

# Service Service Service

New Royal



# ServiceManual

Revision 01 November 2015

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MODIFICATIONS TO SERVICE MANUAL				
From Rev.	To Rev.	Chapter	Inserted	Modified
Rev.00	Rev01	01		Par. 1.4. Safety warnings
			1.5 Service Policy	
		02	Par. 2.3 Specification for the measurement of the coffee products temperature.	
			Par. 2.3.1 Specification for the measurement of the Milk products temperature.	
		06		Par. 6.1 Repair Flow



# 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 views).

### 1.2. Tools and equipment required

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

Qty.	Description	Notes
1	Screwdriver	Torx T 8 - T 10 - T 20
1	Screwdriver	Cross-head
1	Pliers for Oetiker clamps	
1	CC -A - Vdc tester	
1	Digital thermometer	Scale limit > 150°C
1	SSC (Saeco Service Center)	Programmer (for programming and diagnostics mode)

### 1.3. Material

Description	Notes
Thermal paste	Heating element > 200°C
Descaler	Saeco descaler
Grease solvent	Personal choice
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.



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.

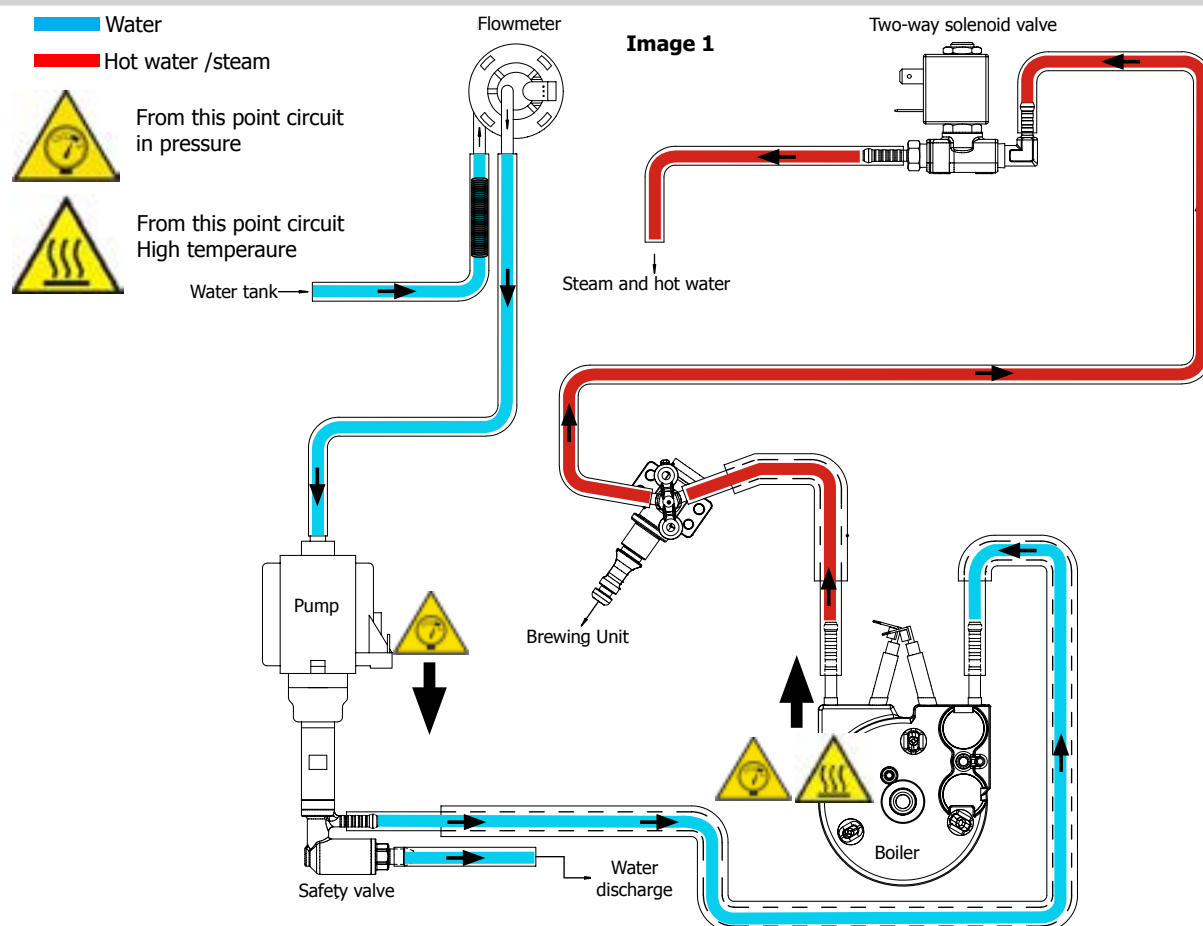


Disassembling the machine, the operator must pay attention to hot and under Pressure parts: boiler, pin-boiler, valves, dispensing, steam tube, brew unit, connections and pipes to avoid burns. Please refer to specific hydraulic circuit (Image1) to know the parts in detail.



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.



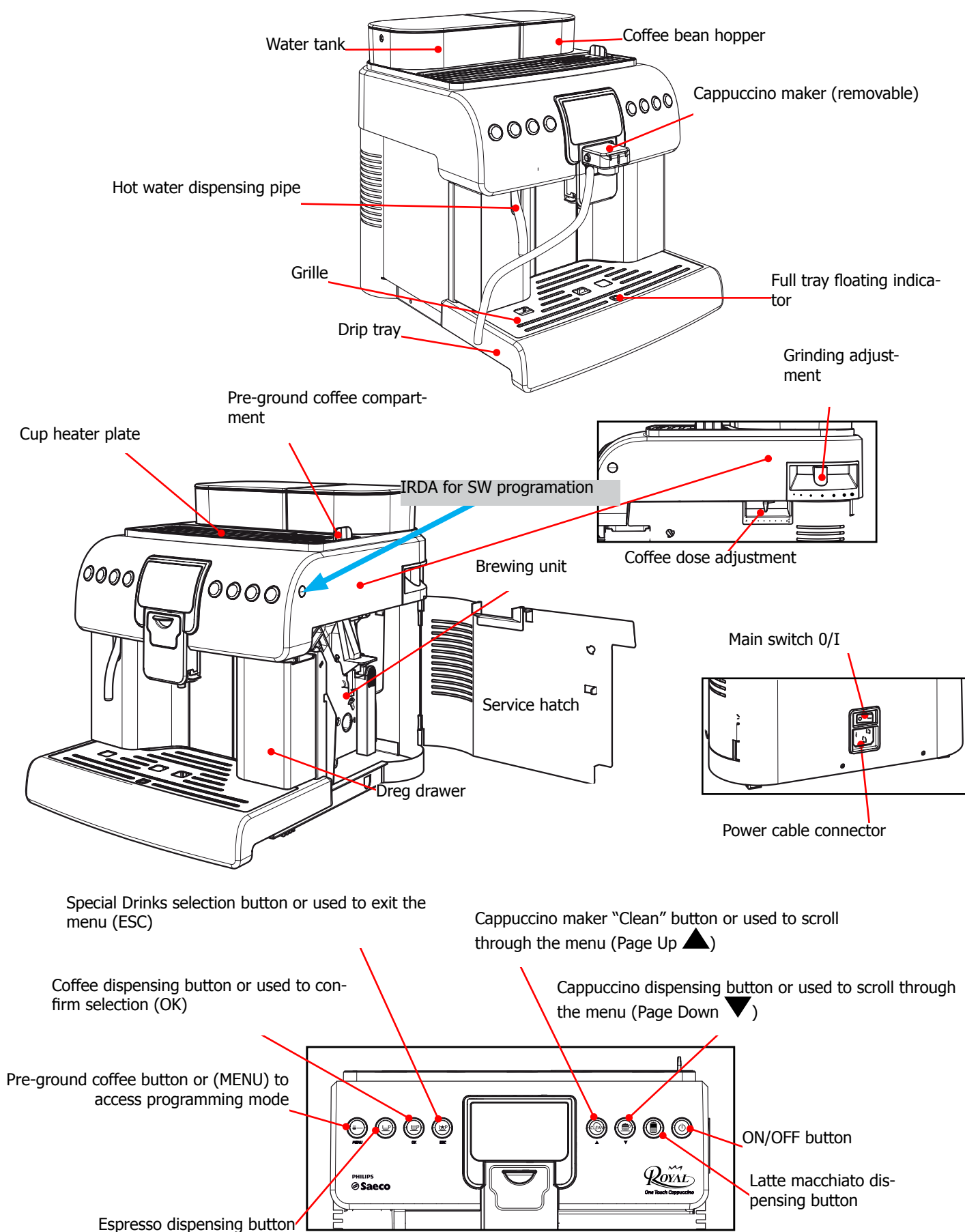
### 1.5 Service POLICY grid as used for coffee machine

**For IN WARRANTY** repairs is recommended 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.

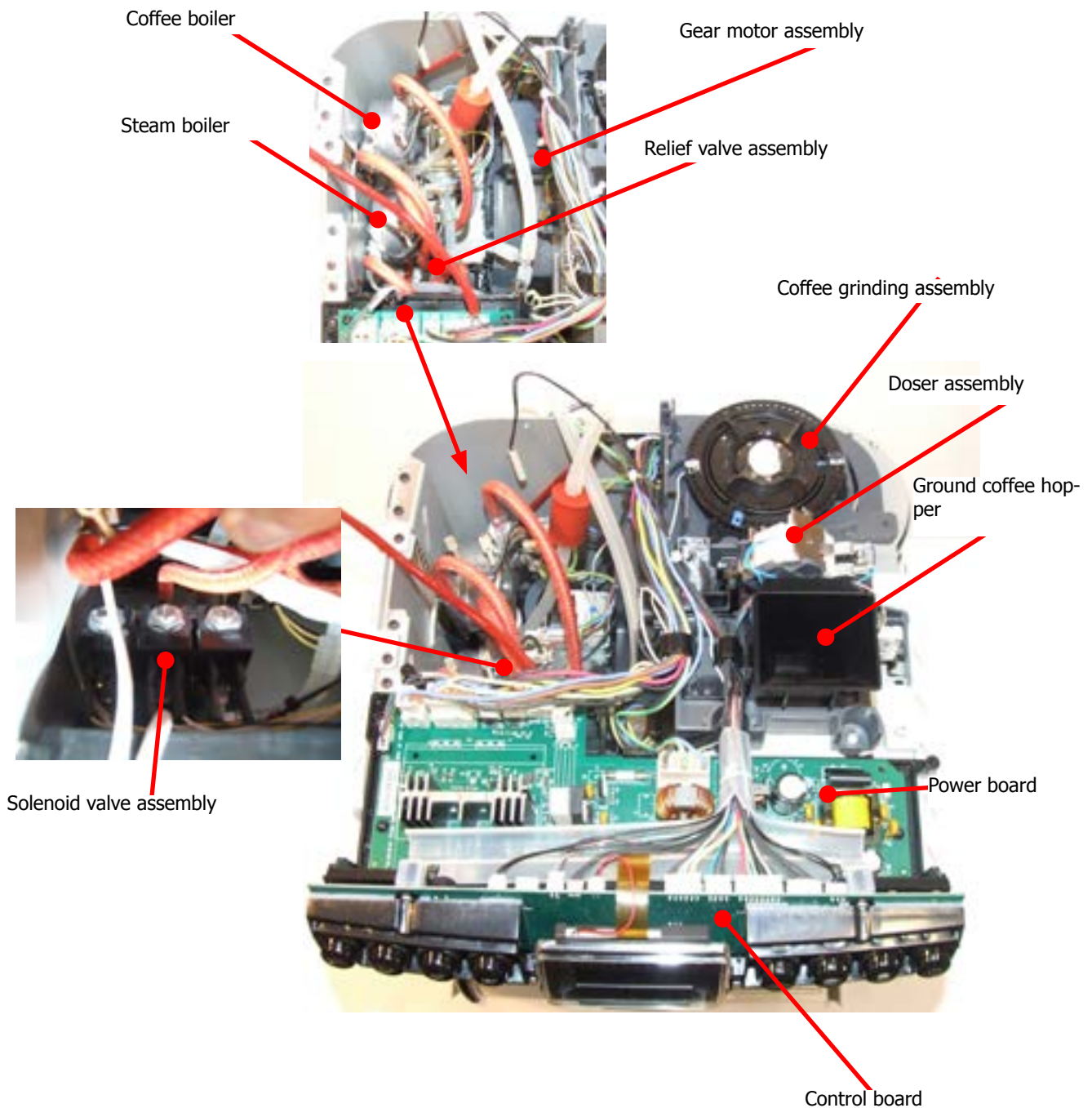
### List of principal assembly present in all our coffee machines

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

## 1.6. External machine parts



## 1.7. Internal machine parts





## CHAPTER 2

# TECHNICAL SPECIFICATIONS



**2.1. Technical specifications**

Power supply and output:	240 V~ 50 Hz 1500 W - 230 V~ 50/60 Hz 1400 W
Temperature monitoring:	(NTC) variable resistor sensor - transmits the value to the electronic card
Safety system:	2 thermostats at 190°C one shot
Coffee heat exchanger output: Stainless steel	(230 V~) 1300 W for coffee dispensing
Steam heat exchanger output: Stainless steel	(230 V~) 1300 W for water/steam dispensing
Gear motor:	2 rotation directions; power supply 24VC
Coffee pump	Ulka Type EP5/S GW approx. 13-15 bar with reciprocating piston and thermal switch 120°C 48 W, 230V, 50 Hz,
Steam pump	Ulka HF with reciprocating piston 230V, 50 Hz and thermal switch 120°C - 22W
Overpressure valve: (multi-way valve)	Opening at approx. 19-23 bar
Water filter:	In tank
Coffee grinder:	Direct current motor with conical steel grinder blades
Power consumption:	During heating phase- approx. 5.6 A
Consumption in Standby	< 0.3 W
Dimensions: W x H x D in mm:	336x380x450
Weight:	16 kg
Water tank capacity:	2.2 l
Coffee bean hopper capacity:	320 g. of coffee beans
Dreg drawer capacity:	19 (18+1)
Heat exchanger capacity:	Approx. 10 cc
Water circuit filling time:	Approx. 50 sec Max. on first filling cycle including rinsing
Heating time:	Approx. 25 sec. Max. in stand-by
Dispensing temperature:	Approx. 84° ± 4°
Grinding time:	Approx. 4-7 sec.

## 2.2. Machine parameters and performance

PRODUCT QUANTITY	Minimum quantity (Puls.)	Default quantity (Puls.)	Maximum quantity (Puls.)	User programmable	Programm. by Production / Service
<b>Espresso</b>	90	130 - 170 *	200	Yes	No
<b>Coffee</b>	100	200 - 280*	600	Yes	No
<b>Long coffee</b>	70	330 - 440 *	600	Yes	No
<b>American coffee</b>	300	-	600	Yes	No
<b>Pre-ground</b>	Yes				
<b>Hot water</b>	Continues for 400 pulses				

\* Depends on the language selected by the user

RINSE	Initial rinse	Final rinse
When performed	When the machine is switched on and the boiler temperature is $\leq 50^{\circ}\text{C}$	When the machine is switched off electronically, manually or automatically after 30', if at least one coffee has been dispensed, before switching off
No. of pulses	130	100
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
<b>1</b>	Soft (up to $7^{\circ}\text{dH}$ )	240 litres (480,000 pulses)	480 litres (960,000 pulses)
<b>2</b>	Medium ( $7^{\circ}$ - $14^{\circ}\text{dH}$ )	120 litres (240,000 pulses)	240 litres (480,000 pulses)
<b>3</b>	Hard ( $15^{\circ}$ - $21^{\circ}\text{dH}$ )	60 litres (120,000 pulses)	120 litres (240,000 pulses)
<b>4</b>	Very hard (over $21^{\circ}\text{dH}$ )	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.			

<b>DREG DRAWER</b>	<b>Description and values</b>
<b>Time-out for dreg drawer</b>	5 sec.
<b>Warning to empty dreg drawer after</b>	Yes, after 15 lots of dregs
<b>Empty dreg drawer blocking alarm after (double coffee is the last beverage dispensed)</b>	18 lots of dregs (19 lots of dregs)
<b>Reset dreg counter</b>	The dreg drawer must be emptied only when prompted by the machine ensuring the machine is switched on and removing the drawer for more than 5 seconds.

<b>STANDBY</b>	<b>Description and values</b>
<b>Inlet time (min. – max.)</b>	15 minutes - 180 minutes
<b>Inlet time (default)</b>	30 minutes
<b>Inlet time programmed by user</b>	Yes
<b>Inlet time programmed by Production/Service</b>	Yes
<b>Boiler temperature during Standby</b>	Boiler OFF
<b>Cup heater during Standby</b>	Cup heater OFF

<b>WATER TANK</b>	<b>Description</b>
<b>Water reserve (pulses)</b>	200
<b>Water reserve modifiable by Production/Service departments</b>	No
<b>"Fill tank" alarm</b>	Yes
<b>"No tray" alarm</b>	No
<b>Water mains</b>	No

### 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:

- Water temperature in tank: 23°C (+/-2°C).
- It must be used a plastic cup (see picture N°1).
- It must be used a thermocouple thermometer (e.g. type K - see picture N°2).
- 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:

- 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).
- 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).
- The highest temperature measured during the rotations is the value we are searching for, and that must be reported;
- Test measurement: from end of dispensing to the end of rotations must be completed within 12 seconds.
- 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.

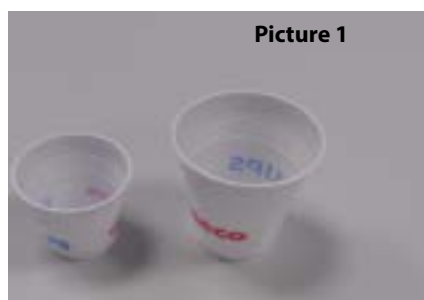
Temperature of 1st product 69°C ≤ 85°C

Temperature of 2nd product 72°C ≤ 85°C

#### Coffee Q.ty 70/120 gr.

Temperature of 1st product 69°C ≤ 85°C

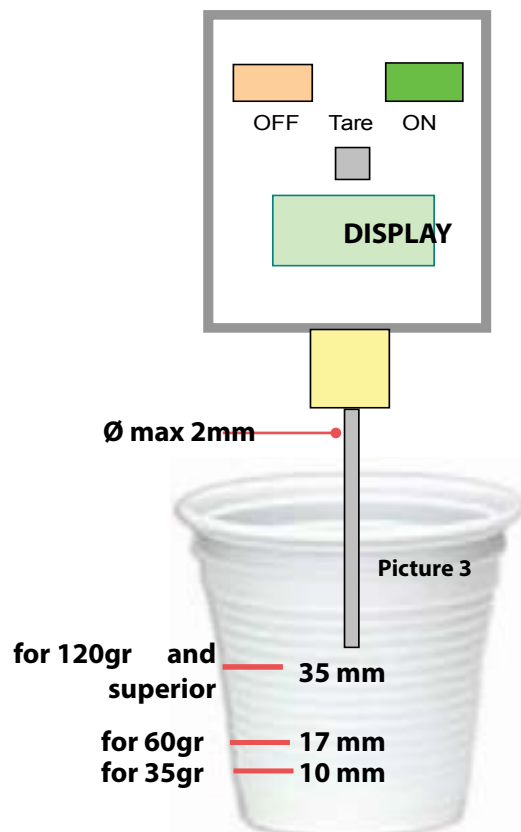
Temperature of 2nd product 72°C ≤ 85°C



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)  $\geq 15\text{mm}$  on 100gr. of brewed product

Semi-automatic system (cappuccinatore)  $\geq 20\text{mm}$  on 100gr. of brewed product

Automatic system: carafe, cappuccinatore, Pinless wonder (New Royal, Energica Pure, Intelia EVO latte)  $\geq 20\text{mm}$  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 Trefr..

**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 sole-noid 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 Trefr..

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:

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

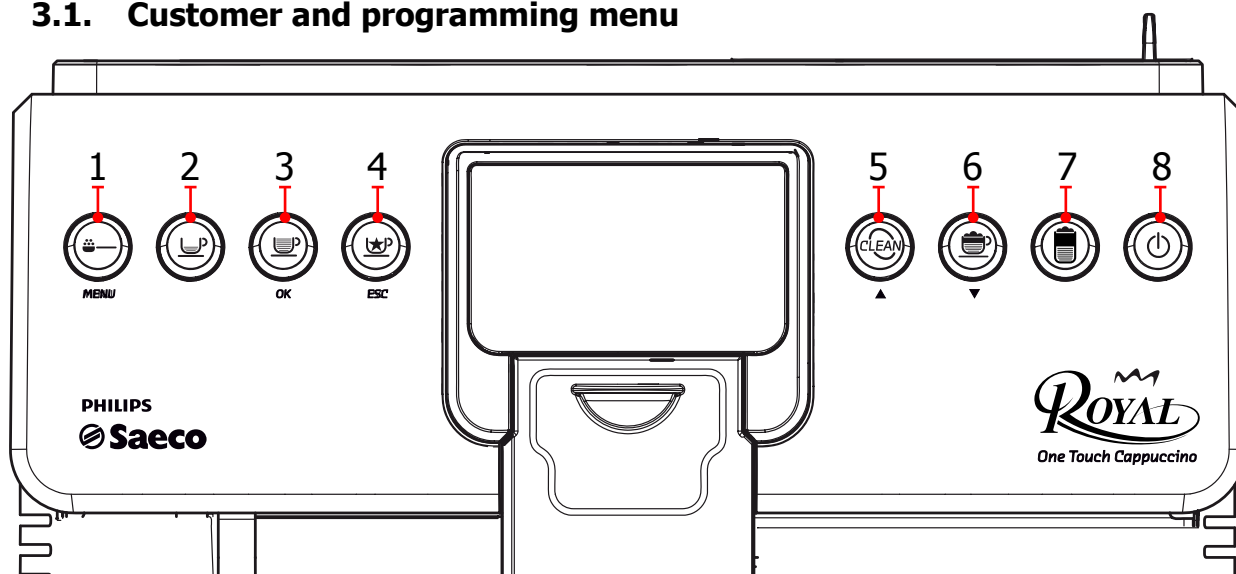
**NB:** To verify more accurately the height of the cream, a practical expedient dictated by experience is to add to the product just delivered a small amount of coffee. The addition of coffee immediately put in evidence the surface of separation between liquid and cream.



## CHAPTER 3

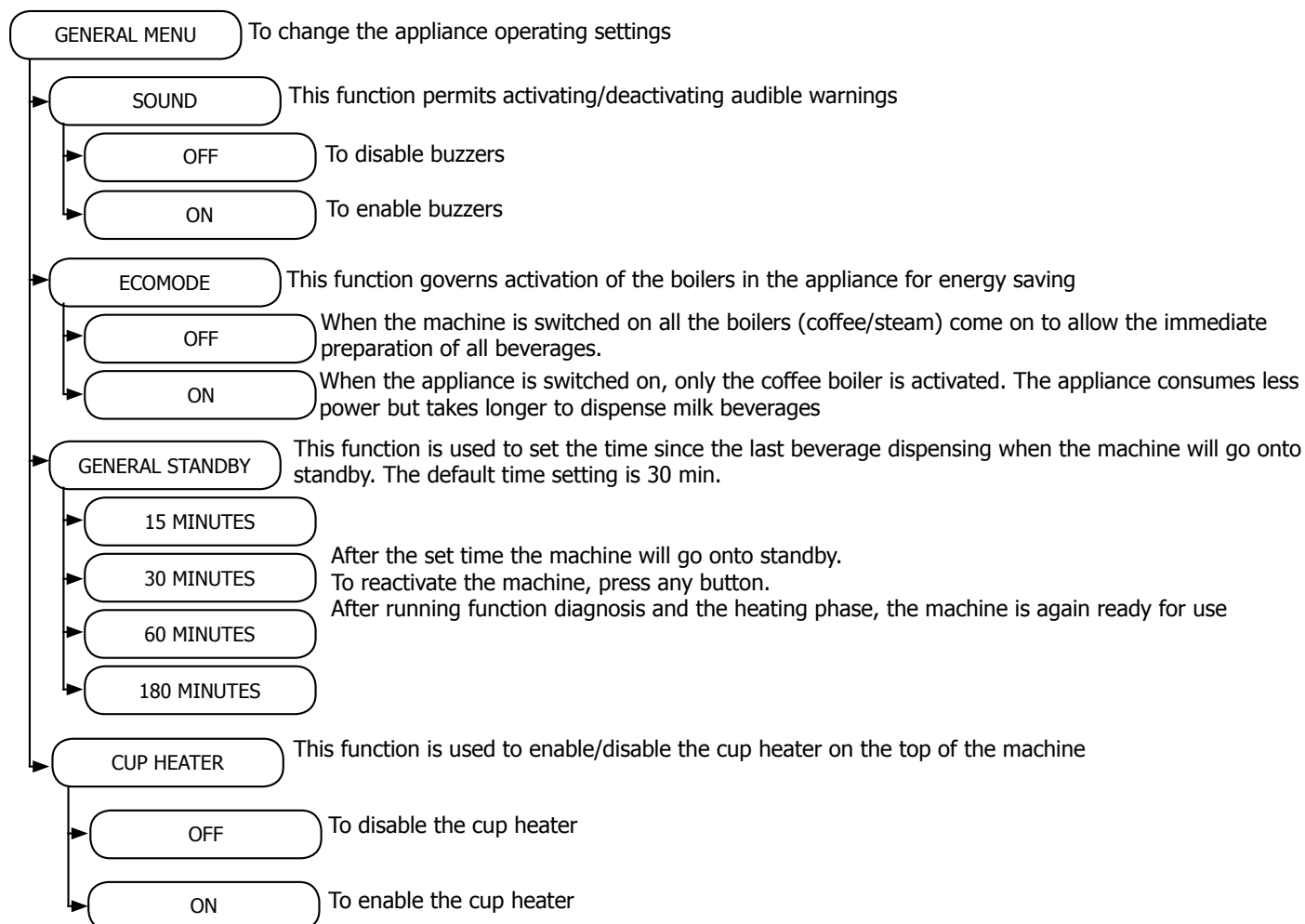
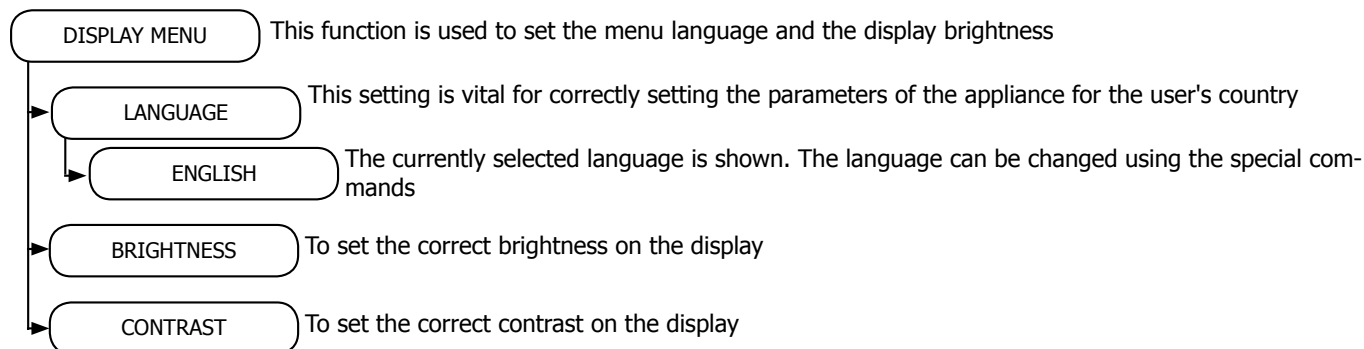
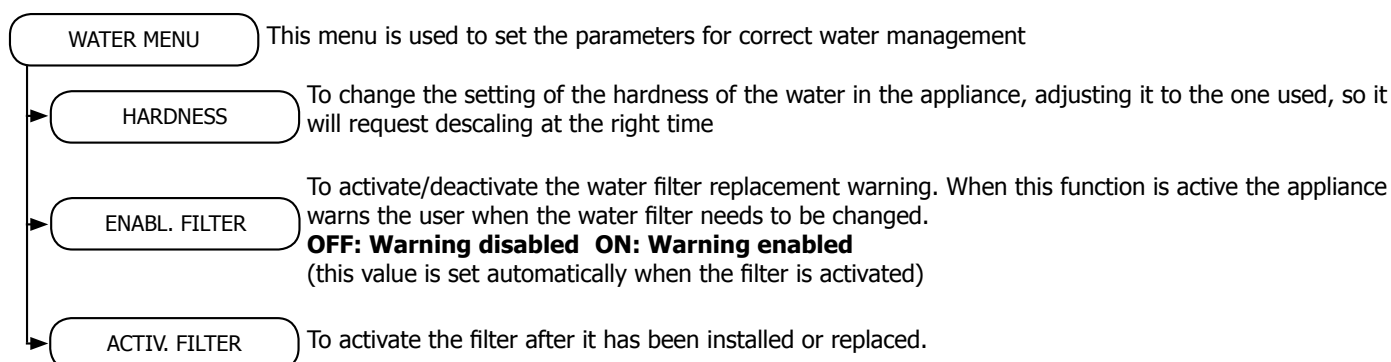
## USER INSTRUCTIONS

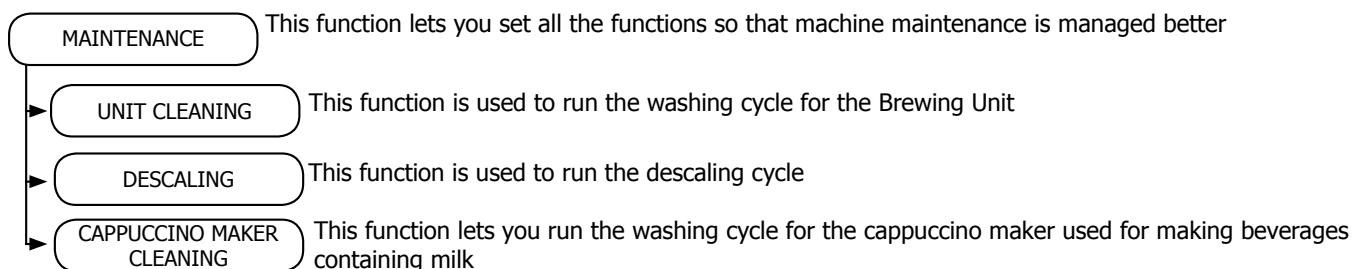
### 3.1. Customer and programming menu



1		Pre-ground selection button - MENU This button is used to select the possibility to dispense the coffee with pre-ground coffee.	<b>2nd function</b> - Press for 5 seconds to access the machine programming menu.
2		Espresso dispensing button	
3		Coffee button - OK The button is used to select the type of coffee dispensing.	<b>2nd function</b> - Press to select the heading shown on the display.
4		Special Drinks selection button - ESC The button is used to access the list of special drinks the machine can dispense.	<b>2nd function</b> - Press to exit the selected page and/or exit the programming mode and/or stop the drink dispensing.
4		CLEAN button (washing) - Page UP The button is used to carry out a cleaning cycle of the cappuccino maker by dispensing steam (for more details refer to the specific paragraph).	<b>2nd function</b> - Press to scroll the selection in the page upwards.
6		Cappuccino dispensing button - Page DOWN The button is used to select cappuccino dispensing.	<b>2nd function</b> - Press to scroll the selection in the page downwards.
7		Latte Macchiato dispensing button	
8		ON/OFF button	



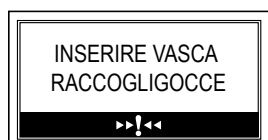
**MACHINE MENU** Used to customize the machine's operational settings**DISPLAY MENU****WATER MENU**

**MAINTENANCE****FACTORY SETTINGS****3.2. Machine indications**

For the machine to become operative, the service hatch must be closed



Fill the coffee hopper with coffee beans.



Insert the drip tray



The appliance requires a descaling cycle.  
If this message appears you may continue to use the machine but the operations may be compromised. Remember that any damage caused due to lack of de-scaling is not covered by the warranty.



Insert the dreg drawer



Close or correctly position the coffee bean hopper lid to enable dispensing of any beverage



The machine requires replacement of the "Intenza" water filter with a new one. Proceed with the replacement of the filter. The alarm is displayed only if the "Enable Filter" function is ON.



Take out the tank and fill it with fresh drinking water



The machine indicates that in a few cycles' time the dreg drawer will need emptying.  
This message allows you to carry on dispensing beverages.



Insert the brewing unit in its correct location



Remove the dreg drawer and empty out the dregs. Note: the dreg drawer must only be emptied with the machine switched on. If the drawer is emptied with the machine switched off the machine cannot register the emptying operation.



An operation has been selected that requires the dispensing of milk.  
Insert the cappuccino maker in the machine as specified in the manual.




An operation has been selected that requires the dispensing of milk. Insert the valve in the cappuccino maker.



An event has occurred that requires restarting the appliance. Note the code (E xx) shown at the bottom. Switch off the machine and switch it back on after 30 seconds. If the problem persists, contact the assistance center.

### 3.3. Operation, cleaning and maintenance

Operating the machine		
1	Fill water tank	
2	Fill the coffee bean hopper	
3	Switch on the appliance	
4	Press the button to start the appliance	
5	Select the desired language	Store
6	Heating	When the heating phase begins, wait for it to finish
7	Rinse	Carry out a rinse cycle for the internal circuits
8	Machine ready	The machine is ready to dispense beverages

CLEANING AND TECHNICAL SERVICING		
A	Empty the dreg drawer	When indicated
B	Empty the drip tray	As necessary (float indicator)
C	Clean the water tank	Weekly
D	Clean the coffee bean hopper	As necessary
E	Clean the casing	As necessary
F	Clean the brewing unit	Every time the coffee bean hopper is filled or weekly
	Lubricate the brewing unit	After 500 dispensing cycles
	Clean the unit housing	Weekly
H	Descaling	When indicated
I	Cleaning the cappuccino maker with detergent	Before redelivery

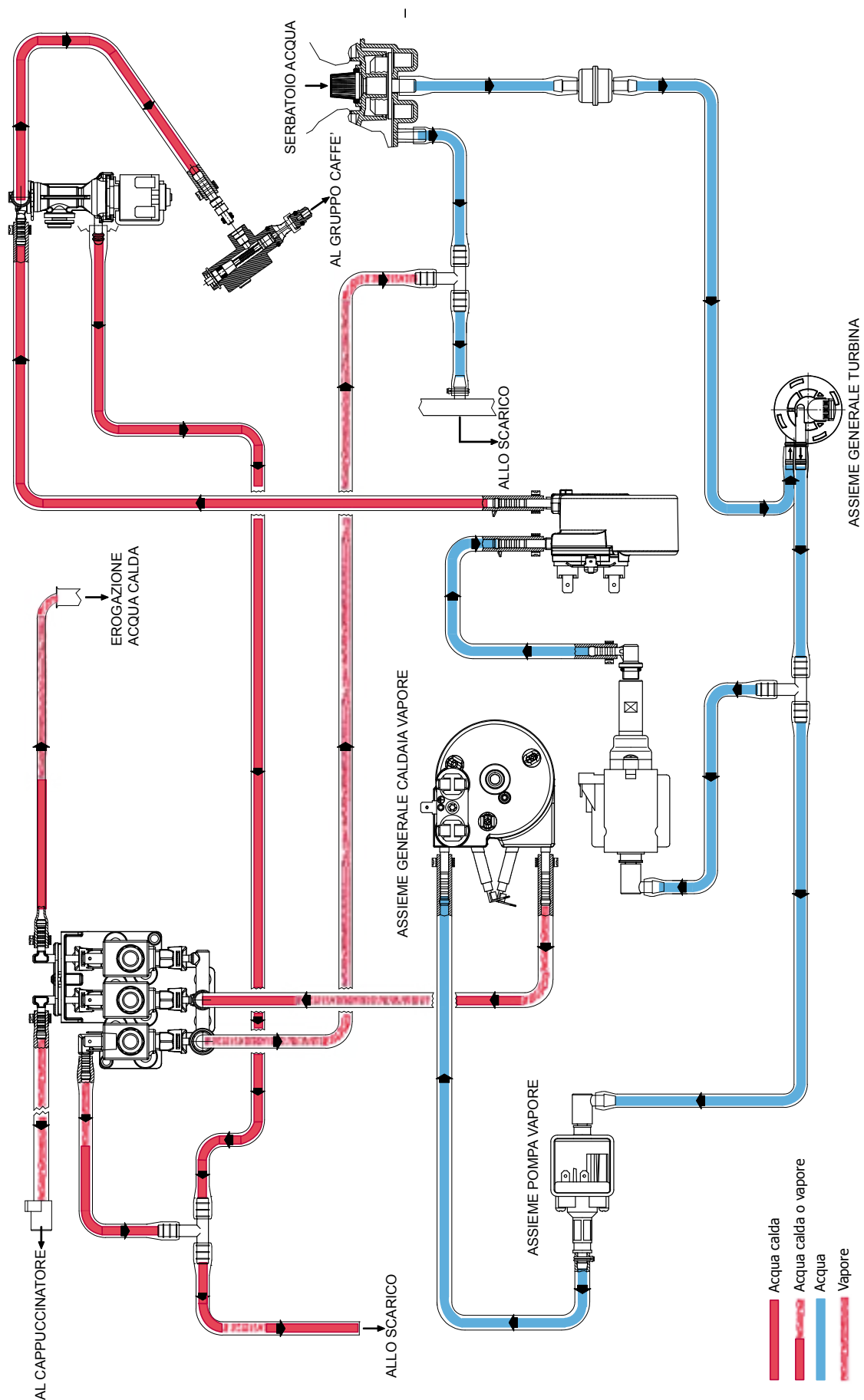
Descaling cycle frequency			
Hardness	Water hardness	Without water filter	With water filter
<b>1</b>	Soft (up to 7°dH)	240 litres (480,000 pulses)	480 litres (960,000 pulses)
<b>2</b>	Medium (7° - 14°dH)	120 litres (240,000 pulses)	240 litres (480,000 pulses)
<b>3</b>	Hard (15° - 21°dH)	60 litres (120,000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



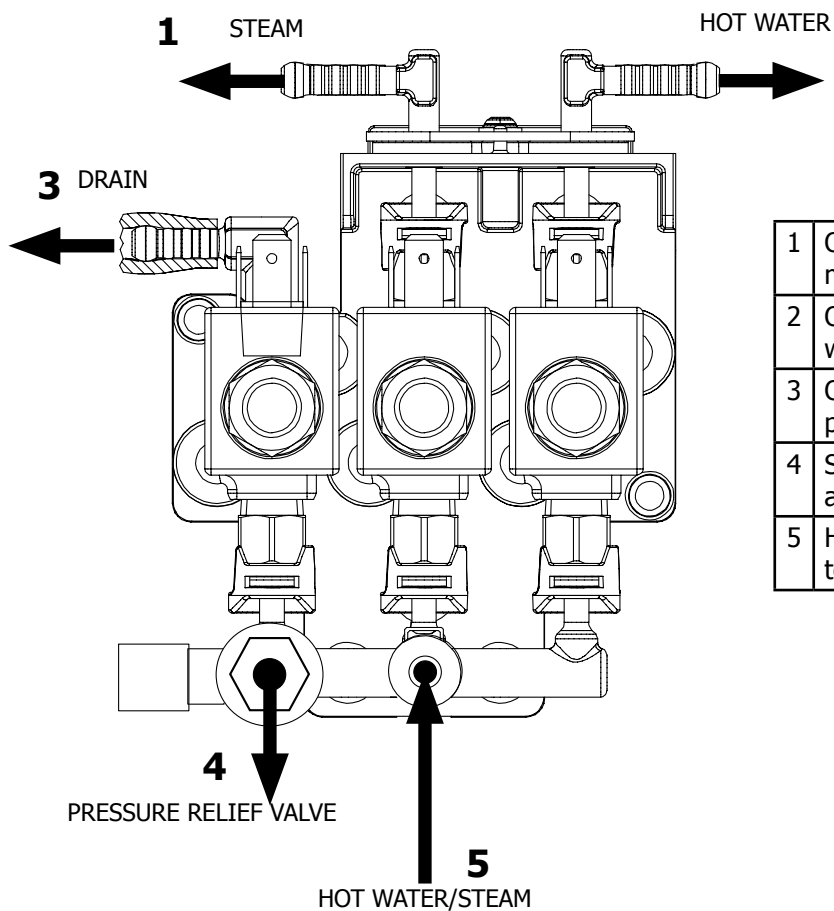
## CHAPTER 4

### OPERATING LOGIC

### 4.1. Water circuit

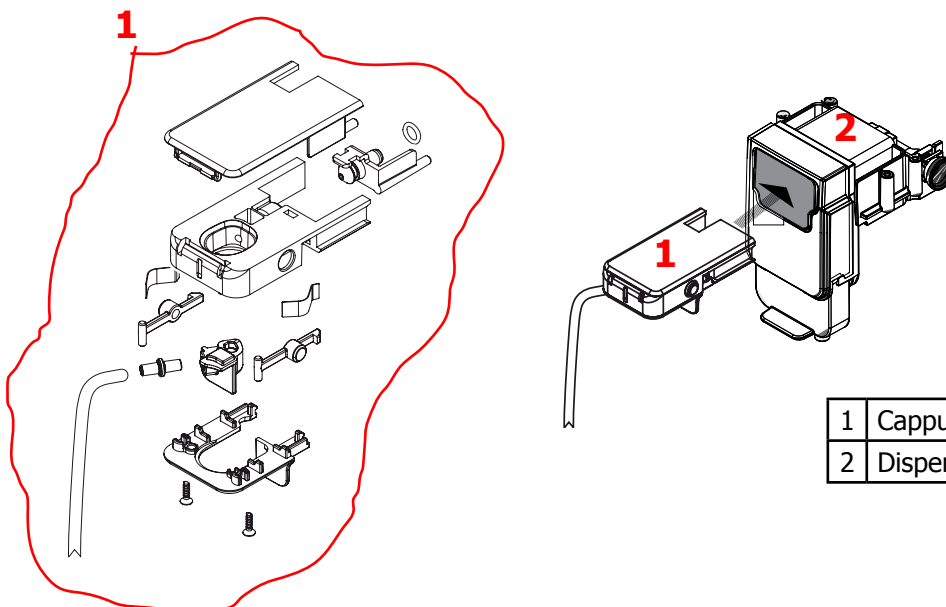


#### 4.2. Frother unit valve assembly



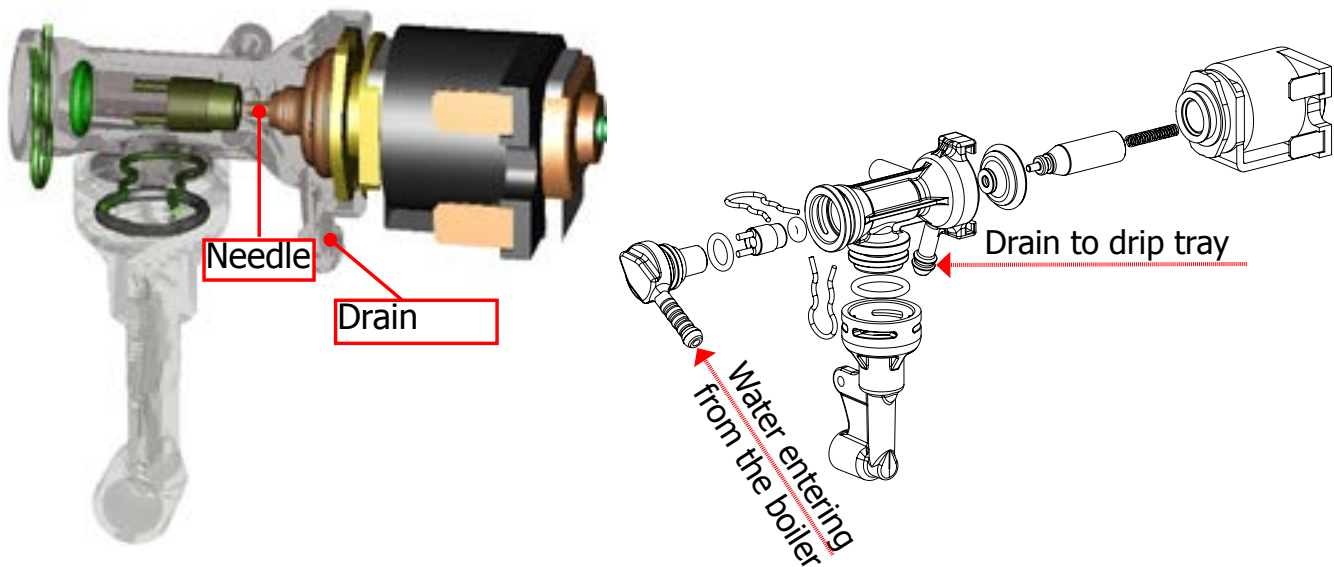
1	Outlet leading to the cappuccino maker for milk-based products
2	Outlet leading to the steam pipe but which dispenses hot water only
3	Outlet for reducing the internal pipe pressure after dispensing
4	Safety valve protecting the valve assembly
5	Hot water or steam inlet according to selected beverage

#### 4.3. Cappuccino maker assembly



1	Cappuccino maker assembly
2	Dispenser assembly

#### 4.4. Relief valve



##### Functions:

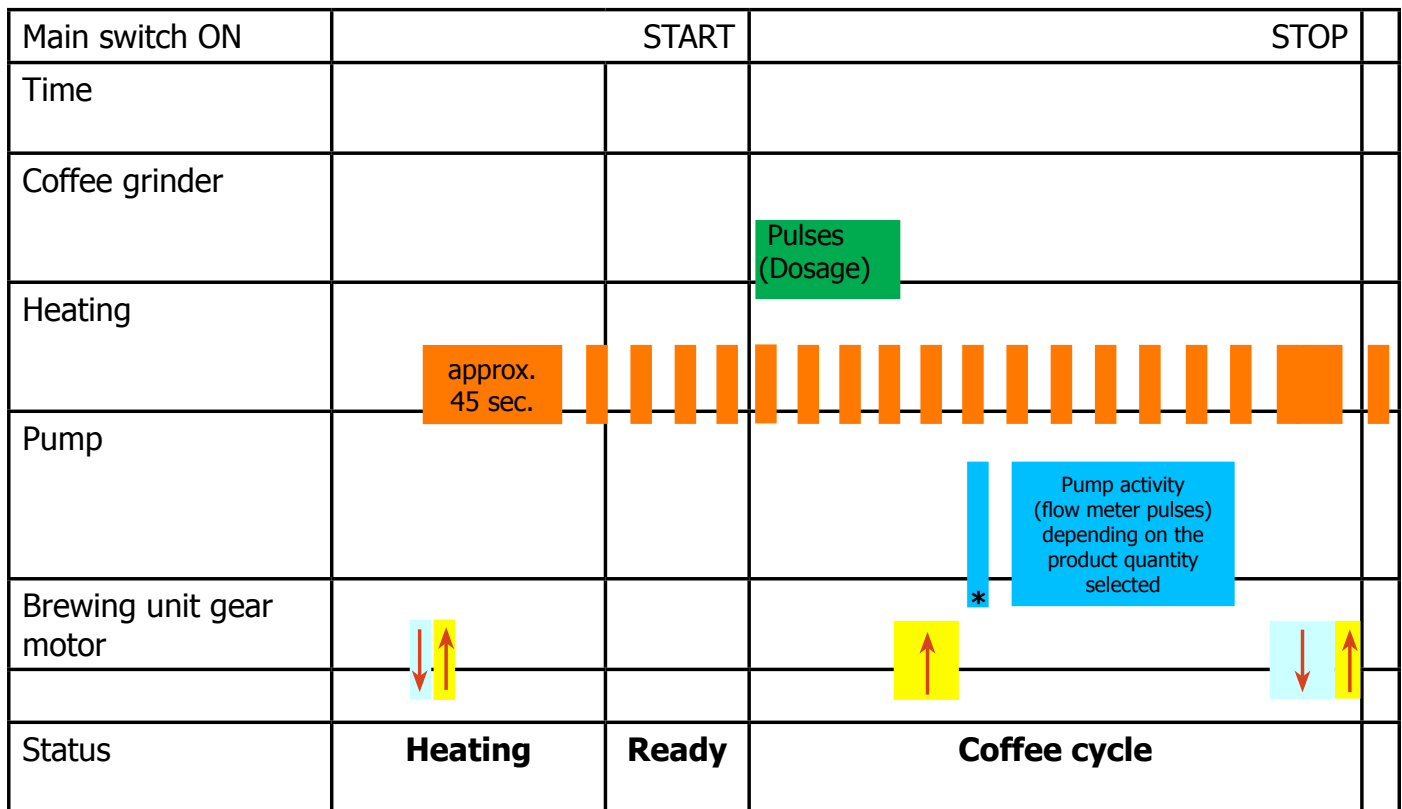
**Safety valve:** functions as a safety valve by opening towards the drain in the event that the pressure rises above 16-19 bar

**Filling the circuit:** The solenoid valve opens (drain position) and the pump is activated, automatically refilling the circuit by expelling the air in the pipe

**Unit discharge:** before the unit descends it opens briefly, discharging the pressure created to prevent spraying and making the dregs drier

**Coffee beverage:** when a coffee beverage is selected, the pump is charged briefly during the grinding process and the valve assumes the drain position in order to fill the pipes with hot water.

### 4.5. Coffee cycle



**Notes: \* Only with Pre-brewing**



### Single microswitch gear motor

#### Switching on

When the machine is switched on, the gear motor repositions itself as follows:

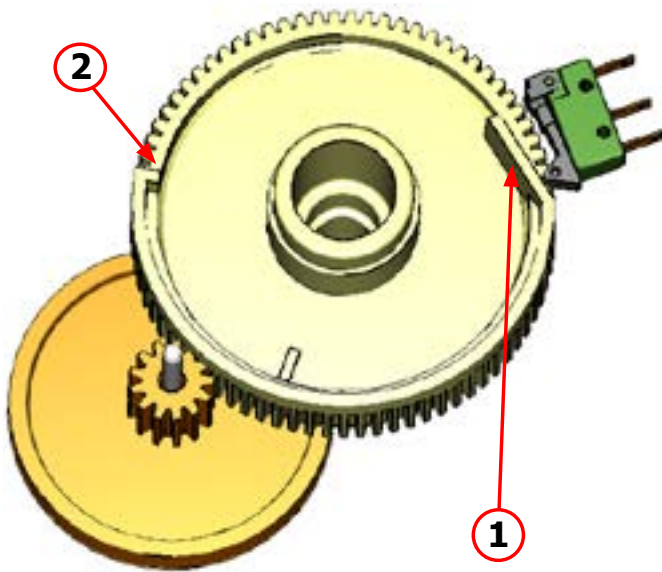
- It acts on microswitch 1 (see following chapter)
- The gear motor changes its rotation direction and moves upwards again by approx. 1-2 mm
- The boiler begins to heat the water for approx. 45 sec., at full power, in order to reach the optimal temperature. The temperature will then remain at a constant level.

#### Coffee cycle

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



#### 4.6. 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 standby position to the dispensing position, and then back to the standby position again.

- **Standby position: 1**

- **Dispensing position: 2**

#### 4.7. Temperature sensor (adjustment)

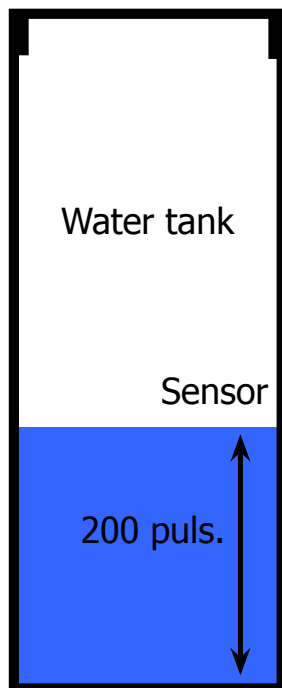
Temp. (°C)	R nom (kΩ)	ΔR (+/- %)
20	61.465	8.6
50	17.599	5.9
75	7.214	4.1
80	6.121	3.7
85	5.213	3.4
90	4.459	3.1
100	3.3	2.5
125	1.653	3.9
150	0.893	5.1

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 of the sensor and adjusts it accordingly.

Heating element values and corresponding temperatures: see table.

#### 4.8. Water level detection (water tank)



##### **“Water low” message (water reserve)**

###### **Function:**

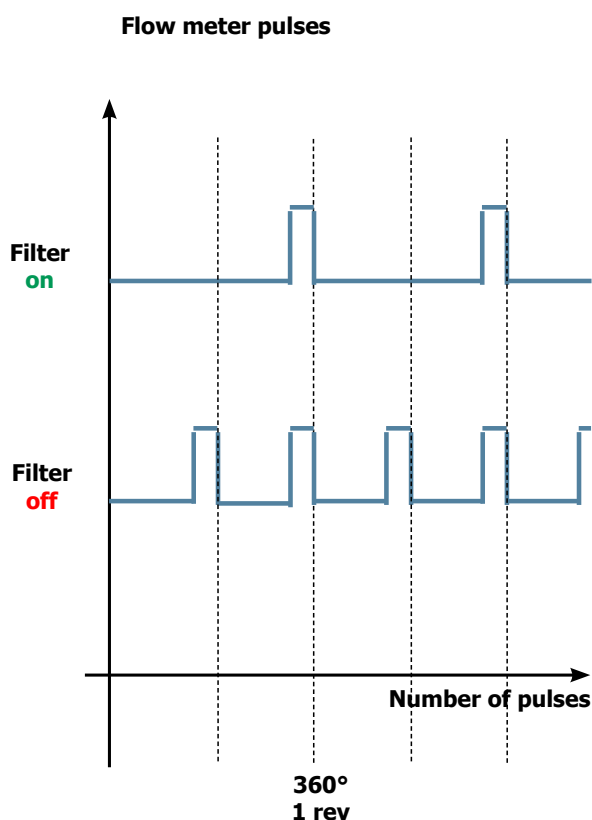
The water level is monitored by a capacitive sensor, located one third of the way up the water tank wall.

If the electronics assembly detects, by means of the sensor, that the amount of water in the tank has dropped below the above mentioned level, a water reserve remains available for the dispensing process underway (this will cover 200 flow meter pulses).

The beverage dispensing process will then come to an end.

If a dispensing cycle ends after the sensor has been triggered (in the reserve) then the display “Water low” continues to be displayed during the following dispensing cycle.

#### 4.9. Descaling request



##### **“Descaling” – message with water filter inserted**

(appliances with display only)

The water hardness is set on the basis of the regional water hardness analysis (1, 2, 3, 4).

###### **Filter off:**

If the function is turned off the electronics assembly monitors the flow meter pulses, recording one pulse each turn.

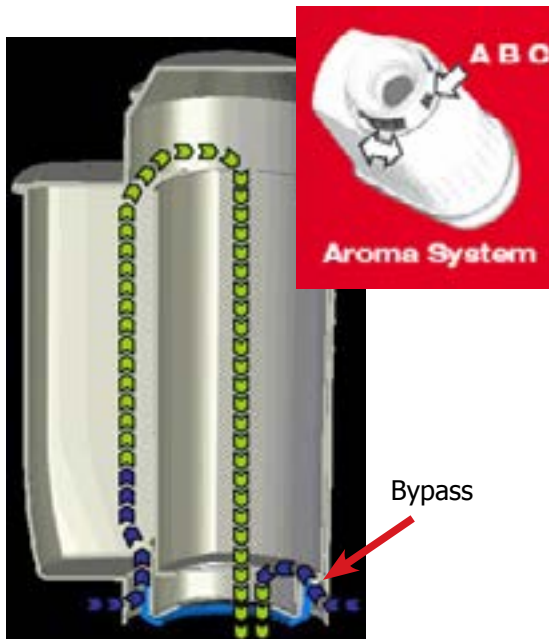
###### **Filter on:**

If the function is turned on the electronics assembly monitors the flow meter pulses, recording one pulse every two turns.

##### **“Change water filter” message**

The electronics assembly uses the flow meter pulses to keep track of the amount of water which has flowed through; after the specified amount (set in accordance with the water hardness level), the “Replace filter” message appears.

#### 4.10. Water filter



##### 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.

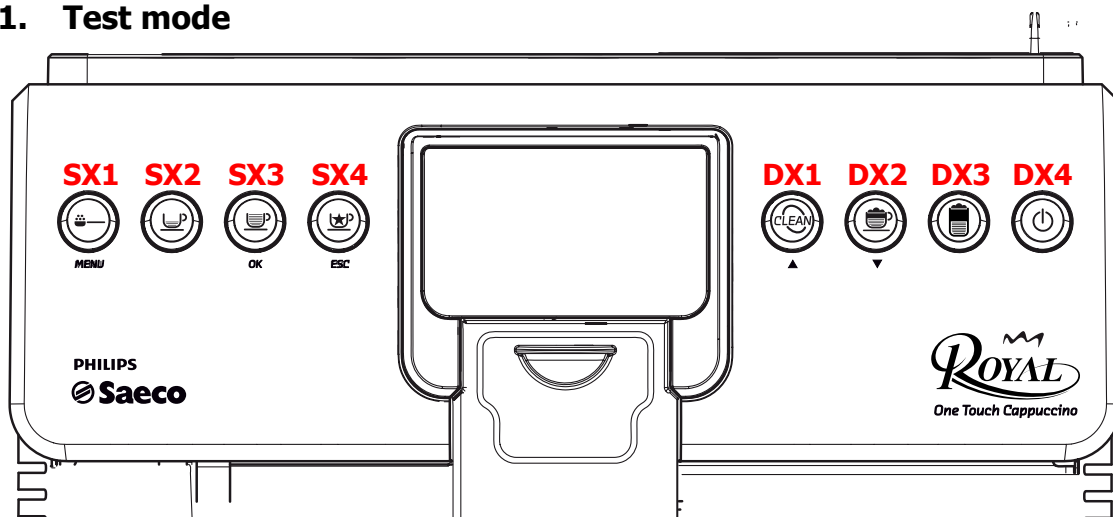
See small image.



## CHAPTER 5

## TROUBLESHOOTING

## 5.1. Test mode



BUTTON	MAIN FUNCTION	SECONDARY FUNCTION
SX1	Select ground/pre-ground	Menu access (hold down)
SX2	Espresso	
SX3	Coffee	OK
SX4	Access to Special Menu	ESC
DX1	Clean cycle	Scroll menu up
DX2	Cappuccino	Scroll menu down
DX3	Latte macchiato	
DX4	Entry to Stand-By	

### To enter Test Mode:

- Switch on the machine.
- Press the four function keys in the sequence indicated below (**SX3, SX2, SX4, SX1**) before the initialization bar is completed.

TITLE			
SX1	SX2	SX3	
INFO1	INFO2	INFO3	INFO4
INFO5	INFO6	INFO7	
	DX2	DX3	DX4

Entry into Test Mode results in a screen divided into sections, as illustrated in the diagram below

The sectors highlighted in yellow on the following screens represent the various loads that can be activated by pressing the keys indicated in each sector.

This load is deactivated by pressing the same key once more.

The sectors highlighted in green provide information on the sensor status.

Other conditions in which a load can be automatically deactivated are:

- If a work cycle is defined and ends (e.g., coffee grinder or brewing unit).
- A time-out is reached (e.g.: 5 sec for the boiler test).

The symbols ▼ ▲ can be activated with keys SX4 and DX1 and are used to navigate the Test mode.

## Description of each page

## 1 Software

1 Software			
DF:64	ER:8	Debug	▲
B2C	B2B	B2B RI	MV: xx
f: xx Hz	*	xx.yy.zz	
▼	Swiss	Pow Off	ESC

SECTOR	TYPE	DESCRIPTION
<b>DF</b>	FUNCTION	Provides information on the memory status. Must be 64
<b>ER</b>	FUNCTION	Provides information on the memory status. Must be 8
<b>Debug</b>	FUNCTION	If selected, enables a debug window in user mode
<b>Swiss</b>	FUNCTION	The Swiss function is used to enable or disable the ECO-MODE default setting. If Swiss is enabled, the default for the Eco-Mode is "ON", if Swiss is disabled the default for the Eco-Mode is "OFF". The water circuit emptying function restores the ECOMODE value to the default value. As stated above, the default value depends on the Swiss setting.
<b>Pow Off</b>	FUNCTION	Indicates whether the machine will go to Stand-By mode when powered up - main electro-mechanical switch (I/O) on, if this occurs the words "Pow Off" are highlighted. If it is disabled, the machine will not go to Stand-By mode straight after Power On.
<b>ESC</b>	FUNCTION	If pressed, it exits the Test mode.
<b>B2C</b>	INFO	If activated, it indicates that the machine version is B2C.
<b>B2B</b>	INFO	If activated, it indicates that the machine version is B2B.
<b>B2B RI</b>	INFO	If activated, it indicates that the machine version is B2B with mains water.
<b>MV: xx</b>	INFO	Indicates the version of the EEPROM Memory
<b>f</b>	INFO	Indicates the mains frequency. It has the following values: 50 Hz 60 Hz ERR if the frequency cannot be detected.
<b>xx.yy.zz</b>	INFO	Indicates the version of the loaded software.

Press DX1 to move on to the next screen

## 2 Brew Unit

2 Brew Unit			
Work	Home	Stop	▲
H/W	m Door	m Dreg	m BU
xx	m Tray	mA: xxxx	
▼	Dreg+	Dreg-	*

SECTOR	TYPE	DESCRIPTION
<b>Work</b>	FUNCTION	If activated, it causes the gear motor to move the unit into the Work position
<b>Home</b>	FUNCTION	If activated, it causes the gear motor to move the unit into the Home position
<b>Stop</b>	FUNCTION	If activated, it stops the gear motor
<b>Dreg+</b>	FUNCTION	If activated it increases the maximum value of the dregs set before the alarm is activated
<b>Dreg-</b>	FUNCTION	If activated it decreases the maximum value of the dregs set before the alarm is activated
<b>H/W</b>	INFO	If activated it indicates that the Home/Work position microswitch has been pressed
<b>m Door</b>	INFO	If activated it indicates that the side hatch microswitch has been pressed
<b>m Dreg</b>	INFO	If activated it indicates that the magnetic reed sensor for the dreg drawer presence is active container present
<b>m BU</b>	INFO	If activated it indicates that the unit presence microswitch has been pressed
<b>xx</b>	INFO	Indicates the current value set for the maximum quantity of dregs
<b>m Tray</b>	INFO	If activated it indicates that the magnetic reed sensor for the drip tray presence is active drip tray present
<b>mA</b>	INFO	Indicates the maximum unit current value as an average in one sec.

Press DX1 to move on to the next screen

## 3 Water Circuit

3 Water Circuit			
EV steam	EVwater	EVdisch.	▲
m Capp	m Milk	m Tank	*
T1 xx	T2 xx	p/s: xx	
▼	EVcoffee	Pump 1	Pump 2

SECTOR	TYPE	DESCRIPTION
<b>EVsteam</b>	FUNCTION	If activated it switches on the 24VDC solenoid valve in the steam circuit
<b>EVwater</b>	FUNCTION	If activated it switches on the 24VDC solenoid valve in the hot water circuit
<b>EVdisch.</b>	FUNCTION	If activated it switches on the 24VDC solenoid valve in the steam circuit discharge
<b>EVcoffee</b>	FUNCTION	If activated it switches on the 230VAC solenoid valve in the electro-pilot
<b>Pump 1</b>	FUNCTION	If activated it switches on pump 1 in the coffee circuit
<b>Pump 2</b>	FUNCTION	If activated it switches on pump 2 in the water/steam circuit

SECTOR	TYPE	DESCRIPTION
<b>m Capp</b>	INFO	Indicates the status of the presence of the cappuccino maker unit if it is inserted it is on
<b>m Milk</b>	INFO	Indicates the status of the presence of the milk valve inside the cappuccino maker if it is inserted it is on
<b>m Tank</b>	INFO	If activated it indicates that the water sensor in the tank is active water present at least to the sensor level
<b>T1 xx</b>	INFO	indicates the temperature of the coffee boiler in °C
<b>T2 xx</b>	INFO	indicates the temperature of the water/steam boiler in °C
<b>p/s: xx</b>	INFO	indicates the water flow rate in the water circuit, expressed in flow meter pulses per second

Press DX1 to move on to the next screen

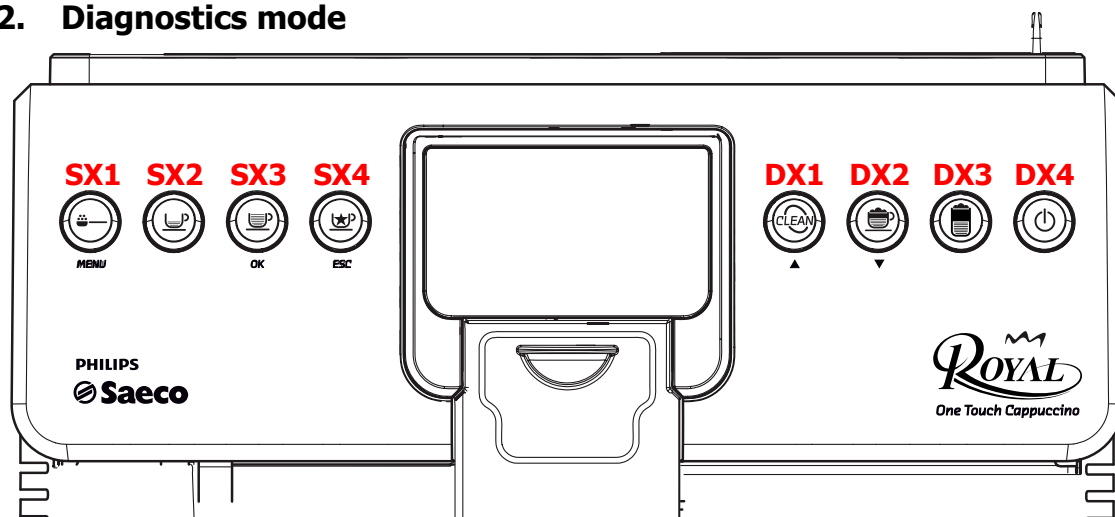
#### 4 Heaters & Grinder

4 Heaters & Grinder			
Heater 1	Heater 2	St.Out.	▲
T1 xx	T2 xx	NoBean	T.O.
m Bean	m Dose	Grinder Block	
▼	Grinder	EVdose	CupHeat

SECTOR	TYPE	DESCRIPTION
<b>Heater 1</b>	FUNCTION	If activated, runs the coffee boiler for T.O. (8 seconds). The boiler comes on only if the coffee boiler temperature is less than 130°C
<b>Heater 2</b>	FUNCTION	If activated, runs the coffee boiler for T.O. (8 seconds). The boiler comes on only if the water/steam boiler temperature is less than 130°C
<b>St.Out.</b>	FUNCTION	If selected, it activates the Steam-Out function
<b>Grinder</b>	FUNCTION	If activated, it activates the coffee grinder. The coffee grinder remains on until the activation button is no longer pressed, or the coffee low warning is given or the doser chamber is filled, i.e. the "m Dose" microswitch is pressed. The coffee grinder will not come on if the "m Bean" sensor is not enabled (bean lid closed)
<b>EVdose</b>	FUNCTION	Activates the doser solenoid valve for 0.5 sec
<b>CupHeat</b>	FUNCTION	Activates the cup heater plate
<b>T1 xx</b>	INFO	indicates the temperature of the coffee boiler in °C
<b>T2 xx</b>	INFO	indicates the temperature of the water/steam boiler in °C
<b>NoBean</b>	INFO	If activated, it indicates that there is no coffee
<b>T.O.</b>	INFO	Displays the 8 second countdown prior to boiler activation
<b>m Bean</b>	INFO	If activated it indicates that the bean hatch is closed
<b>m Dose</b>	INFO	If activated, it indicates that the doser microswitch is pressed doser chamber full
<b>Grinder Block</b>	INFO	If activated, it indicates that the coffee grinder is blocked for safety reasons



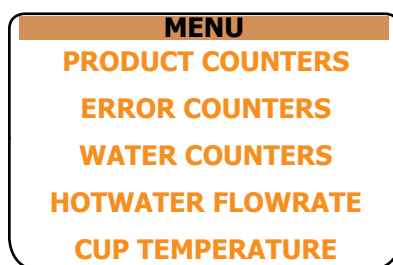
## 5.2. Diagnostics mode



### To enter Diagnostics mode:

- Switch on the machine
- Press the four function keys in the sequence indicated below (**SX2, SX4, SX1, SX3**) before the initialization bar is completed

### Description of menus in diagnosis mode



#### 1. Product counters

- Espresso
- Coffee
- Long coffee
- American Coffee
- Hot water
- Cappuccino
- Latte macchiato
- Hot milk

#### 2. Error counters

##### 2.1. Error log

- Error code
- Error index
- Error text

##### 2.2. Errors reset

#### 3. Water counters

##### 3.1. Descaling cycle

- Since last
- Since second last
- Since third last
- Number of execution

##### 3.2. Brewing unit cleaning

- Number of execution
- Since last

##### 3.3. Since production

##### 3.4. Water filter

- Since last reset
- Number of reset

#### 4. Hotwater flowrate

- 100 ÷ 150

#### 5. Cup temperature

- 75 ÷ 85

Press buttons **DX2** or **DX1** to move the cursor onto the desired beverage and press **SX3** to enter the sub-menu

### 1. PRODUCT COUNTERS

• ESPRESSO (default 0)	• dispensing no.
• COFFEE (default 0)	• dispensing no.
• LONG COFFEE (default 0)	• dispensing no.
• AMERICAN COFFEE (default 0)	
• HOT WATER (default 0)	• dispensing no.
• CAPPUCCINO (default 0)	• dispensing no.
• LATTE MACCHIATO (default 0)	• dispensing no.
• HOT MILK (default 0)	• dispensing no.

### 2. ERROR COUNTERS

• ERRORS LOG (default 0)	• ERROR CODE (default 0)	ERROR CODE - the code representing the type of error that has occurred (see Tab. 5.3 Error messages)
	• ERROR INDEX (default 0)	NUMERICAL POSITION - represents the numerical position of the error in the internal list for a max no. of 20
	• ERROR TEXT (default 0)	ERROR DESCRIPTION - a text description of the type of error that has occurred

### • ERRORS RESET

All the errors are reset

### 3. WATER COUNTERS

• DESCALING CYCLES	• SINCE LAST (default 0)	Represents the consumption of water since the last descaling cycle
	• SINCE SECOND LAST (default 0)	As above but for the penultimate descaling cycle
	• SINCE THIRD LAST (default 0)	As above but for the third last descaling cycle
	• NUMBER OF EXECUTION (default 0)	total no. of descaling cycles performed
• BREWING UNIT CLEANING	• NUMBER OF EXECUTION (default 0)	Represents the consumption of water since the last unit cleaning cycle. When performed it goes back to 0.
	• SINCE LAST (default 0)	Represents the number of unit cleaning cycles carried out on the C.A.
• WATER FILTER		
	• SINCE LAST RESET (default 0)	Represents the consumption of water since the last filter activation cycle. When performed it goes back to 0
	• NUMBER OF RESET (default 0)	total no. of filter activation cycles performed.

### • WATER SINCE PRODUCT

Total consumption of water in litres (default 0)

### 6. HOTWATER FLOWRATE

100 to 150 (default 120)

### 7. CUP TEMPERATURE

75 to 85 (default 78)

**5.3. Error messages**

<b>Code</b>	<b>Brief description</b>	<b>Description</b>
01	Coffee grinder blocked	The coffee grinder is blocked (grinder blades jammed or sensor not reading properly)
03	Brewing unit blocked in 'work' position	Descent time-out exceeded
04	Brewing unit blocked in 'home' position	Ascent time-out exceeded
05	Water circuit blocked	No water in flow meter or flow meter not turning (jammed)
06	Frother unit solenoid valve	Frother unit solenoid valve short-circuit
07	Doser microswitch blocked	Doser microswitch short-circuit
10	Coffee boiler short-circuit	Coffee boiler temperature sensor short-circuit
11	Coffee boiler in open circuit	Coffee boiler temperature sensor in open circuit
12	Steam boiler short-circuit	Steam boiler temperature sensor short-circuit
13	Steam boiler in open circuit	Steam boiler temperature sensor in open circuit
14	Misc. temperature errors (coffee boiler)	Coffee boiler temperatures out of control
15	Misc. temperature errors (steam boiler)	Steam boiler temperatures out of control
16	Brewing unit short-circuit	Brewing unit microswitch short-circuit
17	Not used	
18	Not used	
19	No zero crossing	No zero crossing on card, could be caused by power board
20	Not used	



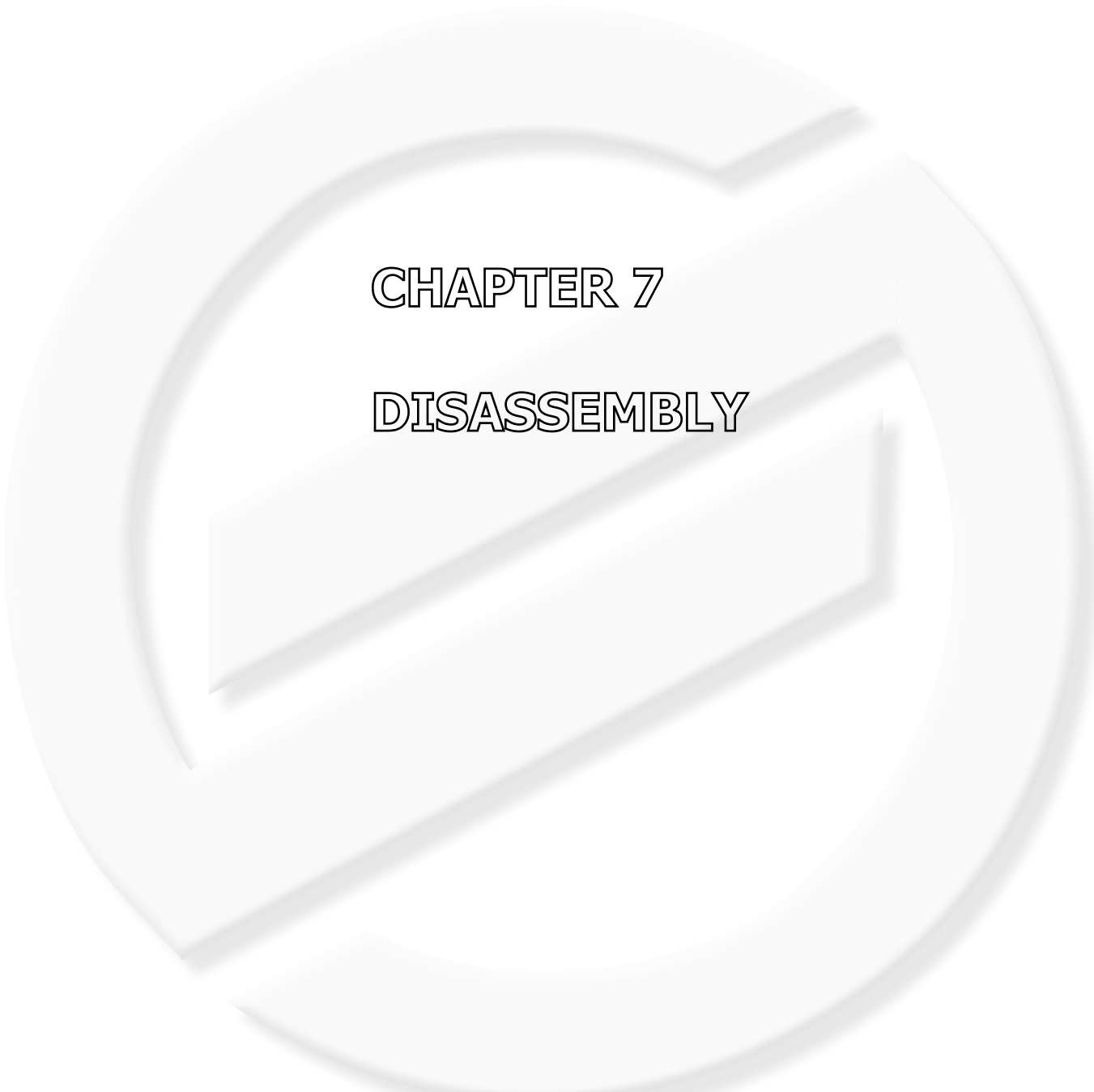
## CHAPTER 6

### SERVICING AND MAINTENANCE

## 6.1. Repair Flow

Proces stap	Saeco no.	Action
<b>Intake</b>	1	Visual inspection (transport damage) take care for pictures
	2	Check Type/serialnumber
		Log all available accessory
<b>Diagnosis</b>	3	Check product for consumer complaint (NFF contact consumer)
	4	Opening machine
	5	Visual inspection check for loosen parts, leaking etc..
	6	Operational tests
<b>Repair</b>		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 damaged due to frozen water
<b>Inspection</b>		
<b>visual</b>		Do cabinet parts fit well together
		Check for damages
<b>Power check</b>		Will the set switch on
<b>Accessoires</b>		Do the accessories match with the intake
<b>Consumer complaint</b>		Check the product for the consumer complaint
<b>Coffee</b>		
<b>Dispense</b>		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 elements



Loosen the screws as illustrated and remove the grinding adjustment lever handle.

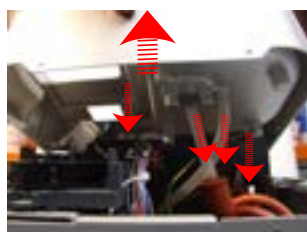
Remove the lid and the water tank, coffee bean and ground coffee container lid, drip drawer, drip tray, brewing unit, coffee unit support plate, coffee dispenser.



Loosen the screw as illustrated and remove the grinding adjustment lever.



Loosen the screws as illustrated.



Lift the upper lid and disconnect the electrical and water circuit connections which prevent it from being removed.



Slide out the pin as illustrated and remove the hatch.

### 7.2. Coffee grinder



Vibration damper.

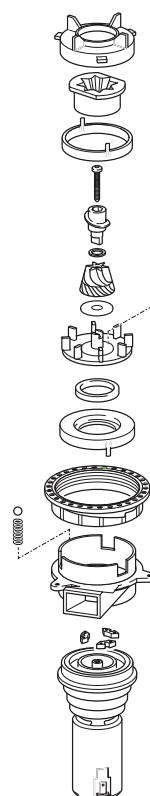
Slide out the coffee grinder from the vibration dampers as illustrated.



Disconnect the electrical connections.



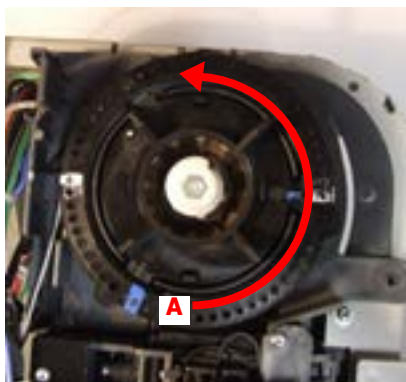
When disassembling, check the position of the marks as illustrated and when re-assembling return them to the same position.



Coffee grinder exploded view



### 7.3. Grinder blades



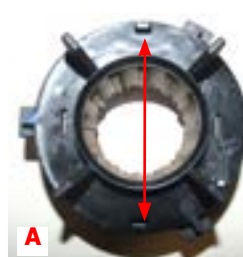
To slide out the upper grinder support turn the nut (A) anticlockwise until it is released.



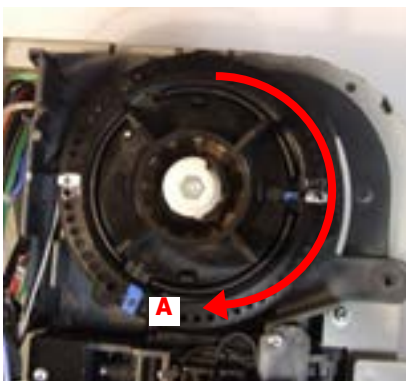
Lower grinder (1) and upper grinder (2).



Loosen the screw as illustrated and slide out the lower grinder. When re-assembling take care to replace the three springs and three balls correctly.



Release the upper grinder lid by pressing on the fins as illustrated (A) and remove the grinder by unhooking the catches as illustrated (B).



**To adjust the distance between the grinders**

- reconnect the coffee grinder and switch on
- turn the adjusting ring (A) slowly clockwise until the two grinders touch each other
- turn the adjusting ring (A) anticlockwise one notch.

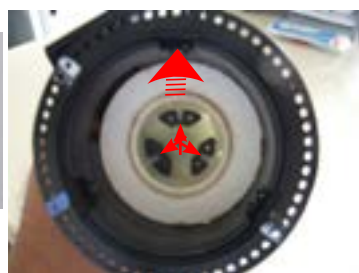
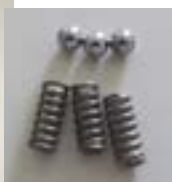


When reassembling the adjusting lever (1) position it in the center (2) and tighten the screw as illustrated.

### 7.4. Coffee grinder motor



Remove the balls as illustrated, the springs underneath and lift up the grinding support.

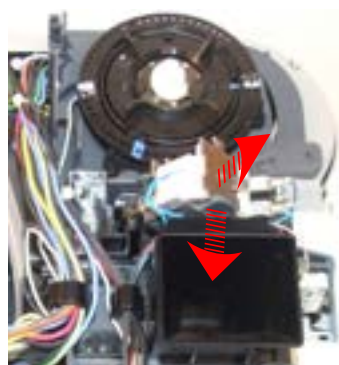


Remove the three grinding dampers and the felt ring.

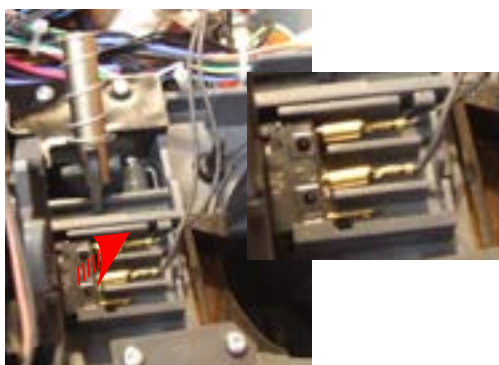


Release the motor support by lifting the catches as illustrated and replace the motor.

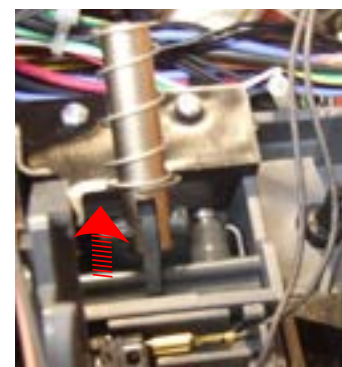
### 7.5. Doser hatch, coil and microswitch



Release the catch as illustrated and lift the coil.

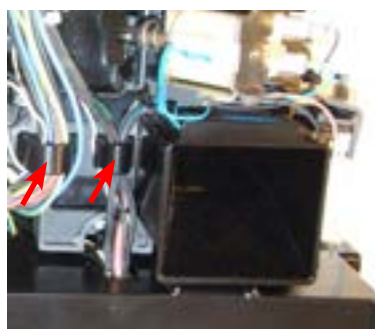


Remove the electrical connections and slide out the microswitch.

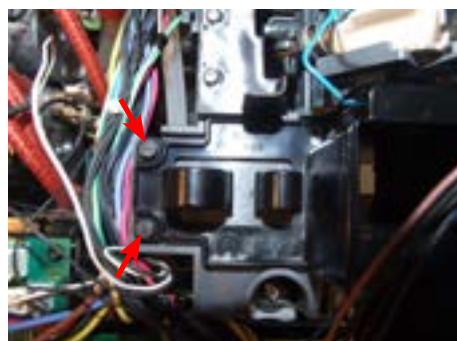


Lift the doser hatch using a lever in the pin and slide it out.

### 7.6. Doser hopper



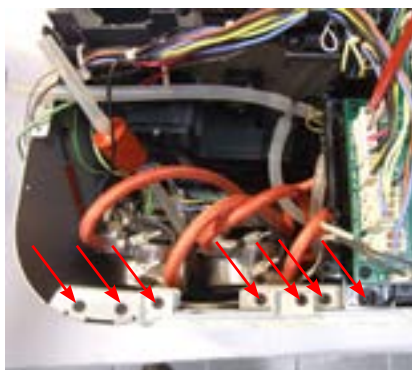
Remove the cabling from the cable grips as illustrated.



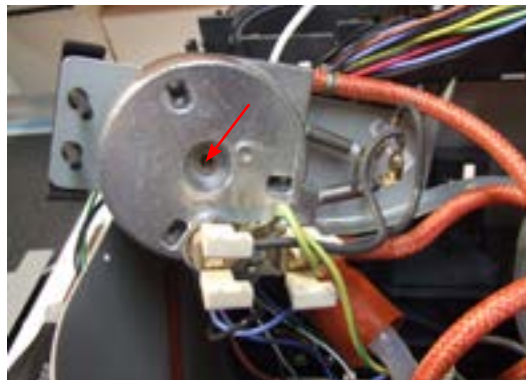
Lift the hopper and release it from the rubber hooks as illustrated.



### 7.7. Coffee boiler and steam boiler



Loosen the screws as illustrated and remove the boiler pin.

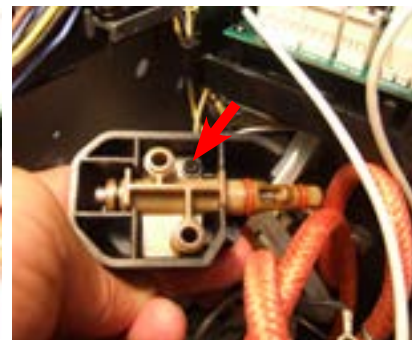
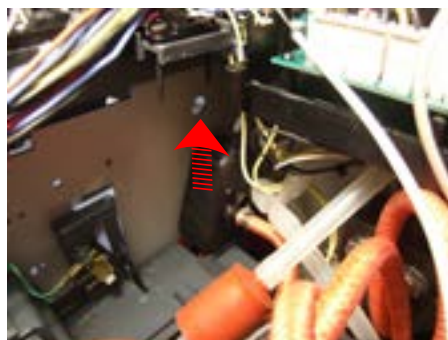


Loosen the screw as illustrated, remove the boiler support and disconnect the electrical and water circuit connections.

### 7.8. Boiler pin

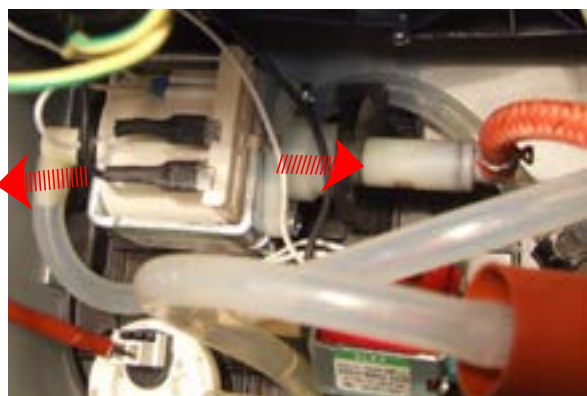


Loosen the screws as illustrated and remove the boiler pin cover.

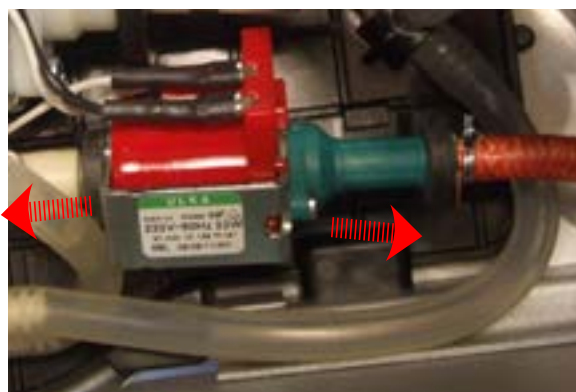


Slip off the pin support and loosen the screw as illustrated.

### 7.9. Coffee pump and steam pump



Remove the boiler support, lift the pump upwards from the two supports and disconnect the electrical and water circuit connections.

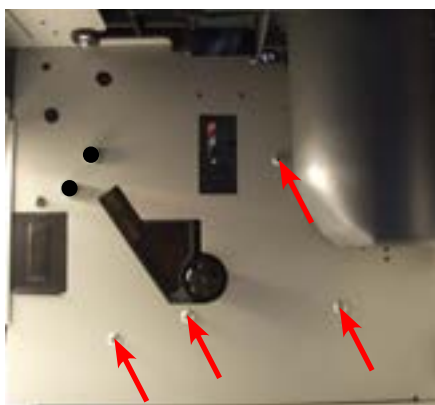


Remove the boiler support, lift the pump upwards from the two supports and disconnect the electrical and water circuit connections.

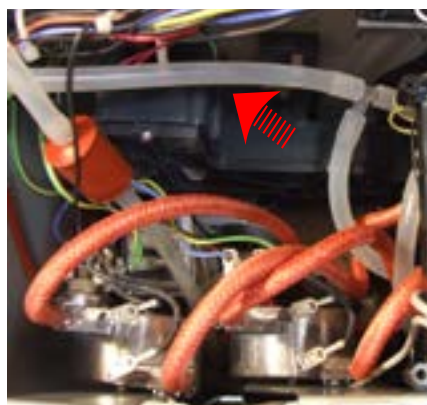
### 7.10. Flow meter



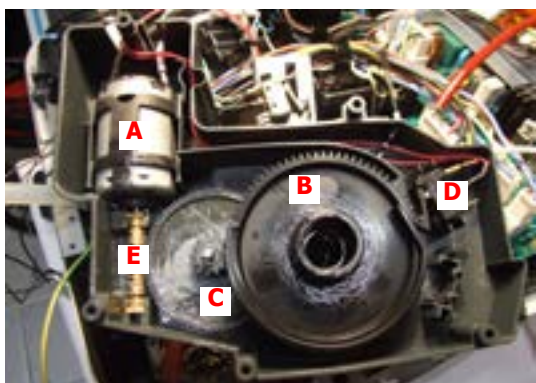
Remove the boiler support lift the flow meter upwards and disconnect the electrical and water circuit connections.



Loosen the screws as illustrated and remove the gear motor assembly.

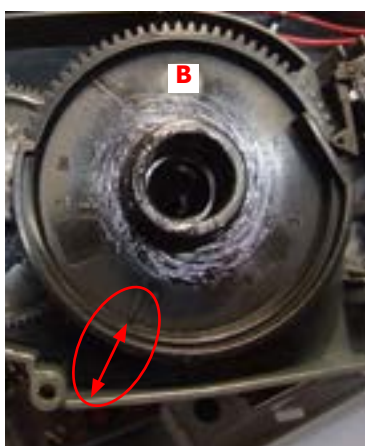


Loosen the screws as illustrated and remove the gear motor cover.



The following are located inside the compartment protected by the casing:

- Electric motor (A) with gears (B) and (C) for transmission and timing of the brewing unit.
- Microswitch (F) detecting brewing unit home and work positions.
- Remove the large gear (B)
- Remove the gear (C) that meshes with the motor transmission shaft
- Remove the motor (A), complete with transmission shaft (E)



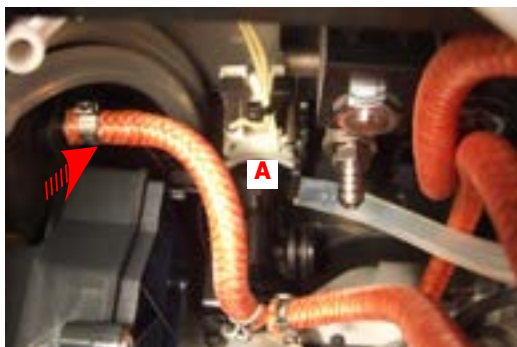
**When re-assembling the gear (B), make sure that the arrow on the gear is in the same position as shown in the photo.**



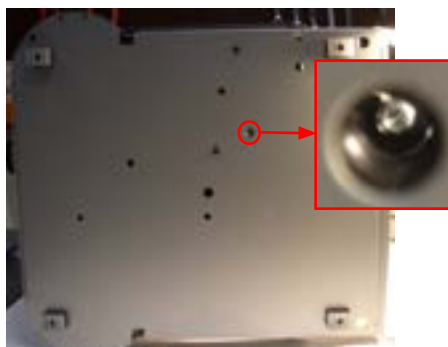
When replacing the motor and the transmission shaft, make sure the guide runners (L) are in the right position. Grease the shaft thoroughly and evenly.



### 7.12. Relief valve



To remove the discharge valve (A) as illustrated firstly loosen the screws which hold the boiler pin cover in place then remove it.



Loosen the screw under the machine as illustrated.



Disconnect all electrical and water circuit connections.

### 7.13. Solenoid valve assembly

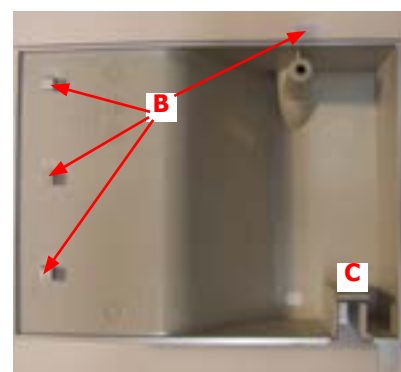


Loosen the screws as illustrated and slide out the card support to access the solenoid valve assembly more easily.



Remove the front body cover as follows:

- Loosen the screw (A) as illustrated
- Move the cover to the left to release the catches (B)
- Lift the lower part of the cover to release the catch (C)
- Pull outwards



Loosen the screws under the front body cover as illustrated.



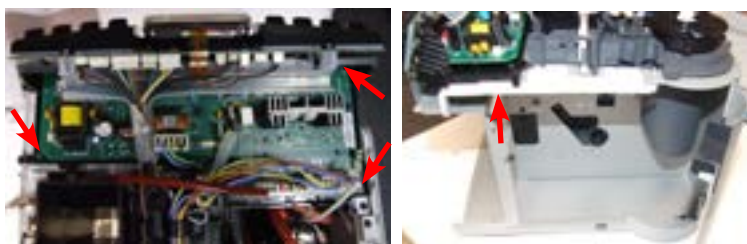
Disconnect the electrical and water circuit connections.



Loosen the screws on the support.



### 7.14. Steam pipe assembly

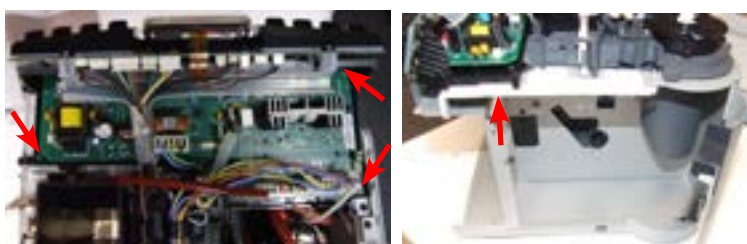


Loosen the screws as illustrated and slide out the card support to access the solenoid valve assembly more easily.

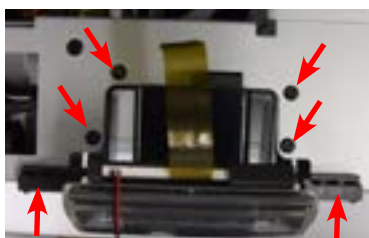


Loosen the screws as illustrated and remove the clip.

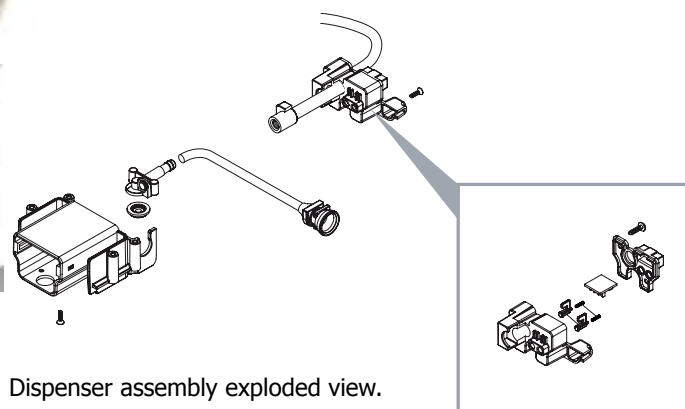
### 7.15. Dispenser assembly



Loosen the screws as illustrated and slide out the card support to access the solenoid valve assembly more easily.



Loosen the screws as illustrated, slide out the display assembly and the dispenser assembly.

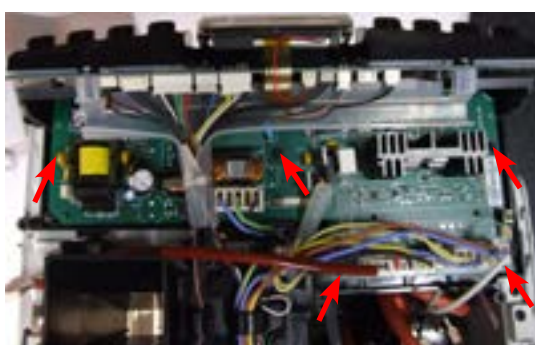


Dispenser assembly exploded view.

### 7.16. Power board



Loosen the screws as illustrated and remove the card cover.

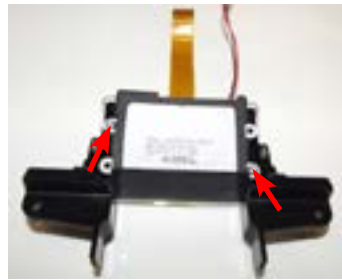


Loosen the screws as illustrated, remove the card cover and disconnect the electrical connections.

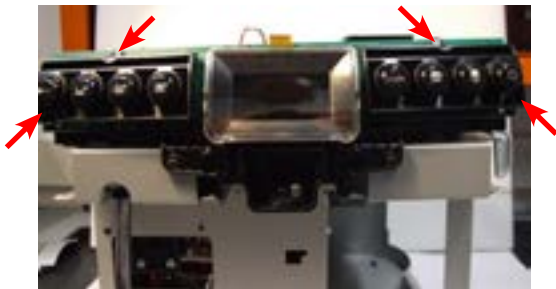
### 7.17. Display, keypads and control board



Loosen the screws as illustrated and disconnect the electrical connections and remove the display assembly.



Loosen the screws on the back of the display assembly as illustrated.



Loosen the screws shown and slide out the keypads.

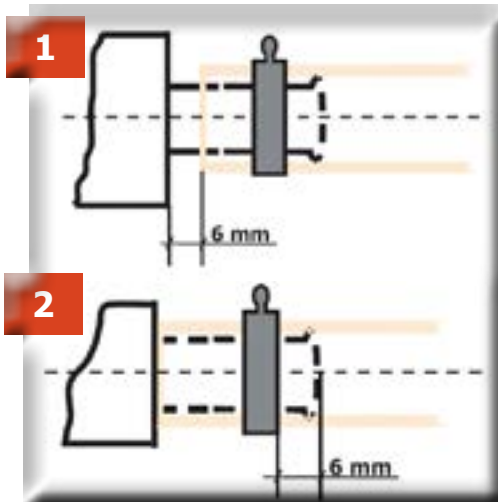


Loosen the screws as illustrated and disconnect all electrical connections.



### 7.18. Fitting and removing Oetiker clamps

Control board and display card assembly



1) Boiler connection

2) Other connections



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



Tighten the clamp as illustrated.





# CHAPTER 8

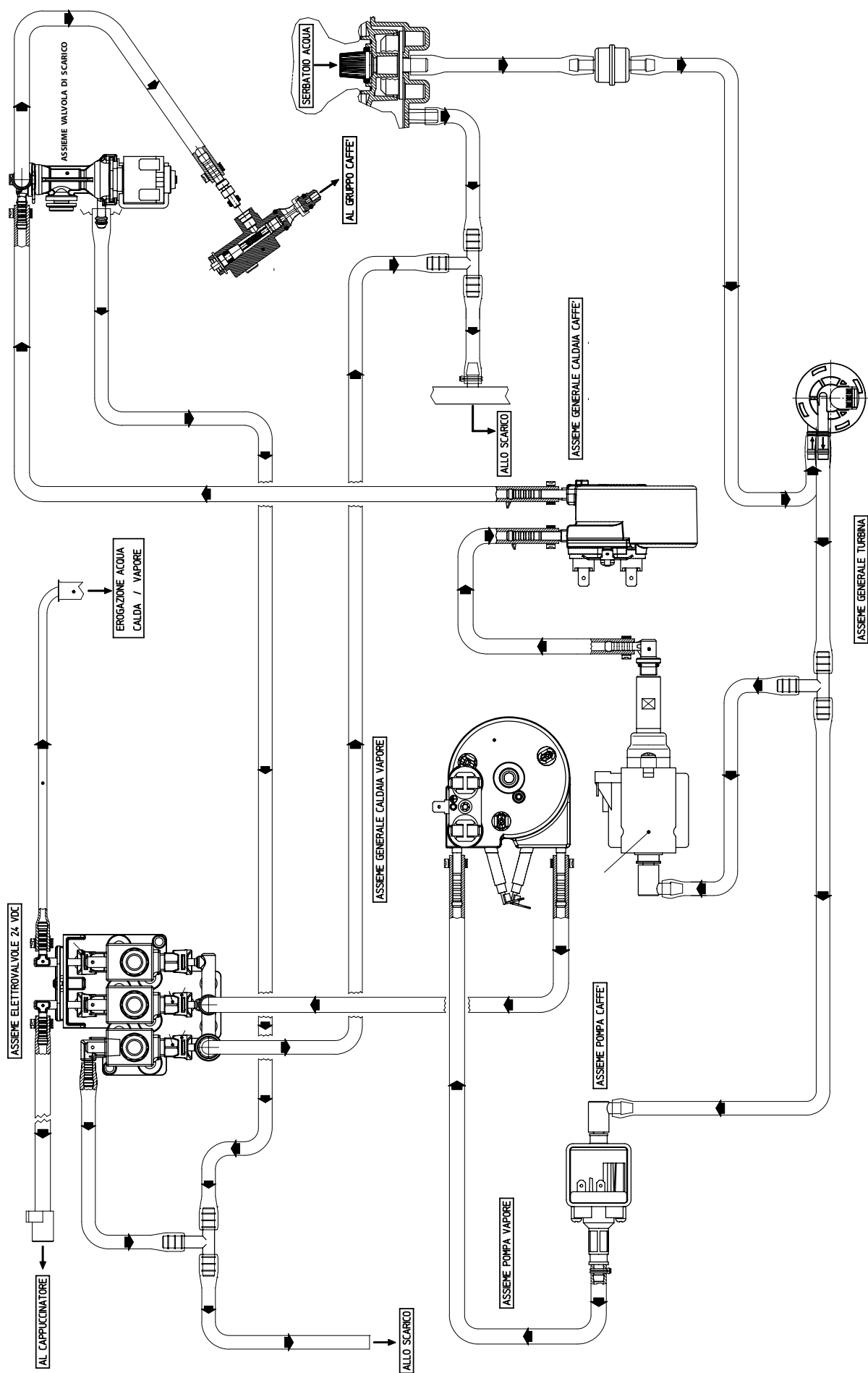
## NOTES





## CHAPTER 9

# WATER CIRCUIT DIAGRAM





# CHAPTER 10

## ELECTRICAL DIAGRAM

