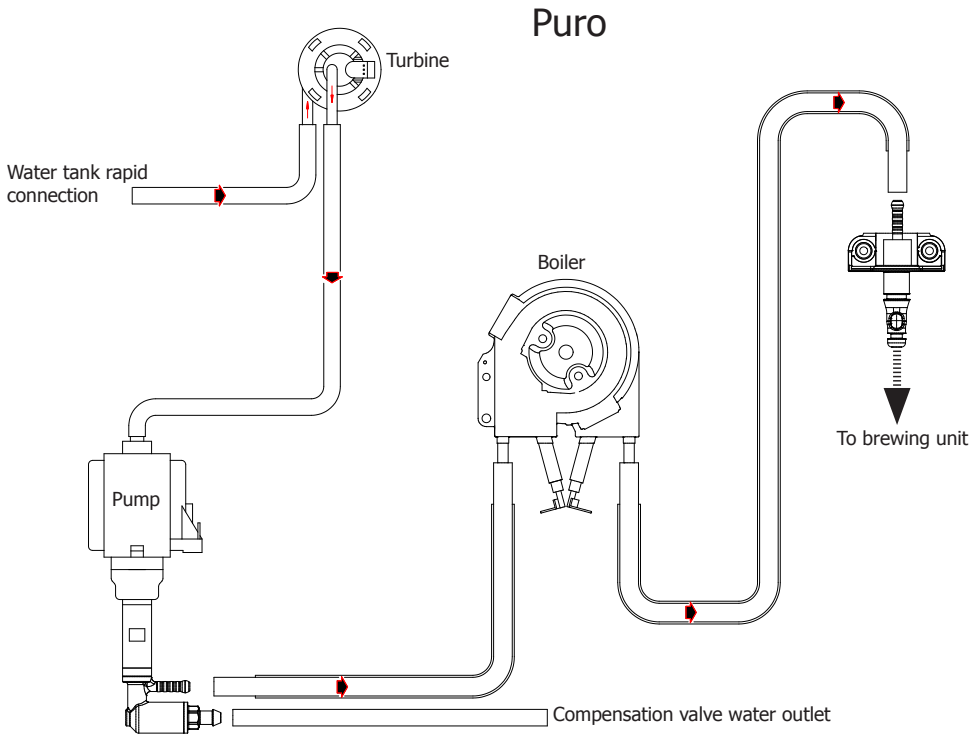
Descaling cycle frequency			
Hard-ness	**Water hardness**	**Without limescale filter**	**With limescale filter**
1	Soft water (up to 7°dH)	Approx. every 3 months / 120 litres	Approx. every 6 months / 240 litres
2	Medium water (7° - 14°dH)	Approx. every 2 months / 90 litres	Approx. every 4 months / 180 litres
3	Hard water (15° - 21°dH)	Approx. every 6 weeks or 60 litres	Approx. every 3 months / 120 litres
4	Very hard water (over 21°dH)	Approx. every 4 weeks or 30 litres	Approx. every 6 weeks or 60 litres

CHAPTER 4

OPERATING LOGIC

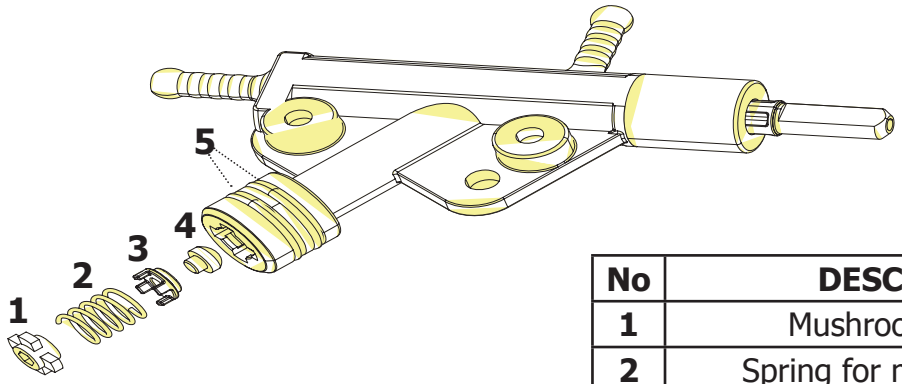
4.1. Water circuit





- Traditional water system
- Turbine – Amount of coffee dispensed into the cup
- Reciprocating piston type pump (13 - 15 bar)
- Compensation valve (opening pressure 16 - 18 bar)
- Presblok valve – select coffee – hot water - steam

4.2. Control ringnut and valve

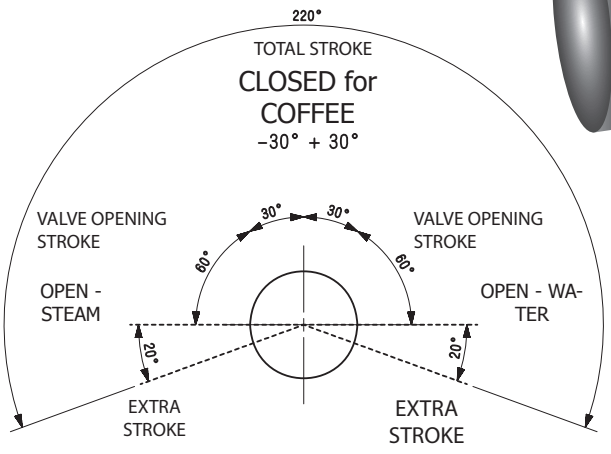


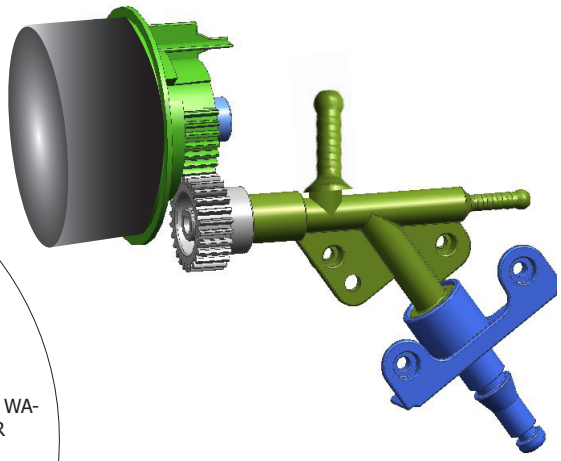
No	DESCRIPTION
1	Mushroom valve cap
2	Spring for mushroom valve
3	Mushroom valve support
4	Mushroom valve
5	Sealing OR

When dispensing coffee the mushroom valve opens at 4 bar +/- 0.5

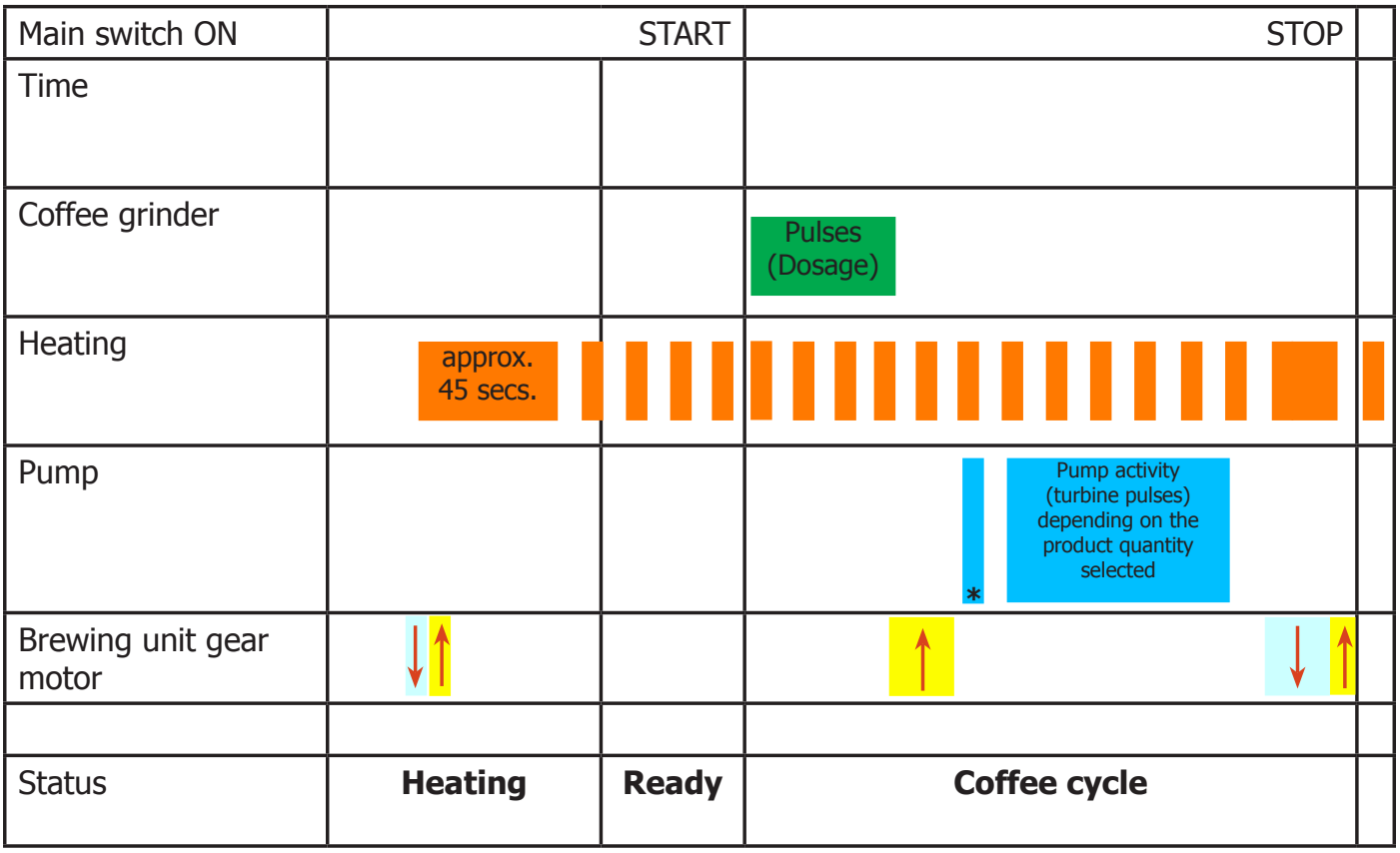
Manual opening when dispensing water

Manual opening when dispensing steam





4.3. Coffee cycle operating diagram



Notes: * Only with Pre-brewing

Single microswitch gear motor

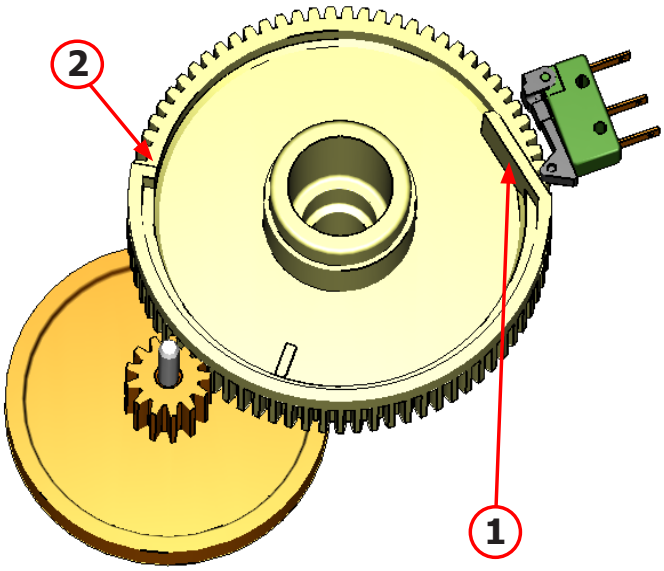
Switching on

When the machine is switched on, the gear motor repositions itself as follows:
- It acts on microswitch 1 (see following. section)
- The gear motor changes its rotation direction and moves upwards again by approx. 1-2 mm
- The boiler begins to heat water for approx. 45 seconds. It absorbs all the available heating power in order to reach the optimal temperature. The temperature will then remain at a constant level.

Coffee cycle

1. The coffee grinder starts the grinding process (controlled by pulses generated by a sensor)
2. The gear motor (brewing unit) moves to the dispensing position
3. Preliminary dispensing phase (short pump activity, short pause)
4. Product dispensing (the pump operation period is defined by the amount of product dispensed)
5. The gear motor moves to its home position (the dregs are expelled automatically)

4.4. Single microswitch



The gear motor is powered by a direct current motor that engages with the smaller double toothed wheel using a worm screw. The unit is mounted on the axle of the large gear wheel and when a coffee is requested, it moves from the home position to the dispensing position, and then back to the home position again.

- Home position: **1**

- Dispensing position: **2**

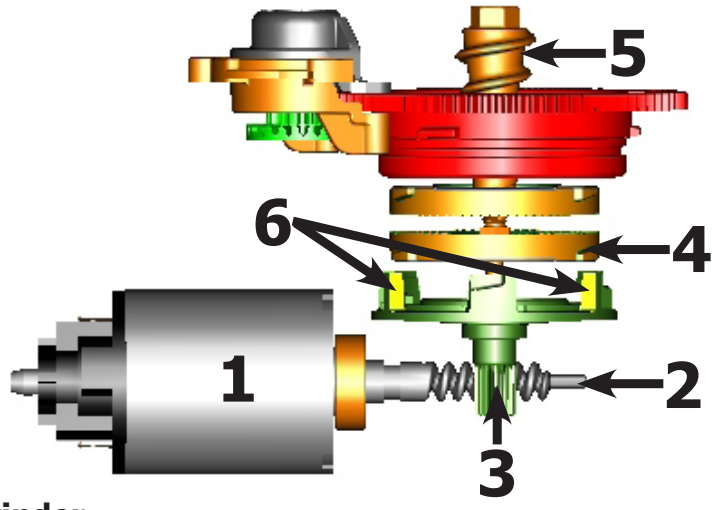
4.5. Temperature sensor (adjustment)

Temperature sensor

An NTC is used as a temperature sensor; in the event of overheating this reduces boiler element power consumption.
The electronic system detects the current boiler temperature from the drop in voltage and adjusts it accordingly.
Resistor values: see table

Temp. (°C)	R nom (kΩ)	ΔR (+/- %)
20	61,465	8,6
50	17,599	5,9
75	7,214	4,1
80	6,121	3,7
85	5,213	3,4
90	4,459	3,1
100	3,3	2,5
125	1,653	3,9
150	0,893	5,1

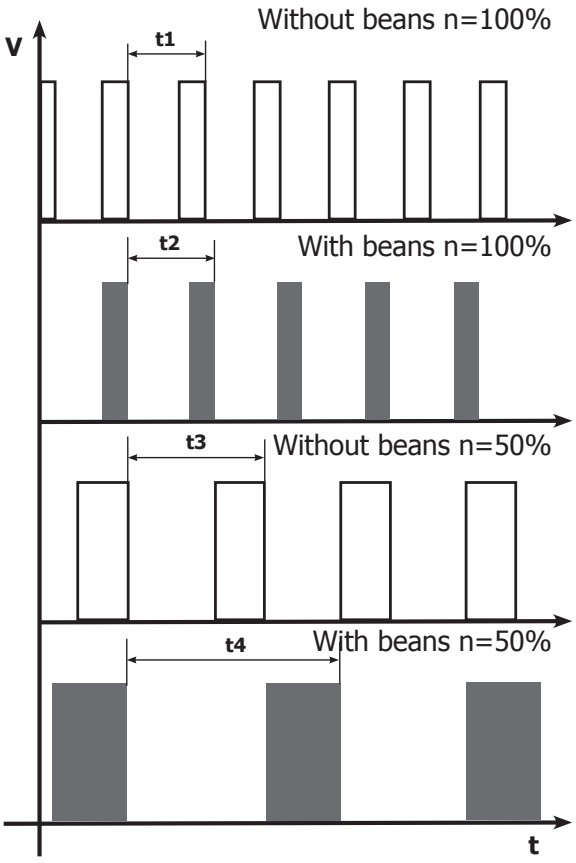
4.6. Coffee grinder function



Ceramic coffee grinder

The coffee grinder is driven by a direct current motor (1) using a worm screw helicoidal wheel transmission (2).
The worm screw (2) drives a plastic gear wheel (3), which turns the lower grinder (4) and the increment pin (5)
There are two magnets (6) in the gear wheel; at every rotation these transmit two pulses to a Hall sensor, which in turn transmits them to the electronic system.

4.7. Low bean level detection, dose quantity adjustment, coffee grinder blocked



No coffee
A low coffee bean level is detected by the Hall sensor, after variations in the pulse frequency (with or without coffee). If there are no coffee beans (operation while empty), the number of rotations – and therefore the number of pulses – will be greater
t1 = No coffee indication

If, however, there are coffee beans, the number of rotations will be lower due to the force created by the grinding
t2 = no indication

t3 and t4 = this measurement is performed at the end of each grinding process

Dose quantity adjustment
The dose quantity is adjusted in accordance with the pulses detected (number of rotations proportional to the selected flavour – mild, medium or strong)

Coffee grinder blockage
If the coffee grinder becomes blocked for any reason, pulses will no longer be transmitted to the electronic system and the grinder will come to a stop

4.8 Dose self-learning (SAS)

The aim of this function is to automatically regulate the average dose of ground coffee (SELF-LEARNING); this takes place with an algorithm based on the following values and setting by the user:

1. Number of coffee grinder pulses during the grinding cycle.
2. Max. average value of the power consumed by the gear motor during the coffee brewing cycle.
3. Aroma selected by the user.

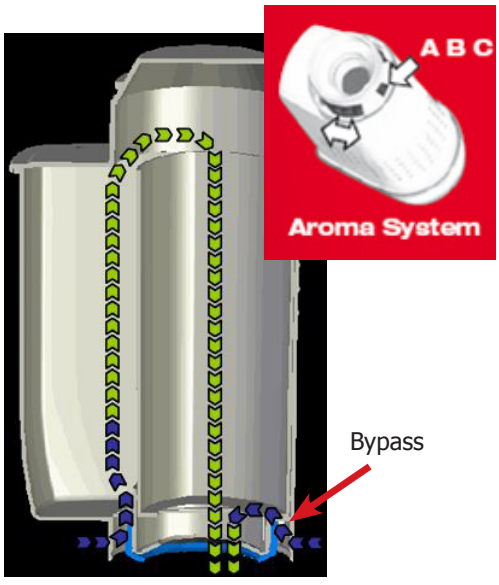
The algorithm compares the maximum average value of the power consumed by the gear motor with the value listed in the table for the selected aroma, in order to calculate the new grinding pulse value for the next coffee produced.
If the power consumption value is less than the minimum current value, the grinding pulses will be increased by 2.
If the power consumption value is greater than the maximum current value, the grinding pulses will be decreased by 4.
If the power consumption value falls within the "over-torque" interval, the product will be dispensed and the grinding pulses will be decreased by 10.
If the power consumption value falls within the "abort cycle" interval, the dreg will be expelled and the grinding pulses will be decreased by 10.
If the "pre-ground" flavour is selected by the user, no modification will be made.

This guarantees that, regardless of the coffee type used, the grinding level setting and the wear on the grinders, the ground coffee dose always remains constant.

SETTING	DOSE ADJUSTMENT (NUMBER OF GRINDER IMPULSES) TO APPLY TO MED AROMA				
	+2	**0**	**-4**	**-10**	**-10 and CYCLE ABORTED**
Strong	MAX_CURRENT_mA <350mA	<=350mA MAX_CURRENT_mA <=500mA	MAX_CURRENT_mA >500mA	MAX_CURRENT_mA >800mA	MAX_CURRENT_mA >1000mA

Caution: In the case of excessive dosage, powder may be expelled into the dreg drawer. This is not a fault, but can occur during preliminary operation or after a service.

4.9. Water filter



Function:
- Reduced limescale deposits which take longer to form.
- Improved water quality.
- Improved taste due to the ideal water hardness.

Life span / descaling performance:
- - 10 ° dH
- 60 litres
- 2 months

To achieve the best possible operating mode consistency over the total life span, the water is channelled using a 3-stage bypass (A, B, C) depending on the degree of hardness. See small image.

CHAPTER 5

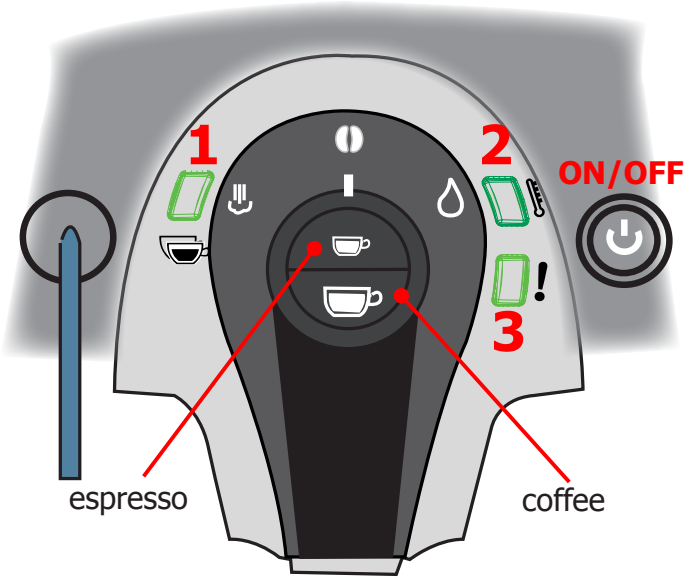
SERVICE MODE

5.1. Test mode XSmall 3 led

To enter TEST MODE, proceed as follows:
MAKE SURE THE MACHINE IS UNPLUGGED.

- Turn the selector to the water position and press and hold the espresso coffee key while you plug the machine in.

Confirmation that the machine is in TEST MODE is signalled by LEDs 1, 2 and 3 lighting up in a cyclical manner.
Release the espresso key; LEDs 1 and 2 will remain lit.



There are four **LEVELS** of checking (to move to a higher level, press the **(on/off)** key

L0 MICROSWITCHES OPERATIONAL CHECK (unit, dreg drawer, hatch)

L1 BREWING UNIT OPERATIONAL CHECK (power consumption and stroke limit microswitch)

L2 PUMP AND TURBINE OPERATIONAL CHECK

L3 BOILER AND COFFEE GRINDER OPERATIONAL CHECK

lev.	pos. selector	LED	key	function	notes
L0 Operational check - microswitches		ON			
		ON			
		OFF		Microswitch: dreg drawer unit hatch	
	OR	blinks once		insert unit	When the unit is removed and replaced, wait for at least 5 sec.
		blinks once		insert dreg drawer	Always insert the compo-nents in this sequence
		blinks once		close hatch	
		ON		check keys	By pressing espresso or coffee
PRESS THE ON/OFF KEY TO ACCESS THE NEXT LEVEL UP					

lev.	pos. selector	LED	key	function	notes
L1 Operational check - brewing unit		ON		brewing unit microswitch	Gear motor rises (brewing unit in work position)
		ON		brewing unit microswitch	Gear motor falls (brewing unit in home position)
		OFF		power consumption of the unit in mA	OK
		Blinks			Between 200 and 300 mA OK with unit inserted
		ON			KO over 300 mA
PRESS THE ON/OFF KEY TO ACCESS THE NEXT LEVEL UP					
L2 Operational check - pump and turbine		Blinks		pump operation	Make water come out of the steam hose
				turbine operation	Each blink corresponds to one turbine rotation
				coffee pipe operation	Return to **L1** and switch the unit to Work, return to **L2** and make water come out of the dispenser
PRESS THE ON/OFF KEY TO ACCESS THE NEXT LEVEL UP					
L3 Operational check - boiler/coffee grinder				power consumption of the boiler	Use an ammeter to check the power consumption is between 5.3 and 6.1 mA
		Blinks		coffee grinder operation	
				coffee grinder sensor	Each blink corresponds to one coffee grinder rotation

5.1.1. Draining the boiler (Steam Out)

To drain the boiler, proceed as follows:

MACHINE UNPLUGGED

- Turn the selector to the water position , press and hold the large coffee key and plug the machine in.

- The three LEDs light up and remain lit.

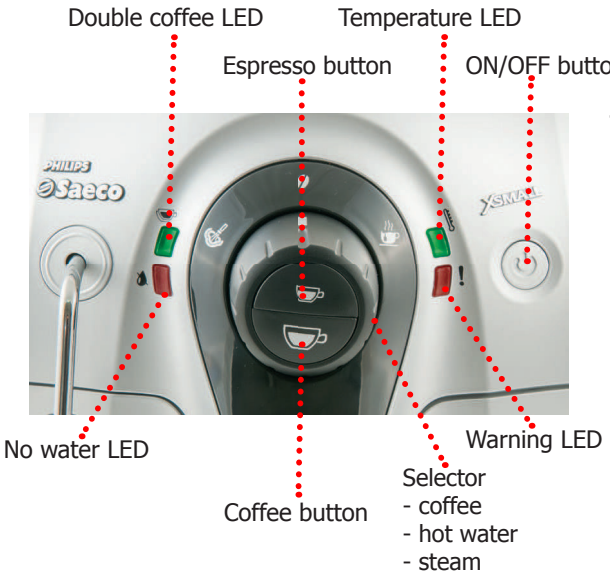
- Release the large coffee key; the LEDs will begin to blink in an anti-clockwise cycle and boiler draining will commence (remember to place a recipient underneath the steam hose).

- When the draining process is complete, the double coffee and temperature LEDs will remain lit.

- Unplug the machine to end this procedure.

- Press on/off; the coffee maker will begin filling the circuit (red LED 3 blinks quickly).

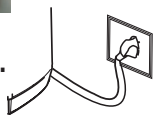
5.2. Test mode XSmall 4 led



This document describes the test mode of XSmall Evo Machine. This application is used in order to test the machine in its mechanics and electronic components.

The machine enters in test mode by moving the knob in the Water position 

then pushing the ESPRESSO button 

and then connecting the machine to the plug. 

As long as the COFFEE short button is pressing the machine shows the Led Temp, Led NoWater, Led DoubleCoffee, Led Alarm flashing with rotation.
When the COFFEE short button is release the machine pass to the first level of the test.
There are 4 different level, in each level the coffee-machine can execute different commands,

Level 0: The machine can test the input signal:

a) Microswitch present of the brewing unit
b) Microswitch present of the dregdrawer
c) Microswitch door closed/opened
d) Button Espresso
e) Button Coffee
f) Button ON-OFF
g) Photosensor Water
h) hotosensor Steam (only in Middle-TOP model)

Level 1: The machine can test the loads in low voltage:

a) Brewing unit (24V DC)

Level 2: The machine can test two load in high voltage (Pump):

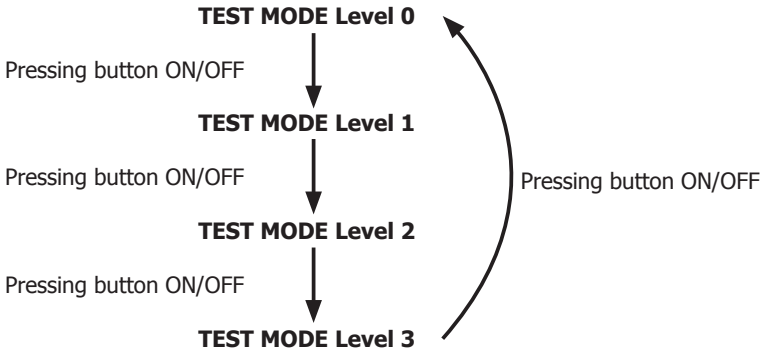
a)Pump (120-230V AC)

Level 3: The machine can test two load in high voltage (Grinder, Heater):

a)Heater (120-230V AC)
b)Grinder (320V DC)

The user can switch the level by pressing the Button ON/OFF.
As long as the button ON-OFF is pressing the machine show the level of the test:

a) Level 0: All OFF
b) Level 1: Led Temp ON, Led Alarm OFF, Led DoubleCoffee OFF
c) Level 2: Led Temp ON, Led Alarm ON, Led DoubleCoffee OFF
d) Level 3: Led Temp ON, Led Alarm ON, Led DoubleCoffee ON



At the start up all loads are turned off. The software allow to have only one load active at the same time.

Level 0 (Input, Led)

Start condition: NO BU, NO drag drawer, No tank, door open and Knob taken again in the coffee position.	LED INDICATION			
	Led Temp	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	**ON**	OFF

Action by user	LED INDICATION			
	Led Temp	Led Alarm	Led NoWater	Led Double Coffee
Insert a full water tank				
Switch on the red led NoWater	OFF	OFF	OFF	OFF
ERROR: The led NoWater remain on , check the capacitive sensor and the wiring (JP23)	OFF	OFF	ON	OFF
Insert the BU				
The red led alarm blinks one time	OFF	One blink	N.A.	OFF
ERROR: The led alarm remains off , check the BU microswitch and the wiring (JP14)	OFF	OFF	N.A.	OFF

Action by user	LED INDICATION			
	Led Temp	Led Alarm	Led NoWater	Led Double Coffee
Insert the drag drawer				
The red led alarm blinks one time	OFF	One blink	N.A.	OFF
ERROR: The led alarm remains off , check the microswitch on the drag drower and the wiring (JP16)	OFF	OFF	N.A.	OFF
Close the door				
The red led alarm blinks one time. When all micro (3) are closed the green led double coffee remains on.	OFF	One blink	N.A.	OFF
ERROR: The led double coffee remains off, check the microswitch on the door and the wiring (JP16)	OFF	OFF	N.A.	OFF
Press the Espresso button				
Switch on the green led temp	ON	N.A.	N.A.	N.A.
ERROR: The led temp remain off , check the interface board and the flat cable (JP21)	OFF	N.A.	N.A.	N.A.
Press the coffee button				
Switch on the green led temp	ON	N.A.	N.A.	N.A.
ERROR: The led temp remain off , check the interface board and the flat cable (JP21)	OFF	N.A.	N.A.	N.A.
Move the knob in the water position				
Switch on the green led temp	ON	N.A.	N.A.	N.A.
ERROR: The led temp remain off , check the interface board and the flat cable (JP21)	OFF	N.A.	N.A.	N.A.
Move the knob in the steam position				
Switch on the green led temp	ON	N.A.	N.A.	N.A.
ERROR: The led temp remain off , check the interface board and the flat cable (JP21)	OFF	N.A.	N.A.	N.A.
Finish condition with tank, BU, drag drawer and door closed	LED INDICATION			
	Led Temp	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF

Level 1 (Brewing unit)

Start condition	LED INDICATION	
	Led Temp	Led Alarm
	OFF	OFF

Action by user	LED INDICATION	
	Led Temp	Led Alarm
Press the Espresso short button to move the BU to work		
When the BU reaches the work position and the current is OK ⇒ the green led temp is switched on.	ON	OFF
ERROR: led temp remains OFF; Check the work microswitch (is broken), the BU motor (is blocked) and the wiring (JP16).	OFF	OFF
ERROR without BU: led alarm blinking; the absorbed current is between 200mA and 300mA check the BU	N.A.	Blinking
ERROR with BU: led alarm Switch ON; the absorbed current is much more 300mA check the BU	N.A.	ON
Press the coffee button to move the BU to home		
When the BU reaches the home position and the current is OK the green led temp is switched on.	ON	OFF
ERROR: led temp remains OFF; Check the work microswitch (is broken), the BU motor (is blocked) and the wiring (JP16).	OFF	OFF
ERROR without BU: led alarm blinking; the absorbed current is between 200mA and 300mA check the BU	N.A.	Blinking
ERROR with BU: led alarm Switch ON; the absorbed current is much more 300mA check the BU	N.A.	ON

Finish condition	LED INDICATION	
	Led Temp	Led Alarm
	N.A.	OFF

Level 2 (Pump)

Start condition	LED INDICATION	
	Led Temp	Led Alarm
	OFF	OFF

Action by user	LED INDICATION	
	Led Temp	Led Alarm
Press the Espresso button to switch on the pump		
The led alarm flashing	OFF	Flashing
ERROR: the led alarm remains OFF; check the pump, the flowmeter, the wiring from the flowmeter to the CPU/POWER board (JP5) and the wiring from the pump to the CPU/POWER board (JP24)	OFF	OFF

Finish condition	LED INDICATION	
	Led Temp	Led Alarm
	OFF	OFF

Level 3 (Grinder-Heater)

Start condition	LED INDICATION	
	Led Temp	Led Alarm
	OFF	OFF
Action by user	LED INDICATION	
	Led Temp	Led Alarm
Press the coffee button to switch on the heater		
The user checkers that the absorbed current is OK	OFF	OFF
ERROR: the absorbed current is KO; check the wiring from the heater to the CPU/POWER board (JP17-3) and the other wiring	OFF	OFF
Press the coffee long button to switch on the grinder		
The led alarm flashing for 3 sec.	OFF	Flashing
ERROR: the led alarm remains OFF; check the hall sensor board in the Grinder, the Grinder, the wiring from the hall sensor board to the CPU/POWER board (JP2) and the wiring from the Grinder to the CPU/POWER board (JP8)	OFF	OFF
Finish condition	LED INDICATION	
	Led Temp	Led Alarm
	OFF	OFF

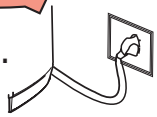
5.2.1. Steam Out

This document describes the procedure of SteamOut in XSmall Evo machine. This application is used in order to empty the boiler.

MACHINE UNPLUGGED

The machine enters in SteamOut mode by moving the knob in the water position 

then pushing the COFFEE button, 

and then connecting the machine to the plug. 

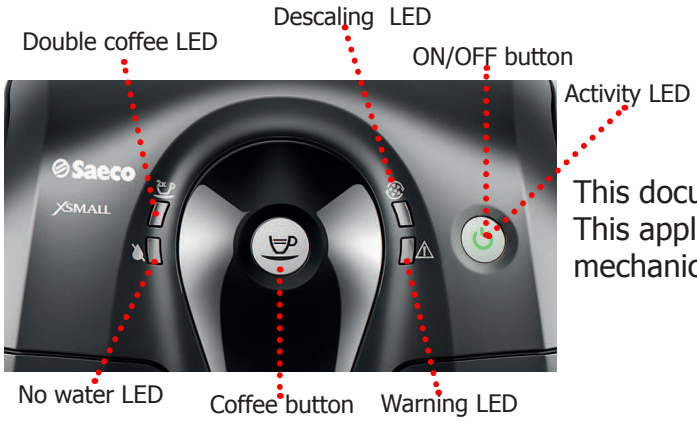
As long as the COFFEE button is pressing the machine shows all LEDS ON: Led Temp, Led Double Coffee, Led Alarm. Led NO_Water.

When the COFFEE button is release the machine starts the Steam Out: Led Temp, Led Double Coffee, Led Alarm, Led No_Water flashing with anticlockwise rotation.

When the steam out procedure is completed the Led Temp, Led No_Water and Led Double Coffee switch on.

The user must close the tap and the Led Double Coffee switch off.
Now is possible to switch off the machine or repeat the procedure pressing and releasing the COFFEE button.

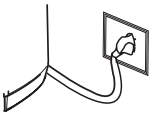
5.3. Test mode XSmall Puro



This document describes the test mode of XSmall Puro.
This application is used in order to test the machine in its mechanics and electronic components.

The machine enters in test mode by pushing the COFFEE button

and then connecting the machine to the plug



As long as the COFFEE button is pressing the machine shows the Led Calc-Clean, Led Activity, Led Alarm, Led NoWater, Led DoubleCoffee flashing with rotation.
When the COFFEE button is release the machine pass to the first level of the test.
There are 5 different levels, in each level the coffee-machine can execute different commands,

Level 0: The machine can test the input signal:

a) Microswitch present of the brewing unit
b) Microswitch present of the dregdrawer
c) Microswitch door closed/opened
d) Button Coffee
e) Button ON-OFF
f) Capacitive sensor water

Level 1: The machine can test the loads in low voltage:

a) Brewing unit (24V DC)

Level 2: The machine can test two load in high voltage (Pump):

a)Pump (120-230V AC)

Level 3: The machine can test two load in high voltage (Heater):

a)Heater (120-230V AC)

Level 4: The machine can test two load in high voltage (Grinder):

b)Grinder (320V DC)

The user can switch the level by pressing the Button ON/OFF.

As long as the button ON-OFF is pressing the machine show the level of the test:

a) Level 0: Led DoubleCoffee ON (G), Led Calc-Clean OFF (O), Led Activity OFF (G), Led Alarm OFF (R), Led Water OFF (R)

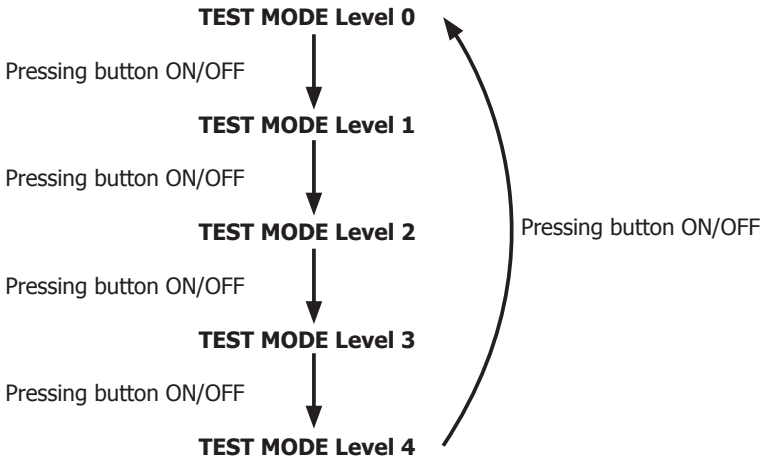
b) Level 1: Led DoubleCoffee ON (G), Led Calc-Clean ON (O), Led Activity OFF (G), Led Alarm OFF (R), Led Water OFF (R)

c) Level 2: Led DoubleCoffee ON (G), Led Calc-Clean ON (O), Led Activity ON (G), Led Alarm OFF (R), Led Water OFF (R)

d) Level 3: Led DoubleCoffee ON (G), Led Calc-Clean ON (O), Led Activity ON (G), Led Alarm ON (R), Led Water OFF (R)

e) Level 4: Led DoubleCoffee ON (G), Led Calc-Clean ON (O), Led Activity ON (G), Led Alarm ON (R), Led Water ON (R)

Legend:
(O) = Orange
(G) = Green
(R) = Red



At the start up all loads are turned off. The software allow to have only one load active at the same time.

Level 0 (Input, Led)

Start condition: NO BU, NO drag drawer, No tank, door open.	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	ON	OFF

Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Insert a full water tank					
Switch on the red led NoWater	OFF	OFF	OFF	OFF	OFF
ERROR: The led NoWater remain on , check the capacitive sensor and the wiring (JP23)	OFF	OFF	OFF	ON	OFF

Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Insert the BU					
The red led alarm blinks one time	OFF	OFF	One blink	N.A.	OFF
ERROR: The led alarm remains off , check the BU microswitch and the wiring (JP14)	OFF	OFF	OFF	N.A.	OFF
Insert the drag drawer					
The red led alarm blinks one time	OFF	OFF	One blink	N.A.	OFF
ERROR: The led alarm remains off , check the microswitch on the drag drower and the wiring (JP16)	OFF	OFF	OFF	N.A.	OFF
Close the door					
The red led alarm blinks one time. When all micro (3) are closed the green led double coffee remains on.	OFF	OFF	One blink	N.A.	ON
ERROR: The led double coffee remains off, check the microswitch on the door and the wiring (JP16)	OFF	OFF	OFF	N.A.	OFF
Press the coffee button					
Switch on the green led activity	ON	OFF	N.A.	N.A.	N.A.
ERROR: The led activity remain off , check the interface board and the flat cable (JP21)	OFF	OFF	N.A.	N.A.	N.A.

Finish condition with tank, BU, drag drawer and door closed	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF	ON

Level 1 (Brewing unit)

Start condition: BU, drag drawer and door closed.	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF	OFF
Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Press the coffee button to move the BU to work					
When the BU reaches the work position and the current is OK ⇒ the green activity temp is switched on.	ON	OFF	OFF	OFF	OFF
ERROR: the BU moves to Home; check the polarity of the motor	N.A.	OFF	OFF	OFF	OFF
ERROR: led activity remains OFF; Check the work microswitch (is broken), the BU motor (is blocked) and the wiring (JP16).	OFF	OFF	OFF	OFF	OFF
ERROR: led alarm Switch ON, check the BU; ERROR: led alarm Switch ON, check the BU; with BU the absorbed current is > 300mA without BU the absorbed current is > 200mA	N.A.	OFF	ON	OFF	OFF
Press the coffee button to move the BU to home					
When the BU reaches the home position and the current is OK⇒ the green led activity is switched on.	ON	OFF	OFF	OFF	OFF
ERROR: the BU moves to Work; check the polarity of the motor	N.A.	OFF	OFF	OFF	OFF
ERROR: led activity remains OFF; Check the work microswitch (is broken), the BU motor (is blocked) and the wiring (JP16).	OFF	OFF	OFF	OFF	OFF
ERROR: led alarm Switch ON, check the BU; with BU the absorbed current is >300mA without BU the absorbed current is > 200mA	N.A.	OFF	ON	OFF	OFF
Finish condition	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	N.A.	N.A.	OFF	N.A.	N.A.

Level 2 (Pump)

Start condition:	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF	OFF
Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Press the coffee button to switch on the Pump					
The led activity flashing	Flashing	OFF	OFF	OFF	OFF
ERROR: the led activity remains OFF and the led alarm switch ON; check the pump, the flowmeter, the wiring from the flowmeter to the CPU/POWER board (JP5) and the wiring from the pump to the CPU/POWER board (JP24)	OFF	OFF	OFF	OFF	OFF
Finish condition	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	N.A.	N.A.	OFF	N.A.	N.A.

Level 3 (Heater)

Start condition:	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF	OFF
Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Press the coffee button to switch on the Pump					
The red led General Alarm remains OFF	OFF	OFF	OFF	OFF	OFF
ERROR: The temperature sensor is shorted or opened, the led GenAlarm switch ON; check the wiring from the heater to the CPU/POWER board (JP17-3) and the other wiring	OFF	OFF	ON	OFF	OFF
Press the coffee button to switch on the Heater					
The user checkers that the absorbed current is OK	N.A.	N.A.	N.A.	N.A.	N.A.
ERROR: the absorbed current is KO; check the wiring from the heater to the CPU/POWER board (JP17-3) and the other wiring	N.A.	N.A.	N.A.	N.A.	N.A.
Finish condition	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	N.A.	N.A.	OFF	N.A.	N.A.

Level 4 (Grinder)

Start condition:	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF	OFF
Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Press the coffee button to switch on the Grinder					
The led activity flashing	Flashing	OFF	OFF	OFF	OFF
ERROR: : the led activity remains OFF and the led alarm switch ON; check the hall sensor board in the Grinder, the Grinder, the wiring from the hall sensor board to the CPU/ POWER board (JP2) and the wiring from the Grinder to the CPU/POWER board (JP8)	OFF	OFF	ON	OFF	OFF
Finish condition	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	N.A.	N.A.	OFF	N.A.	N.A.

5.3.1. Steam Out

This document describes the procedure of SteamOut in XSmall Puro 2014 machine. This application is used in order to empty the boiler.

Steam Out

The machine enters in SteamOut mode pushing

the COFFEE button,
the ON-OFF button,

and then connecting the machine to the plug.

As long as the buttons are pressing the machine shows all LEDS ON: Led Activity, Led Double Coffee, Led Alarm, Led NO_Water, Led CalclClean.

When the buttons are released the machine starts the Steam Out: Led CalcClean flashing.

When the steam out procedure is completed the Led Double Coffee switch on and the Led Calc-Clean switch OFF.

Now is possible to switch off the machine or repeat the procedure pressing and releasing the COFFEE button.

5.4. Test mode XSmall Vapore

This document describes the test mode of XSmall Vapore. This application is used in order to test the machine in its mechanics and electronic components.

The machine enters in test mode by moving the knob in the Water position 

then pushing the COFFEE short button 

and then connecting the machine to the plug.

As long as the COFFEE short button is pressing the machine shows the Led Calc-Clean, Led Activity, Led Alarm, Led NoWater, Led DoubleCoffee, flashing with rotation.
When the COFFEE short button is release the machine pass to the first level of the test.
There are 4 different level, in each level the coffee-machine can execute different commands,

Level 0: The machine can test the input signal:

a) Microswitch present of the brewing unit
b) Microswitch present of the dregdrawer
c) Microswitch door closed/opened
d) Button Short Coffee
e) Button Long Coffee
f) Button ON-OFF
g) Photosensor Water
h) hotosensor Steam (only in Middle-TOP model)

Level 1: The machine can test the loads in low voltage:

a) Brewing unit (24V DC)

Level 2: The machine can test the Pump load in high voltage:

a)Pump (120-230V AC)

Level 3: The machine can test the Heater load in high voltage:

a)Heater (120-230V AC)

Level 4: The machine can test the Grinder load in high voltage:

a)Grinder (320V DC)

The user can switch the level by pressing the Button ON/OFF.

As long as the button ON-OFF is pressing the machine show the level of the test:

a) Level 0: Led DoubleCoffee ON (G), Led Calc-Clean OFF (O), Led Activity OFF (G), Led Alarm OFF (R), Led Water OFF (R)

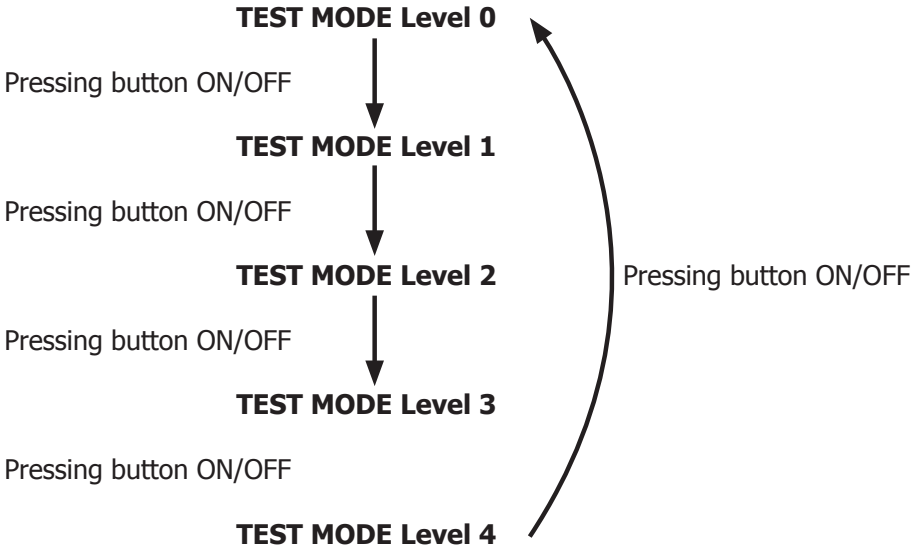
b) Level 1: Led DoubleCoffee ON (G), Led Calc-Clean ON (O), Led Activity OFF (G), Led Alarm OFF (R), Led Water OFF (R)

c) Level 2: Led DoubleCoffee ON (G), Led Calc-Clean ON (O), Led Activity ON (G), Led Alarm OFF (R), Led Water OFF (R)

d) Level 3: Led DoubleCoffee ON (G), Led Calc-Clean ON (O), Led Activity ON (G), Led Alarm ON (R), Led Water OFF (R)

e) Level 4: Led DoubleCoffee ON (G), Led Calc-Clean ON (O), Led Activity ON (G), Led Alarm ON (R), Led Water ON (R)

Legend:
(O) = Orange
(G) = Green
(R) = Red



At the start up all loads are turned off. The software allow to have only one load active at the same time.

Level 0 (Input, Led)

Start condition: NO BU, NO drag drawer, No tank, door open.	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	ON	OFF
Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Insert a full water tank					
Switch on the red led NoWater	OFF	OFF	OFF	OFF	OFF
ERROR: The led NoWater remain on , check the capacitive sensor and the wiring (JP23)	OFF	OFF	ON	OFF	OFF
Insert the BU					
The red led alarm blinks one time	OFF	OFF	One blink	N.A.	OFF
ERROR: The led alarm remains off , check the BU microswitch and the wiring (JP14)	OFF	OFF	OFF	N.A.	OFF
Insert the drag drawer					
The red led alarm blinks one time	OFF	OFF	One blink	N.A.	OFF
ERROR: The led alarm remains off , check the microswitch on the drag drower and the wiring (JP16)	OFF	OFF	OFF	N.A.	OFF
Close the door					
The red led alarm blinks one time. When all micro (3) are closed the green led double coffee remains on.	OFF	OFF	One blink	N.A.	ON
ERROR: The led double coffee remains off, check the microswitch on the door and the wiring (JP16)	OFF	OFF	OFF	N.A.	OFF
Press the coffee short button					
Switch on the activity led temp	ON	OFF	N.A.	N.A.	N.A.
ERROR: The led activity remain off , check the interface board and the flat cable (JP21)	OFF	OFF	N.A.	N.A.	N.A.
Press the coffee long button					
Switch on the activity led temp	ON	OFF	N.A.	N.A.	N.A.
ERROR: The led activity remain off , check the interface board and the flat cable (JP21)	OFF	OFF	N.A.	N.A.	N.A.

Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Move the knob in the water position					
Switch on the activity led temp	ON	OFF	OFF	OFF	OFF
ERROR: The led activity remain off , check the interface board and the flat cable (JP21)	OFF	OFF	ON	OFF	OFF
Move the knob in the steam position					
Switch on the activity led temp	ON	OFF	N.A.	N.A.	N.A.
ERROR: The led activity remain off , check the interface board and the flat cable (JP21)	OFF	OFF	N.A.	N.A.	N.A.
Finish condition with tank, BU, drag drawer and door closed. Knob in the central position	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF	ON

Level 1 (Brewing unit)

Start condition: BU, drag drawer and door closed.	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF	OFF
Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Press the coffee button to move the BU to work					
When the BU reaches the work position and the current is OK ⇒ the green led activity is switched on.	ON	OFF	OFF	OFF	OFF
ERROR: the BU moves to Home; check the polarity of the motor	N.A.	OFF	OFF	OFF	OFF
ERROR: led activity remains OFF; Check the work microswitch (is broken), the BU motor (is blocked) and the wiring (JP16).	OFF	OFF	OFF	OFF	OFF
ERROR: led alarm Switch ON, check the BU; with BU the absorbed current is >300mA without BU the absorbed current is >200mA	N.A.	OFF	ON	OFF	OFF

Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Press the long button to move the BU to home					
When the BU reaches the home position and the current is OK ⇒ the green led activity is switched on.	ON	OFF	OFF	OFF	OFF
ERROR: the BU moves to Work; check the polarity of the motor	N.A.	OFF	OFF	OFF	OFF
ERROR: led activity remains OFF; Check the work microswitch (is broken), the BU motor (is blocked) and the wiring (JP16).	OFF	OFF	OFF	OFF	OFF
ERROR: led alarm Switch ON, check the BU; with BU the absorbed current is >300mA without BU the absorbed current is >200mA	N.A.	OFF	ON	OFF	OFF

Finish condition	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	N.A.	N.A.	OFF	N.A.	N.A.

Level 2 (Pump)

Start condition:	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF	OFF

Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Press the coffee button to switch on the Pump					
The led activity flashing	Flashing	OFF	OFF	OFF	OFF
ERROR: the led activity remains OFF and the led alarm swithc ON; check the pump, the flowmeter, the wiring from the flowmeter to the CPU/POWER board (JP5) and the wiring from the pump to the CPU/POWER board (JP24)	OFF	OFF	OFF	OFF	OFF

Finish condition	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	N.A.	N.A.	OFF	N.A.	N.A.

Level 3 (Heater)

Start condition:	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF	OFF
Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Check the temperature					
The red led General Alarm remains OFF	OFF	OFF	OFF	OFF	OFF
ERROR: The temperature sensor is shorted or opened, the led GenAlarm switch ON; check the wiring from the heater to the CPU/POWER board (JP17-3) and the other wiring	OFF	OFF	ON	OFF	OFF
Press the coffee button to switch on the Heater					
The user checkers that the absorbed current is OK	N.A.	N.A.	N.A.	N.A.	N.A.
ERROR: the absorbed current is KO; check the wiring from the heater to the CPU/POWER board (JP17-3) and the other wiring	N.A.	N.A.	N.A.	N.A.	N.A.
Finish condition	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	N.A.	N.A.	OFF	N.A.	N.A.

Level 4 (Grinder)

Start condition:	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	OFF	OFF	OFF	OFF	OFF
Action by user	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
Press the coffee button to switch on the Grinder					
The led activity flashing	Flashing	OFF	OFF	OFF	OFF
ERROR: the led activity remains OFF and the led alarm swithc ON; check the hall sensor board in the Grinder, the Grinder, the wiring from the hall sensor board to the CPU/POWER board (JP2) and the wiring from the Grinder to the CPU/POWER board (JP8)	OFF	OFF	ON	OFF	OFF
Finish condition	LED INDICATION				
	Led Activity	Led Descaling	Led Alarm	Led NoWater	Led Double Coffee
	N.A.	N.A.	OFF	N.A.	N.A.

5.4.1. Steam Out

This document describes the procedure of SteamOut in XSmall Vapore 2014 machine. This application is used in order to empty the heater.

Steam Out

The machine enters in SteamOut mode by moving the knob in the water position 

then pushing the COFFEE LONG button 

and then connecting the machine to the plug. 

As long as the COFFEE LONG button is pressing the machine shows all LEDS ON: Led Activity, Led Double Coffee, Led Alarm, Led NO_Water, Led CalclClean.

When the COFFEE LONG button is release the machine starts the Steam Out: Led CalcClean flashing.
During this phase if the knob is moving in the central position the steam out procedure will be interrupted and the red led "General Alarm" will be switched On, in order to continue the steam out procedure move back the knob in the water position.

When the steam out procedure is completed the Led Double Coffee switch on and the Led CalcClean switch OFF.

Now is possible to switch off the machine or repeat the procedure moving the knob in the central position and after moving again the knob in the water position.

CHAPTER 6

SERVICING AND MAINTENANCE

6.1. Repair Flow

Proces stap	Saeco no.	Action
Intake	1	Visual inspection (transport damage) take care for pictures
	2	Check Type/serialnumber
		Log all available accessory
Diagnosis	3	Check product for consumer complaint (NFF contact consumer)
	4	Opening machine
	5	Visual inspection check for loosen parts, leaking etc..
	6	Operational tests
Repair		Run Diagnostic to get error codes and relevant set statistics (Saeco Service Center SSC)
	7	Repairing the faults encountered
	8	"Checking any modifications (view Symptom Cure, new software, etc.) Refer Annex tabs per family"
	9	Service activities in accordance with the operating schedule
		Check/Replace Waterfilter (the small filter, not the Britta filter)
		Check/Replace Water tank lip seal
		Check/Replace Boiler pin O-ring
		Clean/align Coffee grinder (Vacuum cleaner / brush)
		Descale the water Circuit
		Check/Replace Hot water/steam valve
	10	Internal check / cleaning
		Check/Clean/Grease Brewing unit
	11	Operational test while the appliance is open
		Check Hoses, attachments and Oetiker clamps
		Check Pump for operation & noise
		Check Gear motor for operation & noise
		Check for leakage
	12	Assembly
	13	Final inspection test
	14	Steam out before shipping out, if temperature is below 0° to prevent any demaged due to frozen water
Inspection		
visual		Do cabinet parts fit well together
		Check for damages
Power check		Will the set switch on
Accesoires		Do the accessories match with the intake
Consumer complaint		Check the product for the consumer complaint
Coffee		
Dispense		Make 2 * coffee. Are both amounts equal
		Make e 2 cups at the same time. Are the volumes equal

Noise		Is the sound normal
Crema		Blow on the coffee. Does the crema come back together
		Is the crema colour correct (Hazelnut)
Temperature		Is the coffee temperature within spec
Grinder		Is the grinder noise normal
Steam		
Steam		Does the steam work
Hot Water		Does the hot water work
Milk		(if applicable)
Cappuchino		Does the cappuccinatore produce good froth
Leakage		
Leakage	14	Did the product leak during the testing
	15	Draining the circuit (in winter)
Cleaning		Clean water reservoir, bean reservoir, brew chamber and conveyor
	16	Clean and dry brew unit, coffee bin and drip tray.
		Lubricating the brewing unit with suitable grease
		External cleaning
Safety check		
		Earth leakage, Isolation test, resistor of earth wire grounding, as requested in certain country's (VDE, ISO)
visueel		Check the mains cord for damages
Packing		
	18	Packing
		Check completeness (accessories) according income log
	19	Neatly pack the product
Documentation		NFF letter
		Descaling instruction with changed procedure (S/C)
		Other instructions according S/C
Repair report		Is there an answer to ALL consumer questions/complaints (see complaint)
		add set statistic and give, if needed clear instruction towards consumer
		Is it indicated which documents are added
		Are there tips how to prevent issues

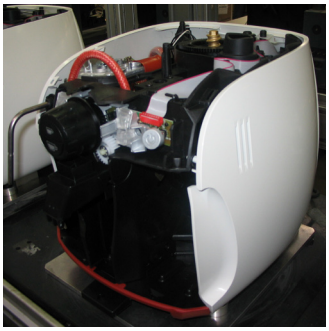
CHAPTER 7

DISASSEMBLY

7.1. Outer shell

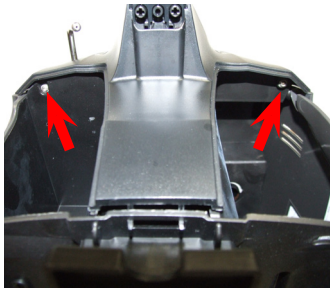
Disassembling the Top cover

Remove the dreg drawer, water tank, mushroom finger protection device on the coffee container lid and coffee container, then loosen the screws shown.



Slide out the steam hose protection, lift the cover at the rear by pressing down gently on the cooling vents to help detach the anchoring tabs, then pull it away from the steam hose, taking care not to scratch it.

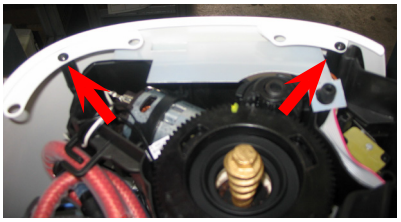
Disassembling the Top cover in XSmall Puro/Vapore

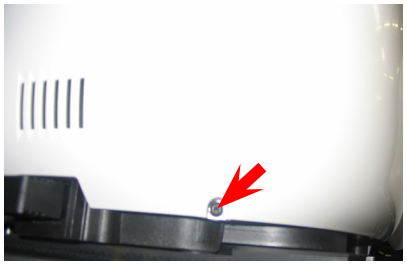


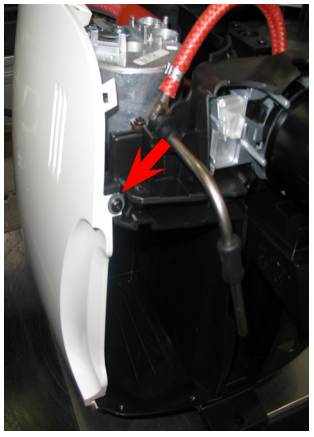
Remove the dreg drawer, water tank, mushroom finger protection device on the coffee container lid, then loosen the screws shown.

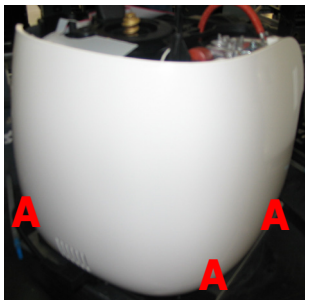
The USA type is inserted a grid Protective hand to replace the mushroom finger protection

Disassembling the side cover

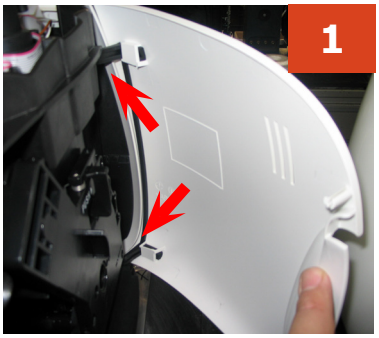








Loosen the screws shown and slide out the side cover; be careful of the protrusions **(A)** on the base.



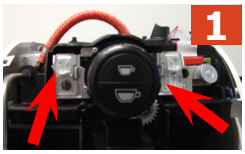
Disassembling the hatch

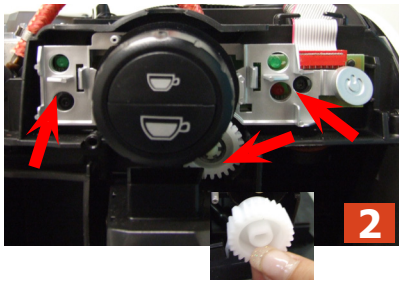
1) Detach the hatch by pressing the fastenings.

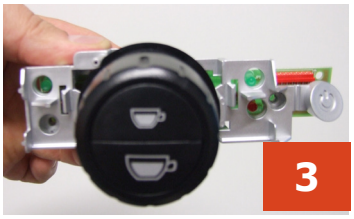
2) Lift the fastenings shown.

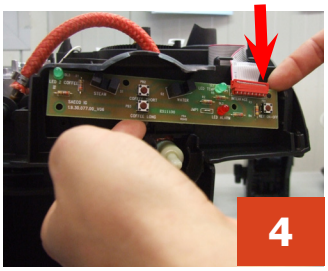
3) Slot for pins.

7.2. KYB interface









Disassembling the CPU

1) Remove the RHS and LHS light guide.

2) Loosen the screws shown, detach the dispenser, then remove the circlip and gear as illustrated in the photograph.

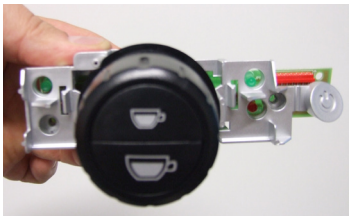
3) Slide out the control keypad.

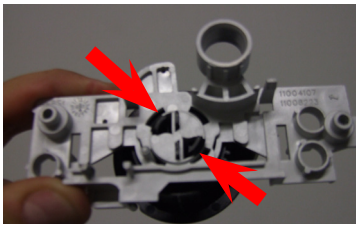
4) Remove the flat cable shown and slide out the P.C.B.

XSmall Puro

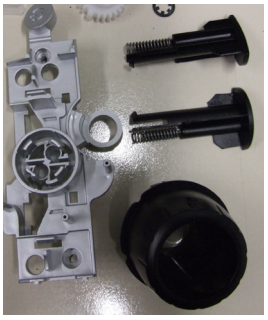
1A) Loosen the screws shown and remove the flat cable

7.3. The control knob and coffee keys



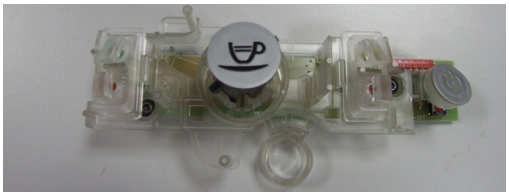


To remove the coffee keys from the control keypad, detach them from the anchoring device on the back of it and take them out.

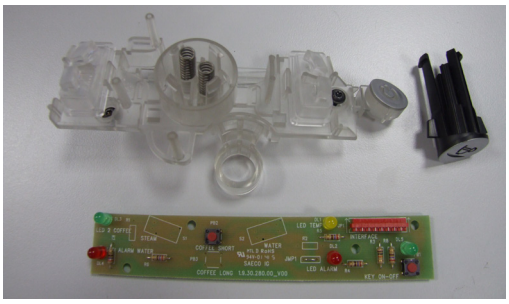


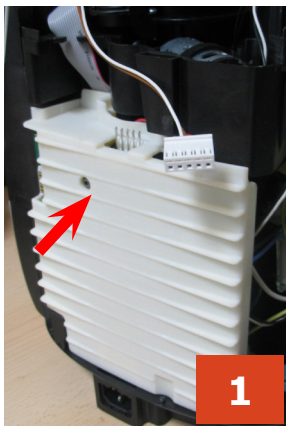
To remove the knob, simply slide it out of its position.

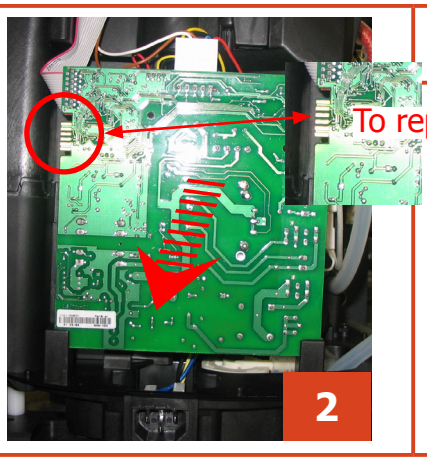
XSmall Puro



To remove the coffee keys from the control keypad, detach them from the anchoring device on the back of it and take them out.







Disassembling the power P.C.B.

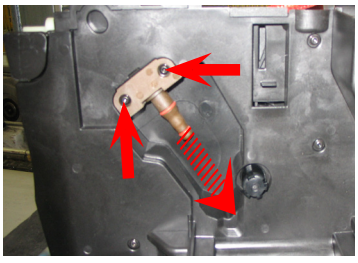
To reprogram the P.C.B. connect the S.S.C

1) Loosen the screw shown and remove the P.C.B. protection.

2) Slide out the P.C.B., removing all connections.

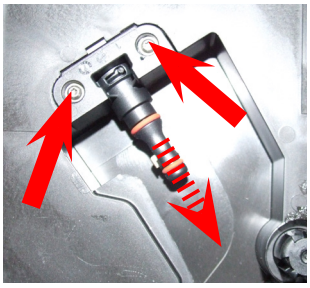
7.4. The boiler pin

Boiler pin (Vapore)

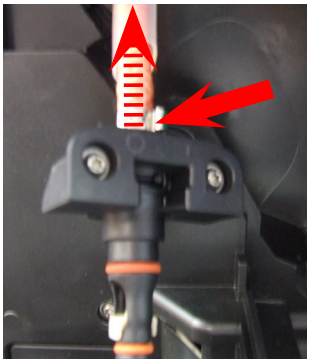


Loosen the screws shown and remove the boiler pin.

Boiler pin (Puro)

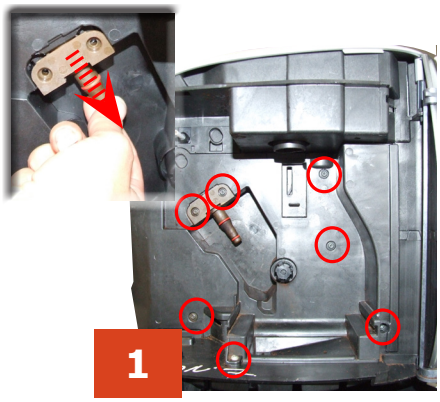


Loosen the screw and remove the boiler pin.

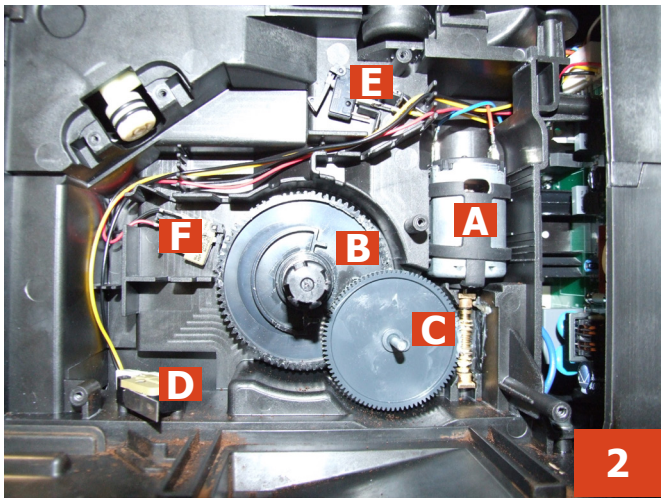


Remove the OETIKER clamp and pull out the silicon tube

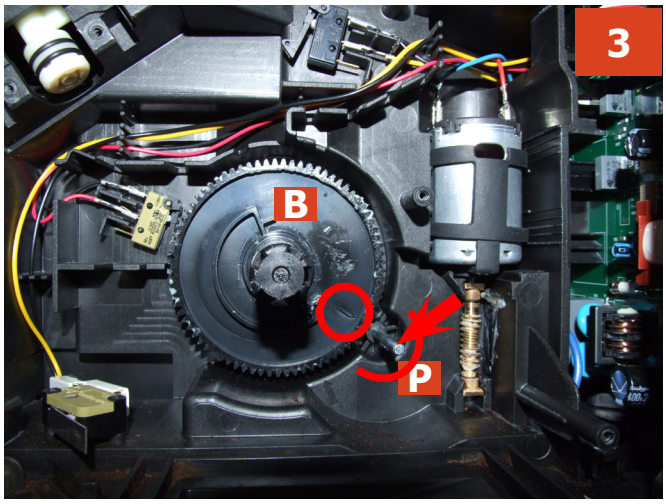
7.5. Gearmotor



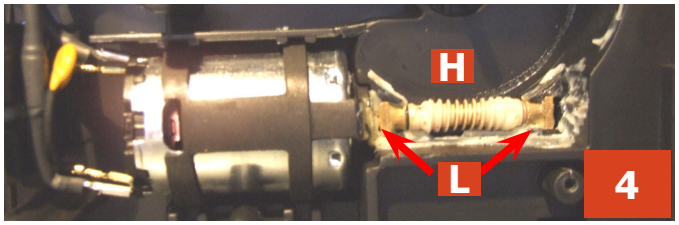
1) Loosen the screws holding the boiler pin in place, remove it and loosen the other screws shown



2) The following are located inside the compartment protected by the casing:
- Brew drive (A) with gears (B) and (C) for transmission and timing of the dispensing head.
- Grounds drawer present microswitch (D).
- Brewing unit present microswitch (E).
- Microswitch (F) detecting brewing unit home and work positions.
- Remove the gear (C) that meshes with the motor transmission shaft
- Remove the large gear (B)
- Remove the motor (A), complete with transmission shaft

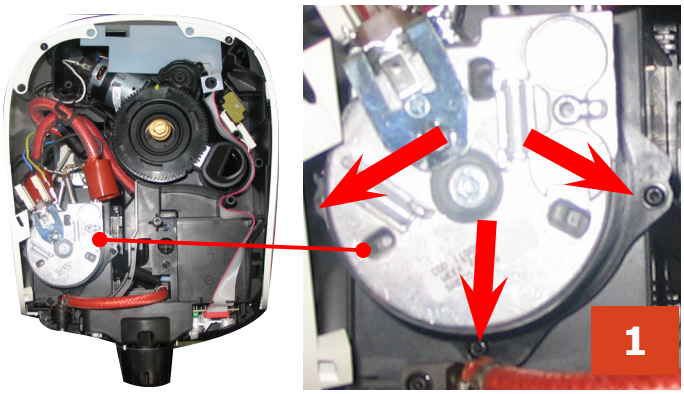


3) Replace the gear (B), making sure that the imprint of the arrow is aligned with the opening containing the pin (P)

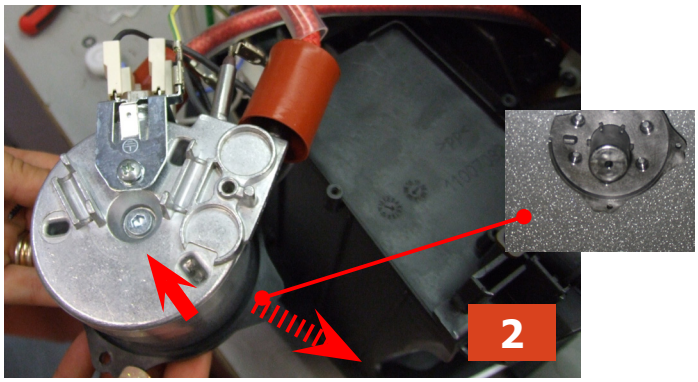


4) When replacing the motor and the transmission shaft, make sure the bearings (L) are in the right position.
Grease the shaft thoroughly and evenly

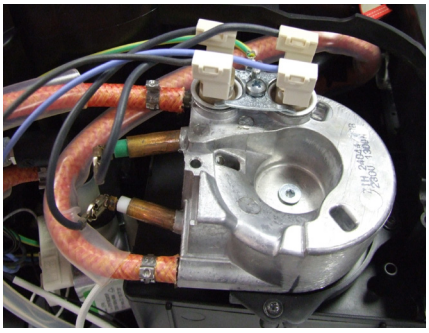
7.6. The boiler



1) Loosen the screws shown.

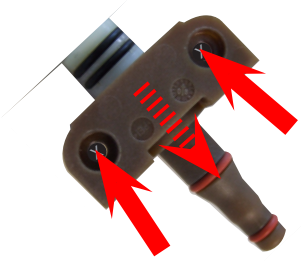


2) Loosen the screw and remove the plastic support.
Disconnect the hoses and the connections.

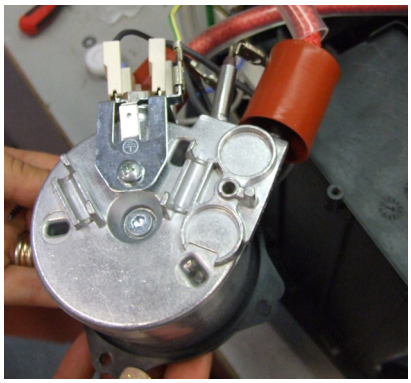


New Boiler

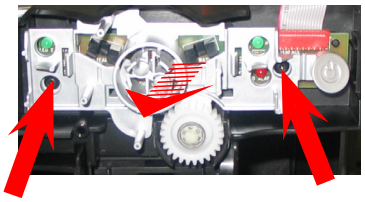
7.7. The flow selector faucet



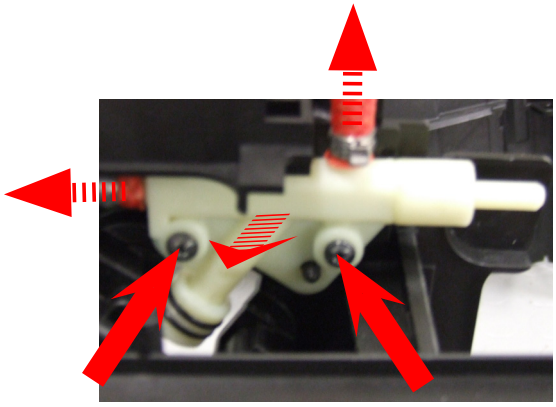
Loosen the screw and remove the boiler pin.



Remove the boiler.

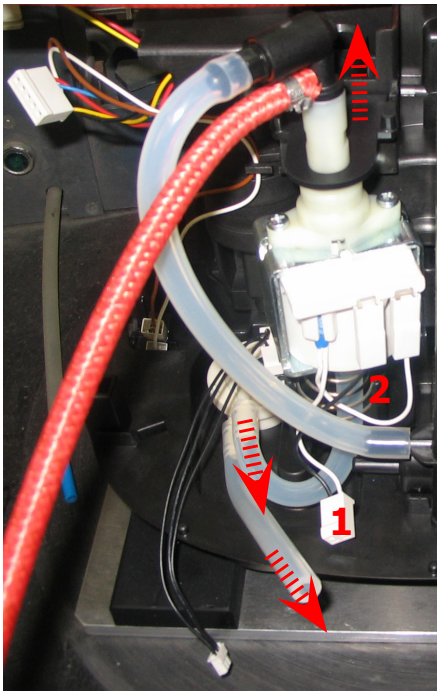


Loosen the screw and remove the control knob and coffee keys.



Loosen the screw and disconnect the hydraulic connections, remove the flow selector faucet.

7.8. The pump and turbine

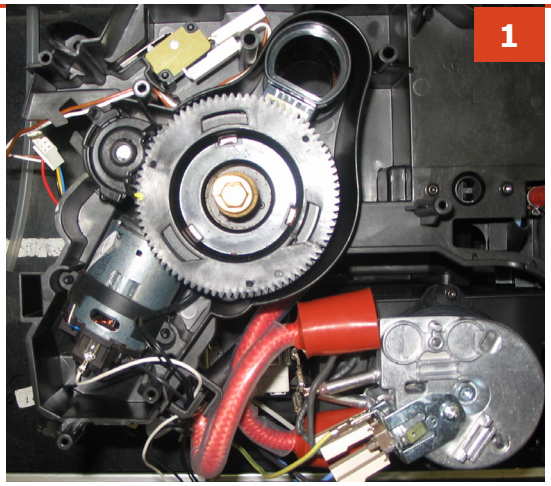


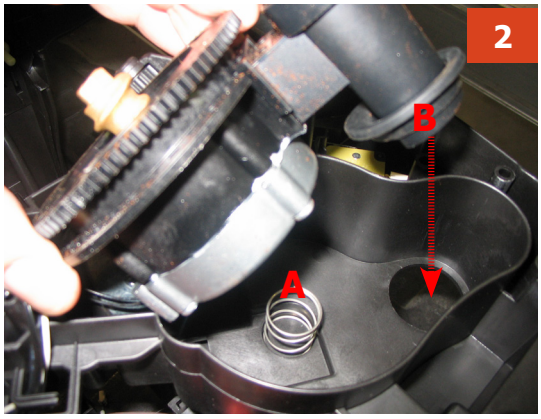
Slide out the support as shown.

Remove connection **1**, slide out the silicone hoses.
To prevent annoying vibrations when reassembling the pump, take extra care when positioning spring **2**.

At this point, the turbine may also be removed from its recess.

7.9. The coffee grinder

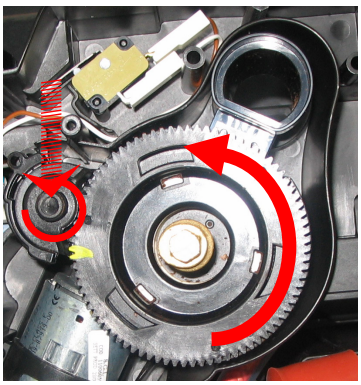




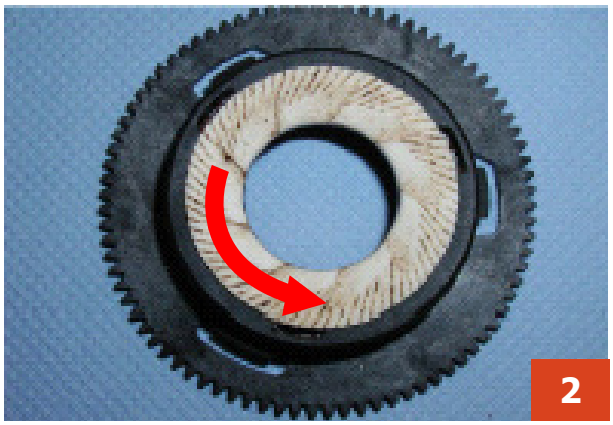
1) To remove the coffee grinder, simply slide it out and remove its connections.

2) When replacing it, make sure the spring (A) and the coffee pipe (B) are positioned correctly.

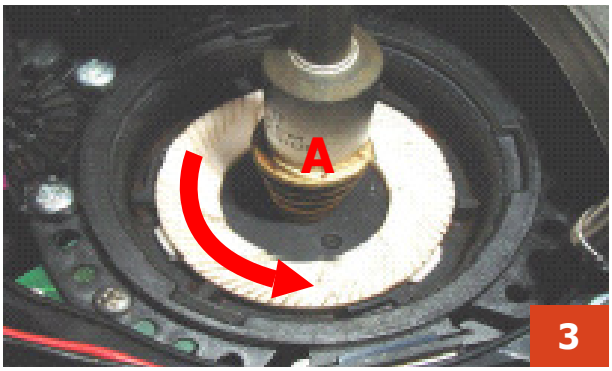
7.10. Grinder adjustment/assembly and disassembly



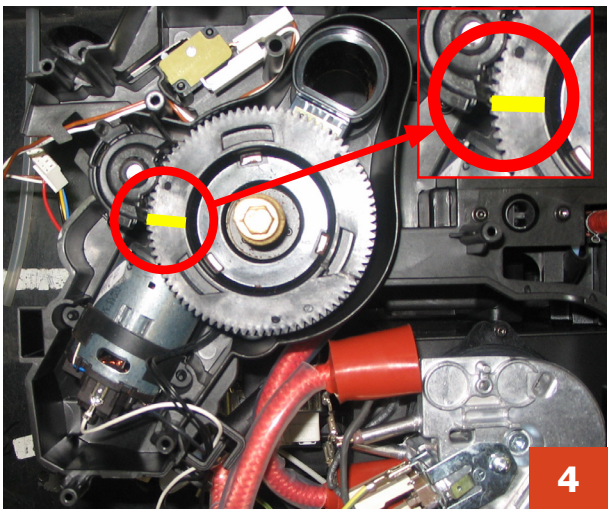
1) To remove the upper grinder support, using a hex key push down and turn clockwise to release the grinder support from the bayonet coupling



2) To remove the grinder blade from the upper support, turn it anti-clockwise until it detaches from the bayonet coupling

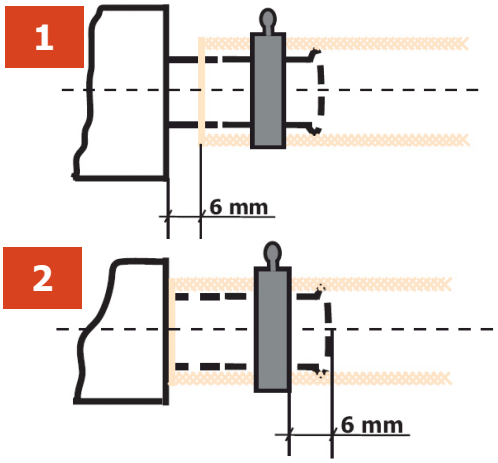


3) To remove the lower grinder blade, keep the increment pin (A) locked in position and turn the grinder blade anti-clockwise, until it detaches from the bayonet coupling



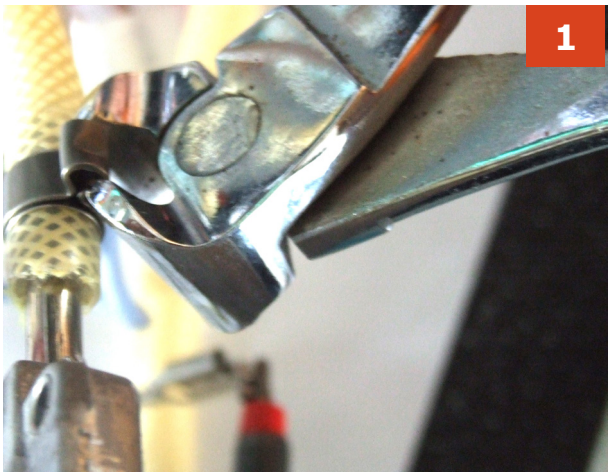
4) When refitting the upper grinder support, make sure you reposition it so that the mark is as illustrated in the photo

7.11. OETIKER clamps assembly and disassembly



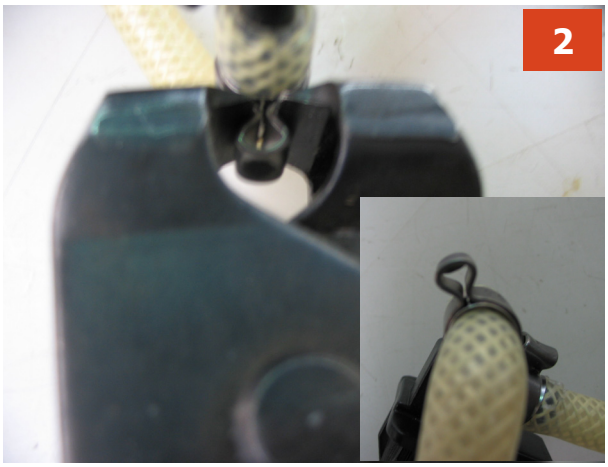
1) Boiler connection

2) Other connections



Replacing the hoses

1) Use a suitable pair of pliers to remove the clamp (as illustrated)



2) Tighten the clamp as illustrated

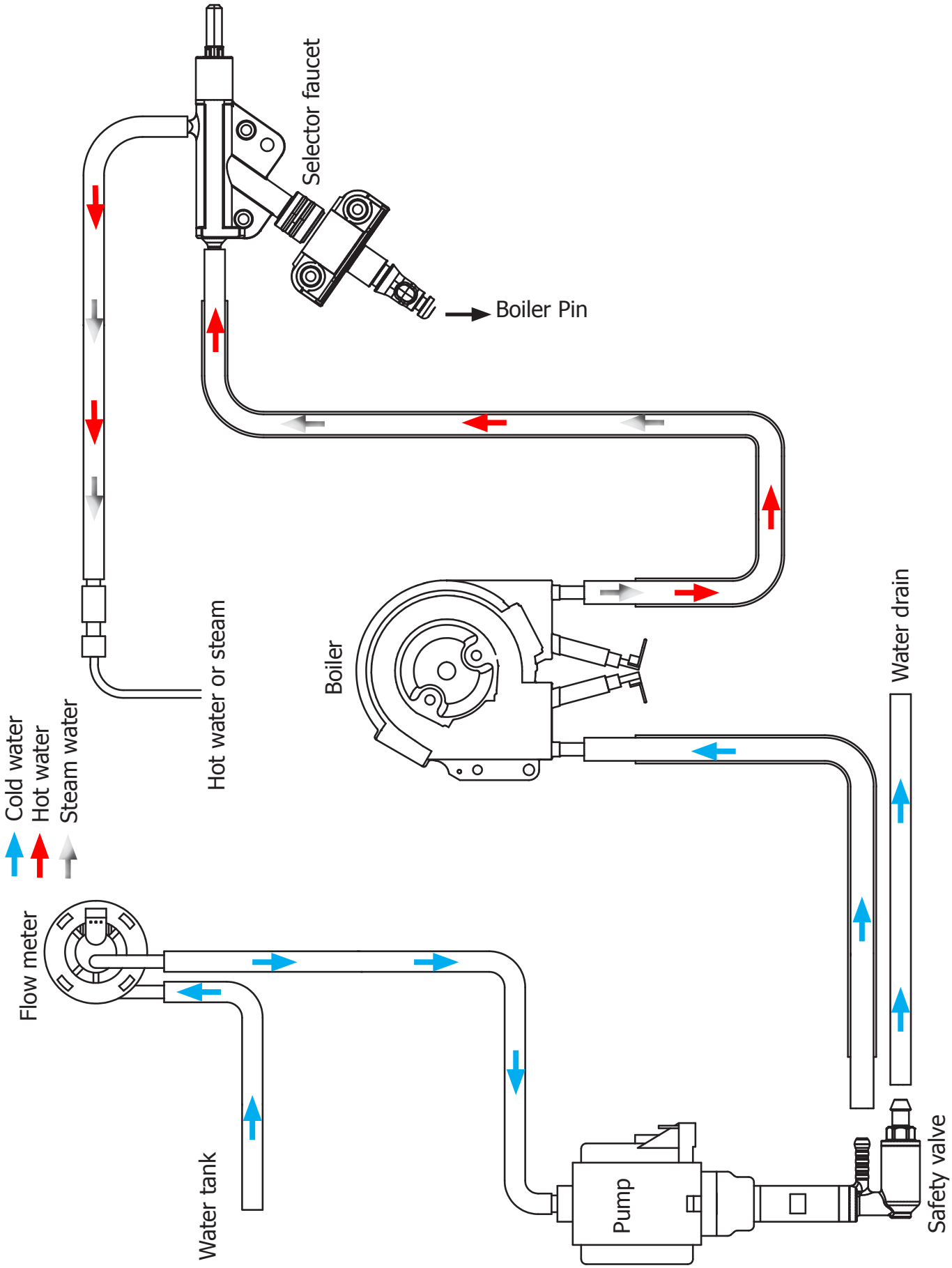
CHAPTER 8

NOTES

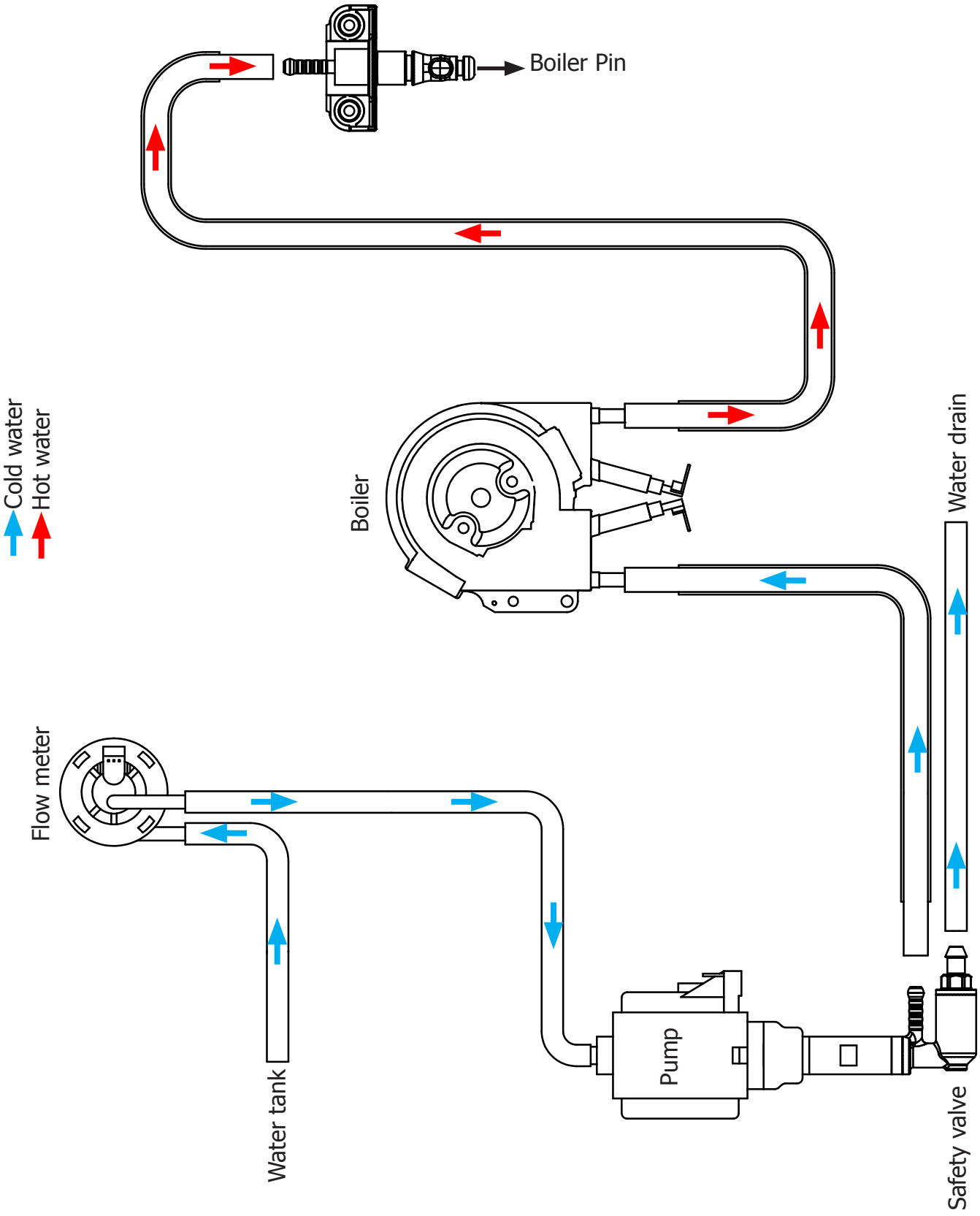
CHAPTER 9

WATER CIRCUIT DIAGRAM

9.1. Water circuit diagram Vapore



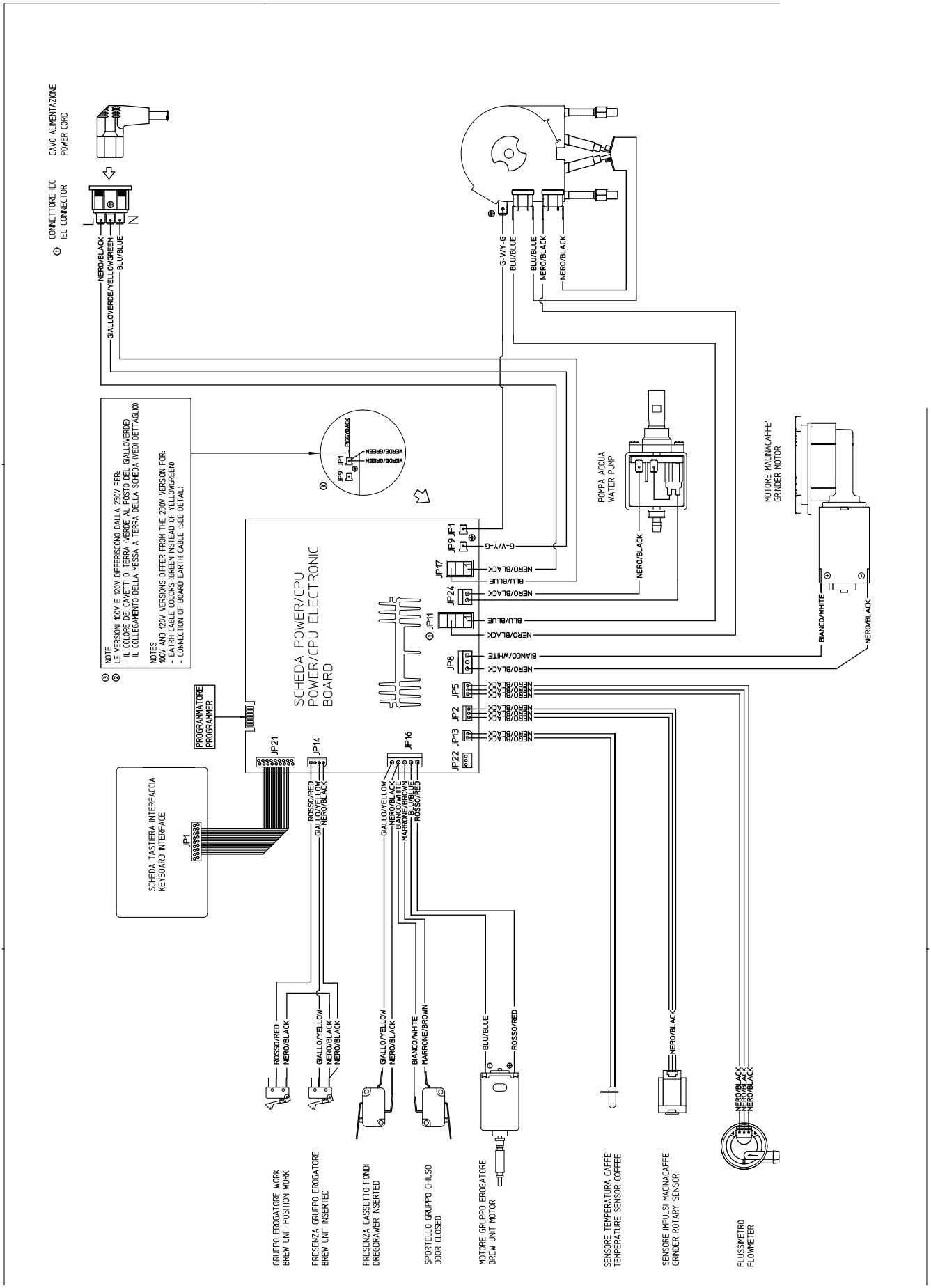
9.1.1. Water circuit diagram Puro



CHAPTER 10

ELECTRICAL DIAGRAM

10.1 Wiring diagram XSmall



10.1.1 Wiring diagram XSmall Puro/Vapore