VIENNA
CAFE GRANDE
CAFE CREMA
VIENNA DIGITAL

SERVICE MANUAL

Revision 3

Saeco

Saeco International Group **DEC.: 2003**

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CHAPTER 1
INTRODUCTION

1. Documents required

The following documents are required for authorised repairs:

- Service manual
- Operating instructions where available

2. Equipment

In addition to an electrical workshop, the following standard tools are necessary:

Qty	Description	Comments
1	Special screwdriver (Pozi)	Size: PZ1
1	Special screwdriver (Pozi)	Size: PZ2
1	Special screwdriver (Torx)	Size: T10
1	Temperature measuring device	Temperature range > 150ºC Suitable for point measurements
1	Special housing	Vienna housing lower part Without back wall

3. Material

Description	Comments	Brand
Heat conductive paste	Temperature resistance ≥ 200°	User's choice (e.g. RS components)
Bolt adhesive	Temperature resistance ≥ 150°	User's choice (e.g. RS components)
Descaler	Item No.: 9801	Saeco
Grease solvent		User's choice
Silicone grease (food safe)	Item No.: 10,80032	Saeco

4. Safety instructions

All prescriptions and regulations in force regarding the repair of electrical equipment must be observed!

The machine must be disconnected from the main power supply before performing repair work. Switching the machine off is not an adequate measure.

The Vienna coffee machine is classified under Protection Class 1. Protective devices must be tested once the repair work has been completed.

5. Overview of product range

TYPE	Pre-brewing	Pre-grinding	Rapid Steam	Display
VIENNA	x			
CAFE GRANDE	x			
CAFE CREMA	x		x	
VIENNA DIGITAL	x	x		x
CAFE NOVA	x	x	x	x

Maximum average daily output: 10 coffees

CHAPTER 2
TECHNICAL DATA

1. Technical data (Vienna / Cafe Grande / Vienna Digital)

Vienna / Cafe Grande/ Vienna Digital	
Technical data	
Power supply/output:	**230 V 50 Hz 1250 W**
Temperature monitoring:	**KTY Temperature sensors transmit respective temperatures to electronic system**
Safety system:	**170°C safety thermostat**
Gear resistor	**437W / 130Ω**
Boiler output:	**1000 W for coffee and hot water dispensing**
Pump:	**Ulka reciprocating piston pump with angle connector and thermal fuse, 48 W, 230V, 50 Hz, Type EX5, 20 l/Std**
Safety valve:	**Conventional safety valve connected to pump, 17 bar**
Water filter:	**Installed in machine in front of the turbine and pump.**
Grinder (conical grinder):	**Plastic grinding screw, galvanised steel grinding cone and grinding disc (lifespan of approx. 15,000 grinding processes)**
Second Doser:	**Adjustment of coffee dose quantity (6-9 g) only available in Vienna Digital**
Power consumption:	**During heating - approx. 4.5 A**
Pump pressure:	**Max. 15 bar**
Dimensions W x D x H in mm:	**395/350/320**
Weight:	**Approx. 8.5 kg**
Water tank capacity:	**Approx. 1.7 l max.**
Coffee bean container capacity:	**Approx. 350g**
Boiler capacity:	**Approx. 250 ccm, 0.25 l volume**
De-aeration time:	**Approx. 25 for initial start-up**
Heating time:	**Approx. 2.5 min. with water at 10°C to operating temperature**
Coffee dispensing temperature:	**Approx. 86° C (+/- 5ºC)**
Grinding time:	**Initial grinding with completely empty machine: About 15 sec. Every subsequent grinding: approx. 5.5 sec.**
Time to make espresso:	**Approx. 27 sec. for 50 ml**
Time to make cup of coffee:	**Approx. 34 sec. for 100 ml**

2. Technical data (Cafe Crema)

CAFE CREMA	
Technical data	
Power supply/output:	**230 V 50 Hz 1250 W**
Safety system:	**Boiler: 170°C safety thermostat** **Pipe heating: 225°C fusible cut-out**
Temperature monitoring:	**Boiler adjustment: KTY thermal sensor** **Pipe heating: Thermostat (175°C)**
Gear resistor:	**437W / 130Ω**
Pipe heating	**1000 W for steam dispensing**
Boiler output:	**1000 W for coffee and hot water dispensing**
Pump:	**Ulka reciprocating piston pump with angle connector and thermostat** **48 W, 230V, 50 Hz, Type EX5, 20 l/Std**
Safety valve:	**Conventional safety valve connected to pump, 17 bar**
Water filter:	**Installed in machine in front of the turbine and pump.**
Grinder (conical grinder):	**Plastic grinding screw, galvanised steel grinding cone and grinding disc**
Second Doser:	**Adjustment of coffee dose quantity (6-9 g)**
Power consumption:	**During heating - approx. 4.5 A**
Pump pressure:	**Max. 15 bar**
Dimensions W x D x H in mm:	**395/350/320**
Weight:	**Approx. 8.5 kg**
Water tank capacity:	**Approx. 1.7 l max.**
Coffee bean container capacity:	**Approx. 350g**
Boiler capacity:	**Approx. 250 ccm, 0.25 l volume**
De-aeration time:	**Approx. 25 for initial start-up**
Heating time:	**Approx. 2.5 min. with water at 10°C to operating temperature**
Coffee dispensing temperature:	**Approx. 86° C (+/- 5ºC)**
Grinding time:	**Initial grinding with completely empty machine:** **About 15 sec.** **Every subsequent grinding: approx. 5.5 sec.**
Time to make espresso:	**Approx. 27 sec. for 50 ml**
Time to make cup of coffee:	**Approx. 34 sec. for 100 ml**

CHAPTER 3
OPERATION

1. Operation (Vienna)

1.1. Operating instructions (quick reference)

	Action	Comments	HS LED	Temp. LED	Steam LED
	Getting started				
1	Unpack machine.	Check for damage.			
2	Fill water tank				
3	Fill coffee beans container.				
4	Connect mains plug.				
5	Turn on main switch.		Light on	Light flashes	
6	De-aerate water circuit.	Open HWD valve until water flows **(in Café Crema press the HWD button!)**	Light on	Light flashes	
		Heating stage (approx. 2.5 min).	Light on	Light flashes	
		Ready	Light on	Light on	
	Making coffee				
7	Select coffee quantity using the control dial.	Depending on cup size.	Light on	Light on	
8	Place cup under dispenser.		Light on	Light on	
9	Press start button (coffee button).	Press once = 1 cup of coffee	Light on	Flashes once	
		Press twice = 2 cups of coffee.	Light on	Flashes twice	
	Steam dispensing (without Rapid Steam)				
10	Press steam button.	Heating stage.	Light on		Light flashes
11		Ready	Light on		Light on
12	Steam dispensing. Open HWD valve	To warm coffee. To froth milk.	Light on		Light on
13	Press steam button / deactivate steam function.	Always de-aerate after steam dispensing	Light on	Light flashes	Light flashes
		Ready (to make coffee)	Light on	Light on	
			LED On	**Temp. LED**	**Hot water LED**
	With Rapid Steam (CAFE CREMA)				
14	Steam dispensing.	Immediate		Light on	
15	Water removed Press hot water button	Immediate			Light on

Cleaning	
Empty dregs drawer.	Storage capacity 15 servings
Empty drip tray	After 15 servings
Clean water tank.	As required.
Clean coffee bean container.	As required.
Clean the housing.	As required.
Rinse brewing unit	1 x per week
Lubrication of brewing unit Clean filer(s).	1 x per month
Descale	Depending on water hardness.

Descale	
Water hardness	**Descaling frequency**
Very hard water (over 21ºdH)	About every 4 weeks
Hard water (15º-21ºdH)	About every 6 weeks
Medium water (15º-21ºdH)	About every 2 months
Soft water (up to 7ºdH)	About every 3 months

Descaling procedure:

1. Place Saeco descaler into fresh water tank.
2. Fill with about one litre of hot water.
3. Make 2-3 coffees (**not to be drunk!).**
4. Remove the remaining descaler mixture in cupfuls via the HWD valve in intervals of about 5 – 10 min.
5. Rinse the machine with about 2 litres of fresh water. Make 2-3 coffees (**not to be drunk!).**

Troubleshooting		
Fault	**Possible cause**	**Remedy**
Does not function	No power	Check mains plug / mains circuit breaker. Ensure machine door is closed.
Brewing unit does not turn on (alarm LED flashes)	Brewing unit not properly installed or not closed.	Install brewing unit correctly.
	Drip tray not properly installed.	Install drip tray correctly.
	Coffee grinds container not properly installed.	Install brewing unit correctly.
Brewing unit does not turn on (alarm LED on)	Coffee bean container is empty.	Fill coffee beans container.
	Water tank is empty.	Fill water tank
Brewing unit does not turn on (coffee and steam LED flash)	After steam dispensing the system is not or is insufficiently de-aerated.	De-aerate machine.
No water / steam	Air in the circuit.	De-aerate
	Steam nozzle blocked.	Free opening using a thin needle.

Troubleshooting		
Fault	**Possible cause**	**Remedy**
The coffee flows too quickly	Beans ground too coarsely.	Select lower grind level; e.g. change from 8 to 6.
The coffee flows too slowly	Beans ground too finely. Install brewing unit filter.	Select higher grind level; e.g. change from 8 to 9.
Coffee has no froth.	Unsuitable coffee blend.	Change brand of coffee.
	Coffee is no longer freshly roasted.	Use fresh coffee.
	Beans ground too coarsely or finely.	Change grind level.
Longer heating time or less hot water.	The machine is calcified.	Decalcify machine.
The brewing unit cannot be removed.	The brewing unit is not in home position.	Turn the machine on, close the service door. (the brewing unit goes automatically to home position)

2. Operation (Vienna digital):

2.1. Operating instructions (quick reference)

	Action	Comments	Display
	Getting started		
1	Unpack machine.	Check for damage.	
2	Fill water tank		
3	Fill coffee beans container.		
4	Connect mains plug.		
5	Turn on main switch.		Standby
6	De-aerate water circuit.	Open hot water pressure valve until water flows.	Heating
		Heating stage (approx. 2.5 min).	Heating
		Ready	Select product Ready for operation
	Making coffee		
8	Place cup under dispenser.		Select product Ready for operation
7	Programme coffee quantity for each selection button.	Depending on cup size. Programme by keeping the coffee selection button pressed until the desired quantity is reached.	Quantity programme
8	Place cup under dispenser.		Select product Ready for operation
9	Elect programme and press appropriate button.	Press once = 1 cup of coffee Press twice = 2 cups of coffee.	1 Coffee 2 Coffees

	Action	Comments	Display
	Steam dispensing.		
10	Press steam button.	Heating stage.	Steam Heating
11		Ready	Steam Ready for operation
12	Steam dispensing. Open HWD valve	To warm coffee. To froth milk.	Steam
13	Press steam button / deactivate steam function.	Cooling stage (can be accelerated by de-aerating)	Overheating.
	De-aerate		Hot water Overheating.
		Ready (to make coffee)	Ready for operation

Descale:
1. Place Saeco descaler into fresh water tank.
2. Fill with about one litre of hot water.
3. Remove about two to three cups via the brewing unit (**not to be drunk!**).
4. Activate the Descale item in the user menu by selecting OK and open the HWD valve (place a sufficiently large container under the steam pipe). The descaler mixture is pumped at intervals through the circuit.
5. Rinse: Fill the water tank once again and open the HWD steam valve (about 2 cups via brewing unit).

Reset: Access the descale indicator via the OK button - select YES with the arrow button - reset with OK (see Page 6).

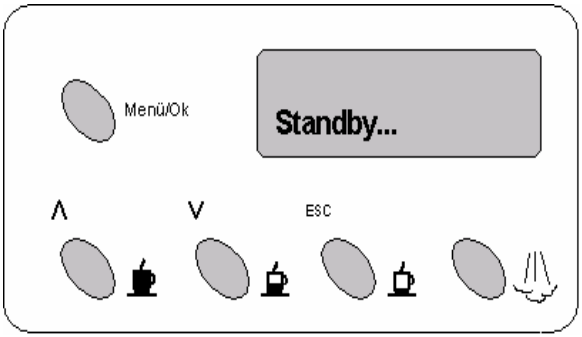
Cleaning	
Empty dregs drawer.	Storage capacity 15 servings
Empty drip tray	After 15 servings
Clean water tank.	As required.
Clean coffee bean container.	As required.
Clean the housing.	As required.
Rinse brewing unit	1 x per week
Lubrication of brewing unit Clean filter(s).	1 x per month
Descale	Depending on water hardness.

Troubleshooting		
Fault/Indicator	**Possible cause**	**Remedy**
Does not function	No power	Mains plug / mains fuse / machine door closed?
Automatic coffee dispensing does not start:		
BREWING UNIT NOT DETECTED	Brewing unit not properly installed or not closed.	Install brewing unit correctly.
GRINDS CONTAINER NOT DETECTED	Drip tray not properly installed.	Install drip tray correctly.
	Coffee grinds container not properly installed.	Brewing unit correctly installed.
COFFEE BEAN CONTAINER EMPTY	Coffee bean container is empty.	Fill coffee container.
FILL WATER DE-AERATE	Water tank is empty.	Fill water tank
OVERHEATING	After steam dispensing the system is not or is insufficiently de-aerated.	De-aerate machine.
GRINDER OBSTRUCTED		Clean grinder.
No water / steam	Steam nozzle blocked.	Free opening using a thin needle.
The coffee flows too quickly	Beans ground too coarsely.	Select lower grind level; e.g. change from 8 to 6.
The coffee flows too slowly	Beans ground too finely.	Select higher grinding level; e.g. change from 8 to 9.
The coffee is cold.	The cups are cold.	Pre-heat cups.
Coffee has no froth.	Unsuitable coffee blend.	Change brand of coffee.
	Coffee is no longer freshly roasted.	Use fresh coffee.
	Beans ground too coarsely or finely.	Change grind level.
Longer heating time or less hot water.	The machine is calcified.	Decalcify machine.
The brewing unit cannot be removed.	The brewing unit is not in home position.	Turn the machine on, close the service door. (the brewing unit goes automatically to home position)

2.2 User programme (Vienna Digital)

The table below indicates the various values, settings and programmes which can be read and selected through the user programme options.
Various cleaning programmes can also be activated.

Access: Access via Menu/OK button.



Menu procedure:

1. Select desired programme using the arrow buttons.
2. Access appropriate item using the OK button.
3. Use the arrow buttons to handle each item.
4. Confirm with the OK button.
5. Exit programme by using the ESC button or main switch.

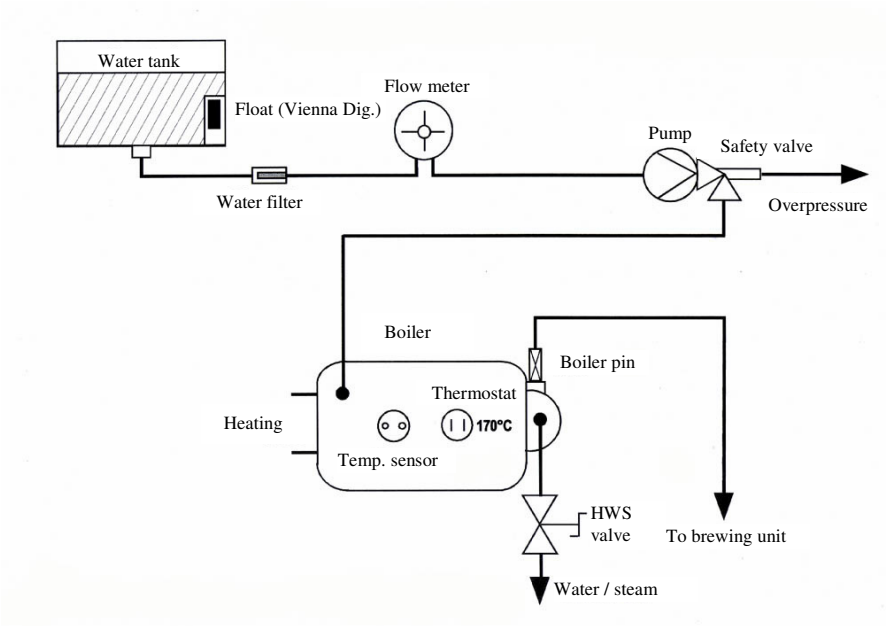
Item	Setting/Indicator	Standard	Function
Standby			
Rinse	ON/OFF	OFF	Rinses residual water through pipes each time machine turned on (when machine is cold).
Language	Country	German	Display language
Water hardness	1 – 500 l (below 7°dH)	3	Change of the flow rate in litres until descaling is required.
	2 – 300 l (7-14°dH)		
	3 – 300 l (14-14°dH)		
	4 – 80 l (above 21°dH)		
Temperature	Maximum	Medium	Adjustment of coffee temperature. (approx. 1 degree)
	High		
	Medium		
	Low		
	Minimum		
Pre-brewing	ON	ON	Coffee is moistened before actual brewing (better aroma)
	LONG		
	OFF		

Item	Setting/Indicator	Standard	Function
Pre-grinding	ON/OFF	OFF	Pre-grinds the next coffee dose.
Total coffee	Number		Coffee quantity indicator (total)
Descale			Activate the descaling programme (approx. 45 min.)
Scale indicator			Reset the descale indicator (counter reset)
Timer	0-12.45 hours	0	Machine switches to standby mode if not used within the programmed time. (Standby mode can also be activated at any time via the menu buttons.)
Cleaning cycle			Pipes and brewing unit are rinsed after a cleaning programme.

CHAPTER 4
FUNCTIONS AND TIMING

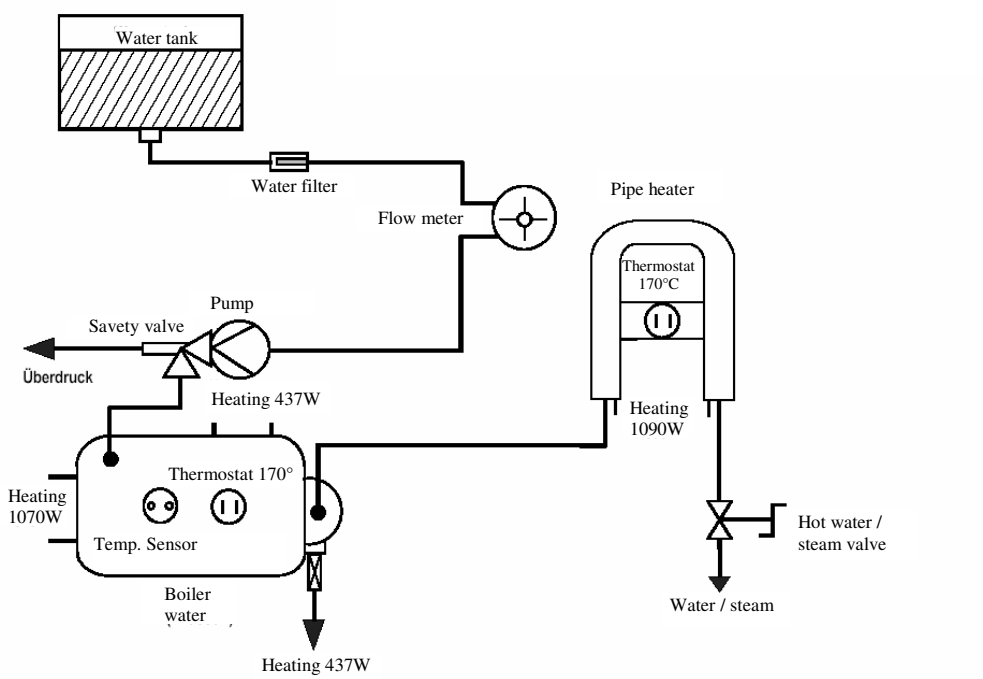
1. Water system

1.1. Water system (Vienna Digital / Vienna / Cafe Grande)



Component	Function
Water tank	Water supply
Float	Water Low detection (only Vienna Digital)
Water filter	Water cleaned of solid matter
Flow meter (turbine)	Measure flow rate
Pump	Water flow/Pressure build-up (13 to15 bar)
Safety valve	Protect boiler against overpressure (opens at 17 bar)
Boiler/Heating	Heats water to approx. 94°C (for brewing process)
Sensor (KTY)	Transmits current temperature value to electronic system
Thermostat	Alternates current supply for heating system in event of overheating.
Boiler pin (Valve plug)	Opens when brewing unit is aligned with water circuit to the unit itself.
HWD valve (tea nozzle)	For hot water and steam dispensing

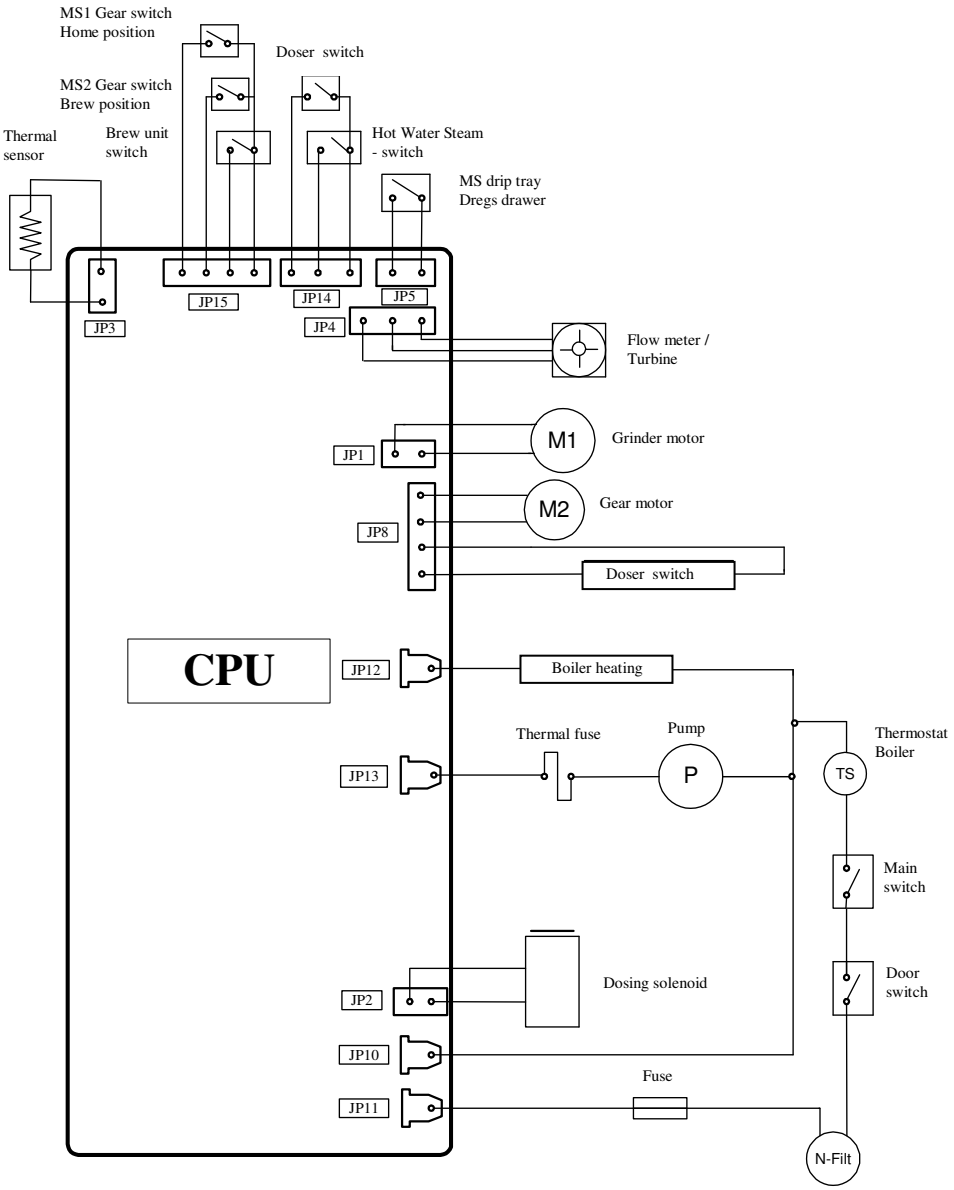
1.2. Water system (Cafe Crema)



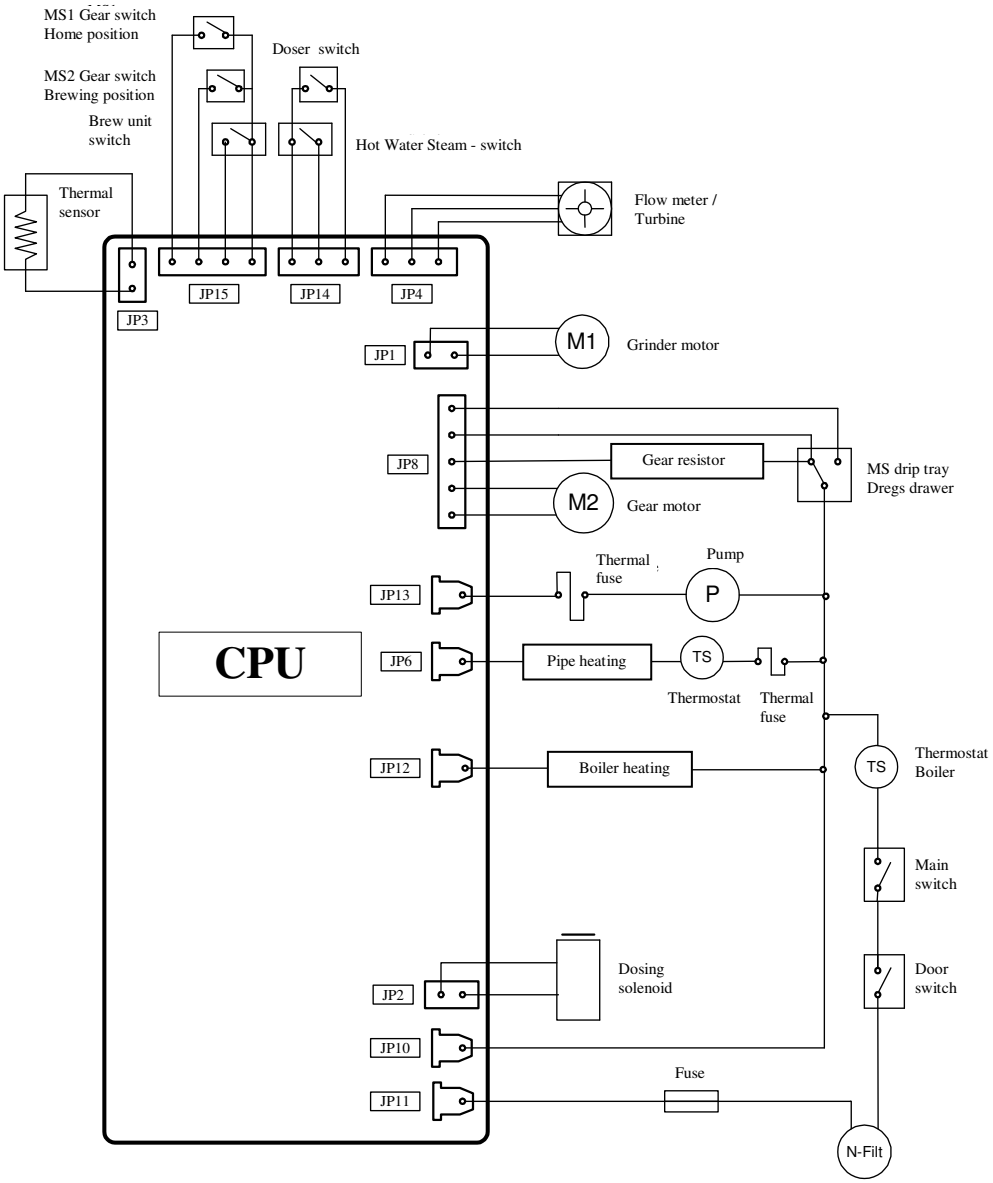
Component	Function
Water tank	Water supply
Water filter	Water cleaned of solid matter
Flow meter	Measure flow rate
Pump	Water flow/Pressure build-up (13 to 15 bar)
Safety valve	Protect boiler against overpressure (opens at 17 bar)
Boiler/Heating	Heats water to approx. 94°C (for brewing process)
Temperature sensor	Transmits current temperature value to electronic system
Thermostat	Turns off flow supply to entire machine if overheating.
Valve plug	Opens when brewing unit is aligned with water circuit to the unit itself.
Pipe heating	Steams pre-heated boiler water for steam function.
Thermostat (pipe heating)	Switches (pulses) pipe heating
HWD valve	For water and steam dispensing

2. Electrical system

2.1. CPU – IN / OUT (Vienna / Cafe Grande)

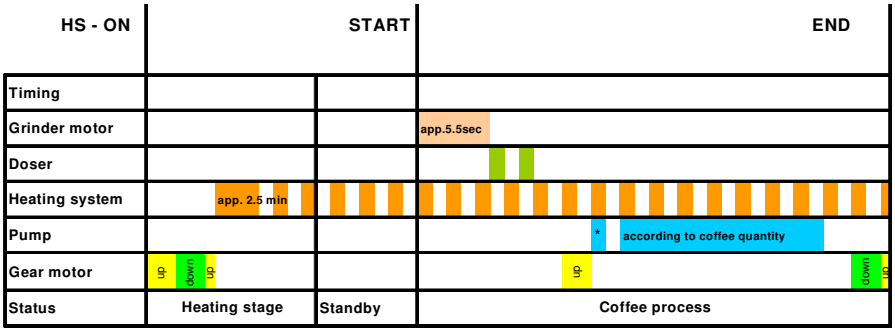


2.2. CPU – IN / OUT (Cafe Crema)



3. Timing

The following time chart indicates the functions of the individual components in terms to time.



Note: * only in machines with pre-brewing

Explanation:

Two processes start when the main switch is activated:

- Firstly, the gearmotor is initialised: The gears move to brewing position (MS2 activated), the gear motor poles are reversed and the gears return to the home position. Microswitch MS1 is activated, the motor changes rotating direction and leaves MS1. The gear cam is positioned approx. 2 mm before MS1 in home position (see illustration).

- The boiler heating is then activated for about 2 min 30 sec., heating the water to operating temperature, whereby full heating takes place for about 105 sec. and during the remaining 45 sec. heating is alternated.

Exception: Brewing unit switch not activated.
The gear motor moves directly to MS1 and then to home position.

After activating the start button:

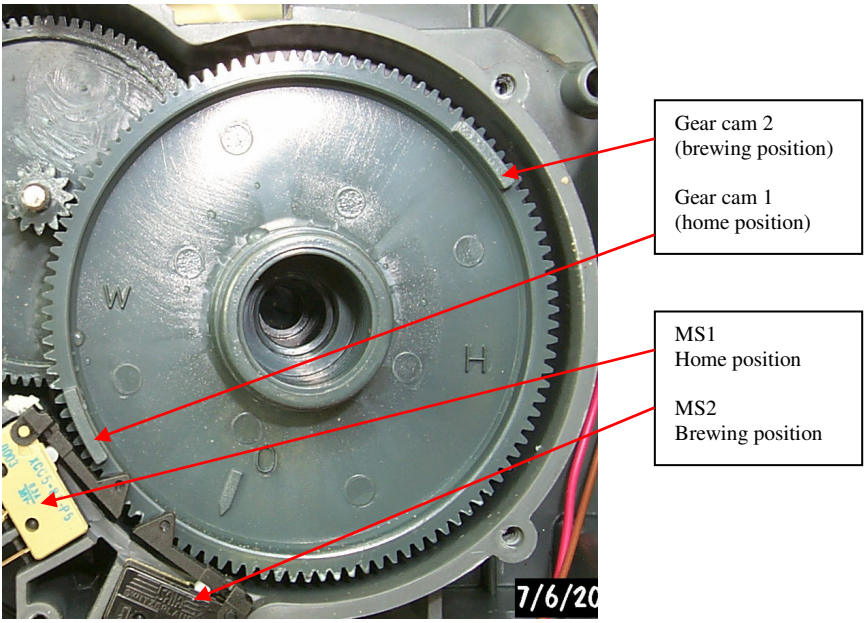
1. The grinder starts operating (about 5.5 sec.).
2. The doser is activated twice.
3. The gears move to brewing position.
4. Depending on the type of machine, pre-brewing begins (brief pump activation).
5. Main brewing process (duration of pump activation depending on selected coffee quantity).
6. The gears move to home position.

4. Function

4.1. Gearmotor

The gearmotor is connected to the power element of the circuit board via the upper heating system (boiler). In order to perform forwards and backwards movements, the gearmotor is controlled alternately with a positive and negative half wave. The voltage is limited by the electronic system to approx. 30 to 35 V. In the event of overload the motor's electronic system switches off after 8-10 sec. and the red fault LED flashes (or gears locked indicator appears).

If the brewing unit is locked in the upward movement, the cycle is interrupted after about 8 seconds and the control system attempts to move the brewing unit to the idle position. This occurs, for instance, when too much powder is present in the brewing chamber. If the brewing unit is locked in the downward movement, the motor turns off after 8 seconds and the machine is locked. This situation is indicated by the flashing fault LED (in digital displays the indicator is: brewing unit obstructed). The machine must be turned off and the cause of the lock removed.



Note: The gear wheel must always be installed so that MS1 and MS2 are positioned at the long section of the switching cams!

(Install gear wheel with arrow in the direction of the microswitch.)

4.2. Gear resistor

The heating system of the thermoblock without marking at the connection point acts as resistor for the gearmotor. The gearmotor cannot function in the event of a defective heating system.
The heating system has a resistance of approx. 130 Ohm.

4.3. Flow meter (Turbine)

The machine is equipped with a water level monitoring system. The system checks whether the water monitoring turbine turns. If no pulses are generated from the turbine within 10 seconds, the current cycle is interrupted. The signal is given by the Water Low indicator or, in digital machines, by the De-aerate indicator. If this control mechanism is activated, the machine must be de-aerated. During the Water Low signal, the pump operates at maximum output. As soon as the pump has created sufficient flow, the pump output is reduced to approx. 20 l/hr.
The water quantity is generally controlled according to the coffee quantity programmed through the turbine pulses.

4.4. HWD valve (steam operation)

The HWD valve is required for water and steam dispensing, as well as during de-aeration.

If the hot water valve is opened during the brewing process, coffee flow is interrupted and the De-aerate indicator will appear. As soon as the hot water valve is closed, the brewing process will continue.

The operating temperature during steam dispensing is approx. 125°C. The steam button is pressed to activate steam production (without rapid steam). Steam dispensing occurs via the HWD valve.

The pump pulses the steam dispensed. This means that constant steam dispensing is ensured over a long period of time. The flow rate of the pump is adjusted on the basis of the thermoblock temperature. If the temperature is too low, the pump pulses are slowed down. This may occur, for instance, when the hot water valve opens before the temperature indicator lights up.

Once the steam has been dispensed, the HWD valve closes and the steam button must be pressed for normal operating mode. The steam and coffee temperature indicators flash or the message overheating appears in machines with digital display, until the machine has cooled and the machine cannot dispense coffee. Cooling can be achieved by dispensing hot water. The pump functions at maximum output and the heating remains turned off as long as the Overheating signal remains. These measures ensure that the cooling process is accelerated and the overheating signal will disappear after a few seconds.

4.5. Temperature sensor (KTY 10)

The temperature sensor is a temperature-sensitive resistance mechanism, converting the boiler temperature into an electrical signal which is measurable by the CPU.
The CPU compares this signal with the programmed reference signal and, depending on the outcome of the comparison, controls the boiler output.
The resistance applied has a positive temperature coefficient; i.e. higher boiler temperature - higher sensor resistance.

The table below indicates the trend in resistance values in relation to the temperature.

Measured values (KTY)

Temperature	Resistance (Ω)	Resistance trend (Ω)
0	1629	0
15	1845	216
20	1922	77
40	2246	324
90	3168	922
100	3366	198
130	3979	613
140	4188	209

At room temperature the resistance is 1.9KΩ.

Temperature adjustment: By acting on the JP9 Jumper the brewing temperature can be raised by 2-3 °C.

4.6. Grinder

The grinder is a conical grinder with upper and lower grinding disc. The grinding level is set by adjusting the height of the upper grinding disc by means of the screw thread.
If the grinding discs are drawn apart by turning the grind level adjusting ring (turning anti-clockwise), the grind is coarser, while turning the adjusting ring clockwise will result in a finer grind.

ATTENTION: Adjust the grind level only when the grinder is in operation!

The grinder operates with a direct current motor and the grinding disc rotation speed is determined by a gearmotor. The grinder motor operates with a voltage of 260 V direct current.

4.7. Doser

The coffee quantity for the current coffee process is portioned (dosed) in the doser chamber; a higher dose results in a stronger (more concentrated) coffee. A lower dose results in a weaker (less concentrated coffee).
The doser is controlled by a microswitch. The ground coffee is transferred from the grinder and is pressed into the dosing chamber; when the dosing chamber is full, the microswitch is activated and transmits to the CPU the signal to turn the grinding motor OFF.
Grinding is stopped, the dosing magnet engages, opens the dosing flap and the coffee falls into the brewing unit.
If the dosing microswitch is not activated within 20 seconds from start of the grinder motor, the coffee beans low signal appears.

The dosing quantity is set automatically by shifting the doser housing wall together with its microswitch.

Depending on the machine type, the setting mechanism may be accessible to the customer or only to a technician.

CHAPTER 5
SERVICE PROGRAMME

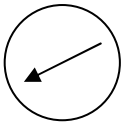
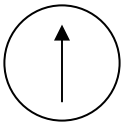
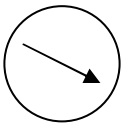
1. Service programme (Vienna / Cafe Grande / Cafe Crema)

1.1. Functions programme

Access: Access the service mode by turning on the machine and simultaneously pressing the coffee and steam buttons.

Various test functions can be activated in the service mode by activating either the coffee or steam buttons in conjunction with various coffee quantity settings.

Programme table

Function	Button	Control setting	LED Indicator
Pump/Flow meter	Coffee		Fault LED (flow meter pulses) *
Brewing unit (Gearmotor) ⬆	SteamSteam (Hot water)		Coffee LED Gear switch (brewing setting)
Heating	Coffee		
Brewing unit (Gearmotor) ⬇	SteamSteam (Hot water)		Coffee LED Gear switch (home position)
Dosing magnet	Coffee		
Grinder	Steam (Hot water)		Steam LED Doser full
HWS microswitch			Steam LED

* The HWS valve must be open.

The current boiler temperature can be read in service mode by pressing the coffee and steam (hot water button in Cafe Crema) buttons at the same time.
Each combination of LEDs provides an indication on the current boiler temperature **(see table below).**

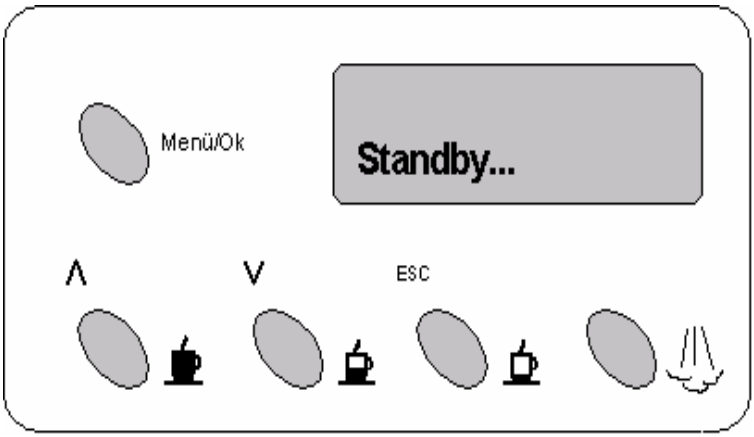
Temperature table

Temperature	Coffee LED	Steam LED	Fault LED
T ≤ 94ºC			X
T = 95ºC	X		X
T = 96ºC	X		
T = 97ºC	X	X	
T ≥ 98ºC		X	

2. Service programme (Vienna Digital)

2.1. Functions programme:

Access: Access the functions programme by pressing twice the Menu/OK buttons (STANDBY mode) and then simultaneously pressing the ESCAPE and MENU buttons.



The various functions indicated in the table can be checked by pressing the button combinations listed below.

Programme table (functions programme)

Buttons	S1 Expresso lungo	S2 Coffee	S3 Espresso	S4 Steam	S5 Menu
Gears up	x				
Gears up		x			
Grinder			x		
Pump			x		x
Doser				x	
Heating		x			x
Temperature indicator in °C				x	x

The upper display line signals the activated microswitch and the Hall effect of the turbine.
The activated buttons are signalled by the lower display line (e.g. 1=S1, 2=S2, etc.).

All CPU input signals from the machine appear in the first line of the display.
1 = Brewing unit in brewing position (brewing position microswitch activated)
2 = Brewing unit in at-rest position (at-rest position microswitch activated)
3 = Doser microswitch activated (full)
4 = HWS valve microswitch activated
5 = Grinds container/drip tray microswitch activated
6 = Brewing unit microswitch activated
7 = Water tank full (reed contact not activated)
8 = Turbine pulses (indicator appears as soon as the magnet passes the sensor)
All CPU input signals from the control board appear in the second line of the display.
1 = Expresso lungo
2 = Coffee
3 = Espresso
4 = Steam
5 = Menu button

Flow rate: If the pump is activated during test mode and the hot water valve opened, a two-digit number appears at the bottom right side indicating the flow rate. This value must be between 40 - 60.

Grinder rate: If no button is activated, a number appears at the bottom right side referring to the grinder rate. This value must be between 120 - 130.

Exit: Switch the machine off at the main switch.

2.2. Diagnosis menu

The values below can be read and adjusted in the diagnosis menu as shown in the table.

Access: Access the service programme by pressing twice the Menu/OK buttons **(STANDBY mode) and then simultaneously pressing the ▲ ESCAPE and MENU buttons.**
Using the ▲ button scroll to the menu item "Diagnosis" and confirm via the Menu button.

Changing programme values: Access appropriate item using the Menu button.
Change value with arrow buttons
Save value by using the Menu button.

Service programme (Vienna Digital):

Function/Standard	Setting range	Increment	Comments
EXPRESSO LUNGO No. of PULSES 600	50 - 1,000 Pulses	+/- 1	Number of flow meter pulses for each saved cup fill volume, where 300 pulses correspond to approx. 100 ml.
EXPRESSO No. of PULSES 195	50 - 1,000 Pulses	+/- 1	
COFFEE No. of PULSES 360	50 - 1,000 Pulses	+/- 1	
----HEATING---- PARAMETER K1 7	1 - 50	+/- 1	**Do not change!**
----HEATING---- PARAMETER K2 30	1 - 50	+/- 1	**Do not change!**
NORMAL TEMP. ° C 86	70- 130°C	+/- 1	Normal temperature is used if not more than 6 min. have elapsed since last coffee dispensed.
HIGH TEMP. ° C 92	70- 130°C	+/- 1	If no coffee is dispensed for an extended time (over 6 min.), the next coffee will be heated to a higher temperature to compensate for cooling of the brewing unit and the associated temperature loss.
TEMP. OF 1st COFFEE ° C 94	70- 130°C	+/- 1	Used when dispensing the first coffee after the machine has been turned on, to compensate for the high temperature loss due to the cold brewing unit and water pipes.
STEAM TEMP. ° C 130	70- 135°C	+/-1	Boiler temperature for steam function (only in machines without pipe heating)

Function	Setting range	Increment	Comments
TEMP. INCREASE ° C 10	0-50	+/-1	The boiler temperature is increased by a set value shortly before brewing in order to pre-heat the boiler and compensate for the temperature drop during the first water flow.
GRINDS COUNTER Number	0-50	+/-1	Counts number of coffee cycles. When this value reaches the Grinds Stop value, "GRINDS CONTAINER EMPTY" will be displayed. (Reset by removing dregs drawer for emptying - min. 6 sec.)
GRINDS STOP 15	5-50	+/-1	Number of cycles until "EMPTY GRINDS CONTAINER" is displayed.
--TOTAL WATER-- (ml) Number	----------	---------- --	Total water flow volume (in ml) / not resettable
WATER DESCALING (ml)	----------	---------- --	Total water flow (in ml) since last descaling / resettable
HOT WATER FLOW (l/h) 20	6 - 34 1/h	+/- 2 1/h	The **pump delivery rate** for hot water can be expressed in litres per hour.
--HOT WATER--- PUMP ADJUST. 63000	58,000 - 65,500	+/- 1	The pump delivery rate is adjusted in relation to the HOT WATER FLOW setting by means of a phase controlled modulator. Pump tolerances can thus also be adjusted. An equivalent value is saved under HOT WATER PUMP ADJUSTMENT.
WATER RESERVE 2300	999 - 3500	+/- 1	Number of pulses (residual water quantity) based on switching of the reed contact until Water Low indicator is displayed. If the value is 0 or exceeds the number of pulses saved in the coffee programme selected, the Water Low indicator will appear.
MACHINE STATUS 96	0 - 255		Programme code

Function	Setting range	Increment	Comments
--DATE OF MANUF---DAY	----------	---------- --	This date indicates when the machine was manufactured. This date cannot be changed.
--DATE OF MANUF---MONTH	----------	---------- --	
--DATE OF MANUF---YEAR	----------	---------- --	
--SERVICE DATE--DAY	0 - 31	+/- 1	The service date indicates the date of the machine's last service. This date can be changed and must be updated at each service.
--SERVICE DATE--MONTH	0 - 12	+/- 1	
--SERVICE DATE--YEAR	1996 - 2050	+/- 1	

Exit: Use the ESC button or the main switch.

CHAPTER 6
FAULTS

1. Faults:

The following table indicates the most common faults, listed by component.

Part	Fault	Cause
Heating	Does not function Contactor indicator light is on.	KTY defective
		Electronic system defective
	Cold coffee Standby LED lights up continuously	KTY defective
		Electronic system defective
	Temperature differences No froth	KTY defective
		Electronic system defective
	Heating remains cold Standby LED lights up continuously	Heating - Interruption
		Heating plug connection
	Machine does not function (no LED lights up)	Thermal fuse of boiler triggered
Doser	Water instead of coffee	(No grinder function) Doser switch constantly activated / Dirt
		Defective doser rinse
	Weak coffee	Dose quantity too low
		Dose chamber - coffee residues
	Fault LED (coffee beans low) lights up constantly - Brewing unit overfull - Gearmotor obstructed	Doser switch does not work
		Electronic system defective
Grinder	Coffee too strong / flows too slowly	Grinding set too finely
	Coffee too weak / flows too fast, no froth	Grind set too coarsely
		Grinder motor not properly installed
	Grinder functions until fault LED (coffee beans low) lights up (insufficient beans in bean container)	Grinding disc worn
		Water in grinder
	Grinder does not work	Motor defective
		Electronic system defective
		Doser switch constantly activated

Part	Fault	Cause
Gearmotor	Brewing unit malfunctions - does not move to home position	MS defective
		Motor defective
		Motor resistor defective
		Loose motor connections
		Gear wheel defective
		Electronic system defective
Brewing unit	Sluggish / obstructed	Plunger stiff
		Gasket of valve plug swollen (black O-ring) Plunger O-ring swollen
HWD system	No water or steam discharge when HWD valve is open	Securing tab on tea nozzle spout broken / bent
	Water drips from steam pipe (with closed HWD valve)	Valve gasket calcified
	Water drips from steam pipe shaft	Fracture in steam pipe
	Water leakage from HWD spout	Defective O-ring
	Water leakage at joint	Defective O-ring
Overpressure valve	Varying cup filling volume	Overpressure valve does not seal / calcified
	More water in drip tray	
Pump	Dry coffee in dregs drawer / water low indicator (fault LED)	Defective pump
		Thermal fuse defective
	Water leakage at overpressure valve threaded joint	Hairline crack in joint area
Flow meter	Varying coffee quantity Water Low/De-aerate indicator although water tank sufficiently full.	Flowmeter calcified / other deposits
		Hall sensor defective

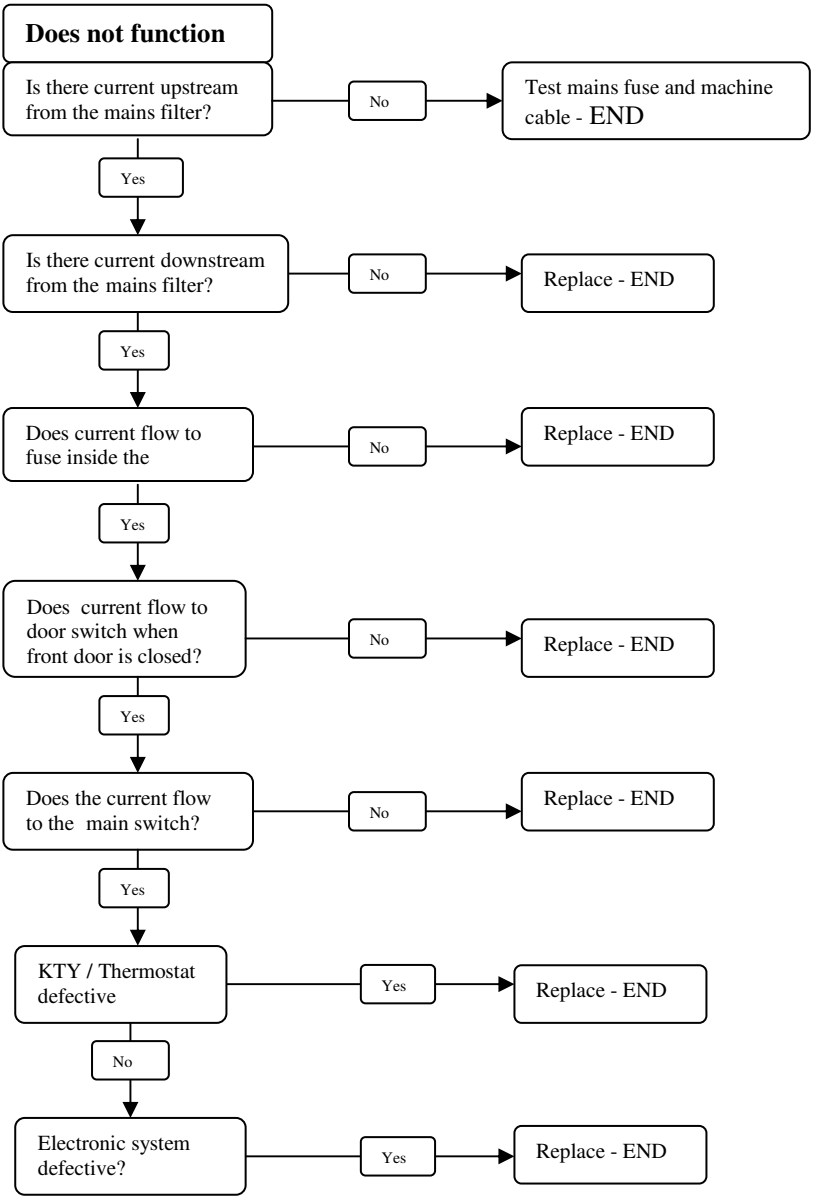
Part	Fault	Cause
	In machines with Rapid Steam	
Pipe heating	No steam function	Pipe heating interrupted
		Thermal fuse triggered

ATTENTION: A defective temperature sensor (KTY) may be responsible for an unexplained functioning mode.

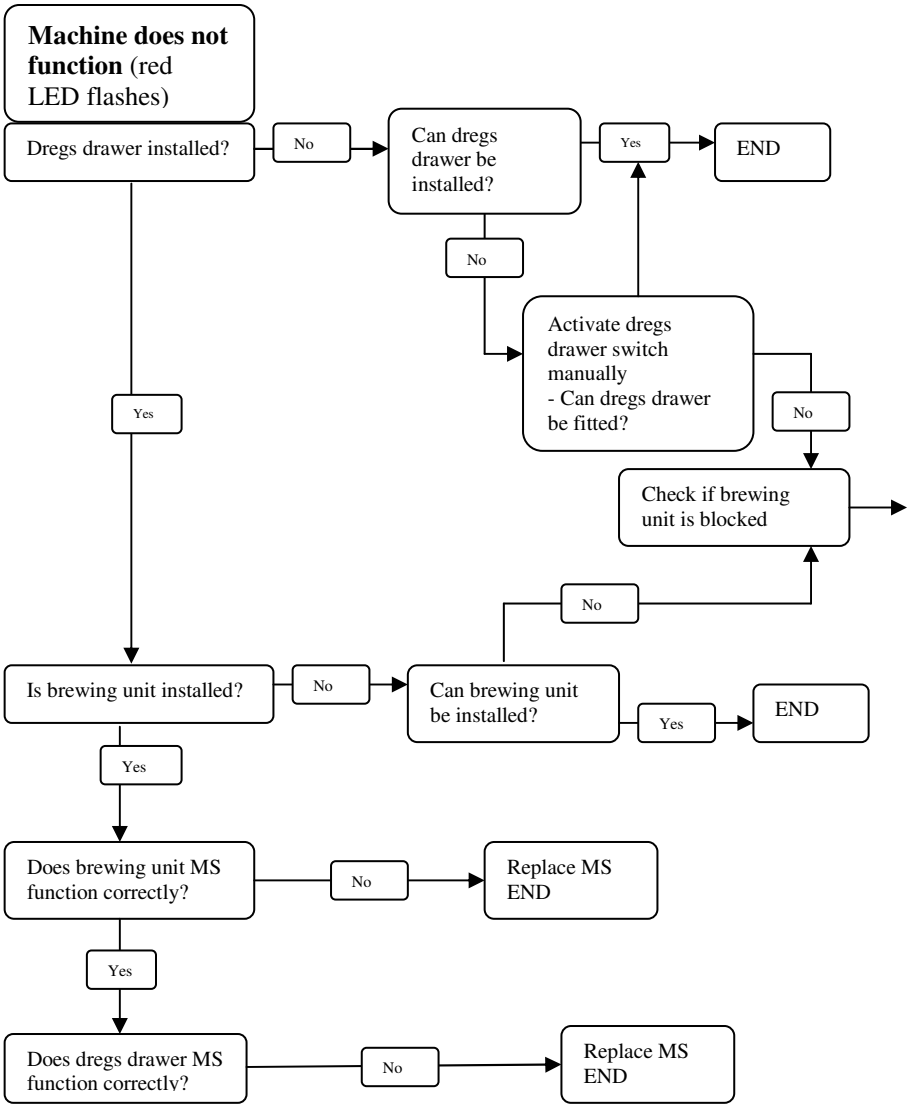
CHAPTER 7
FAULT DIAGNOSIS

1. Fault diagnosis (Vienna without display)

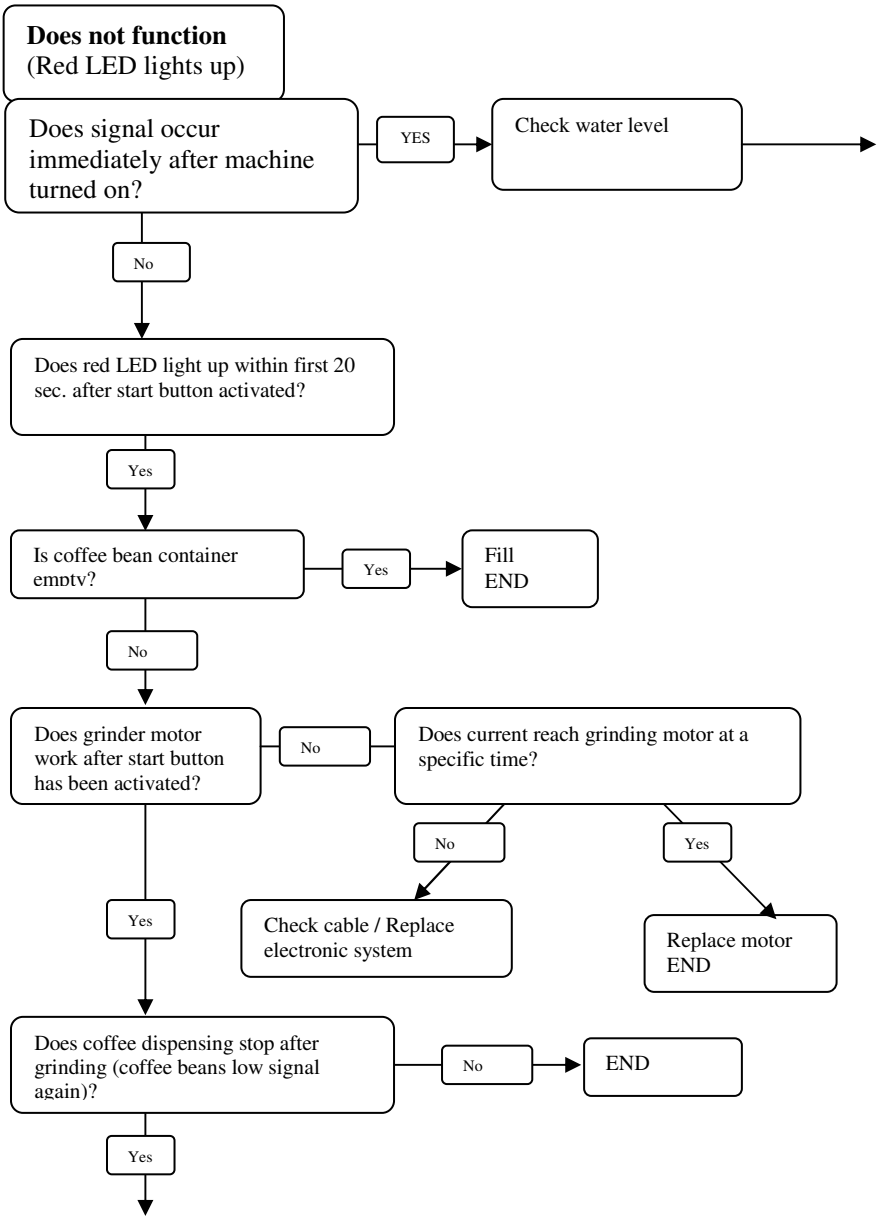
1.1 Machine does not function

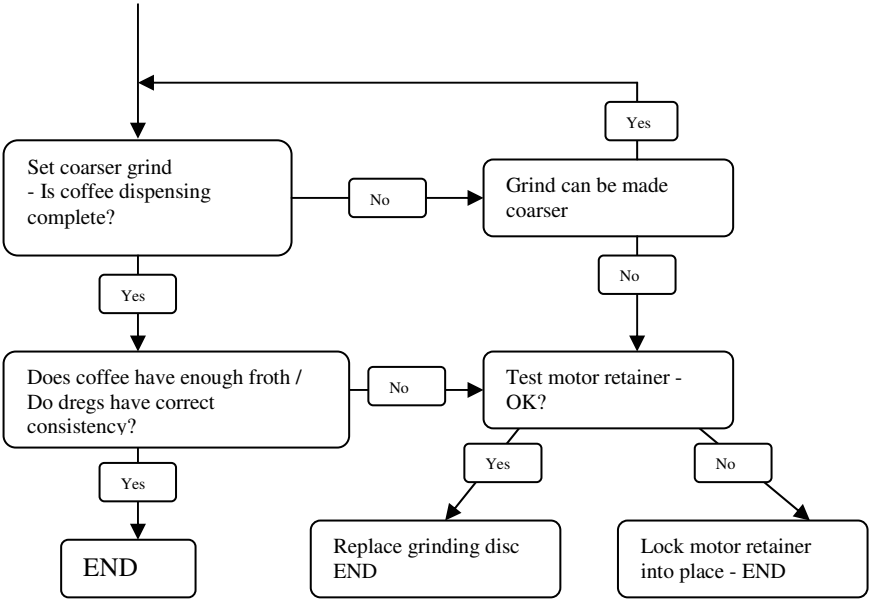


1.2. **Machine does not function** (red LED flashes)

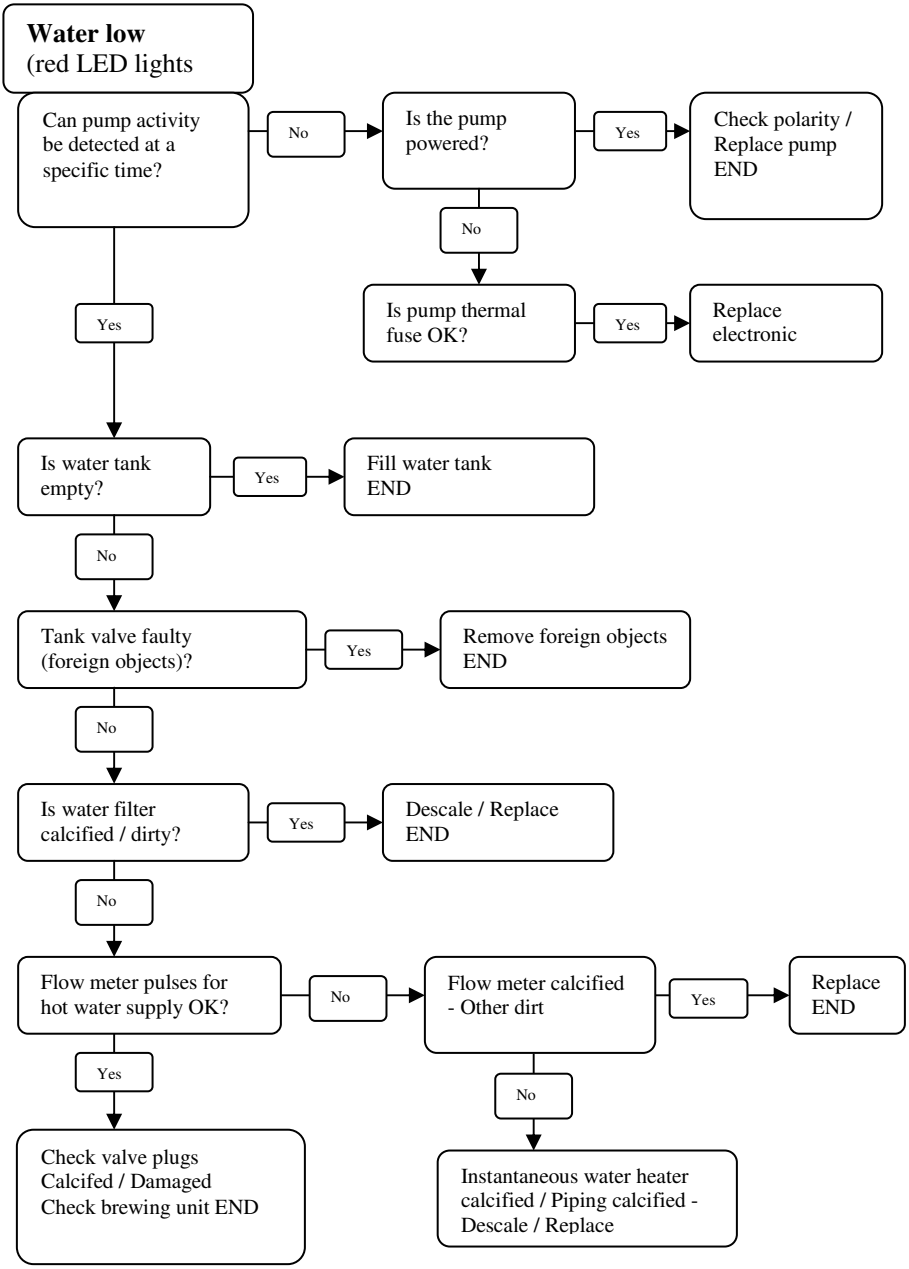


1.3. Machine does not function (red LED lights up)

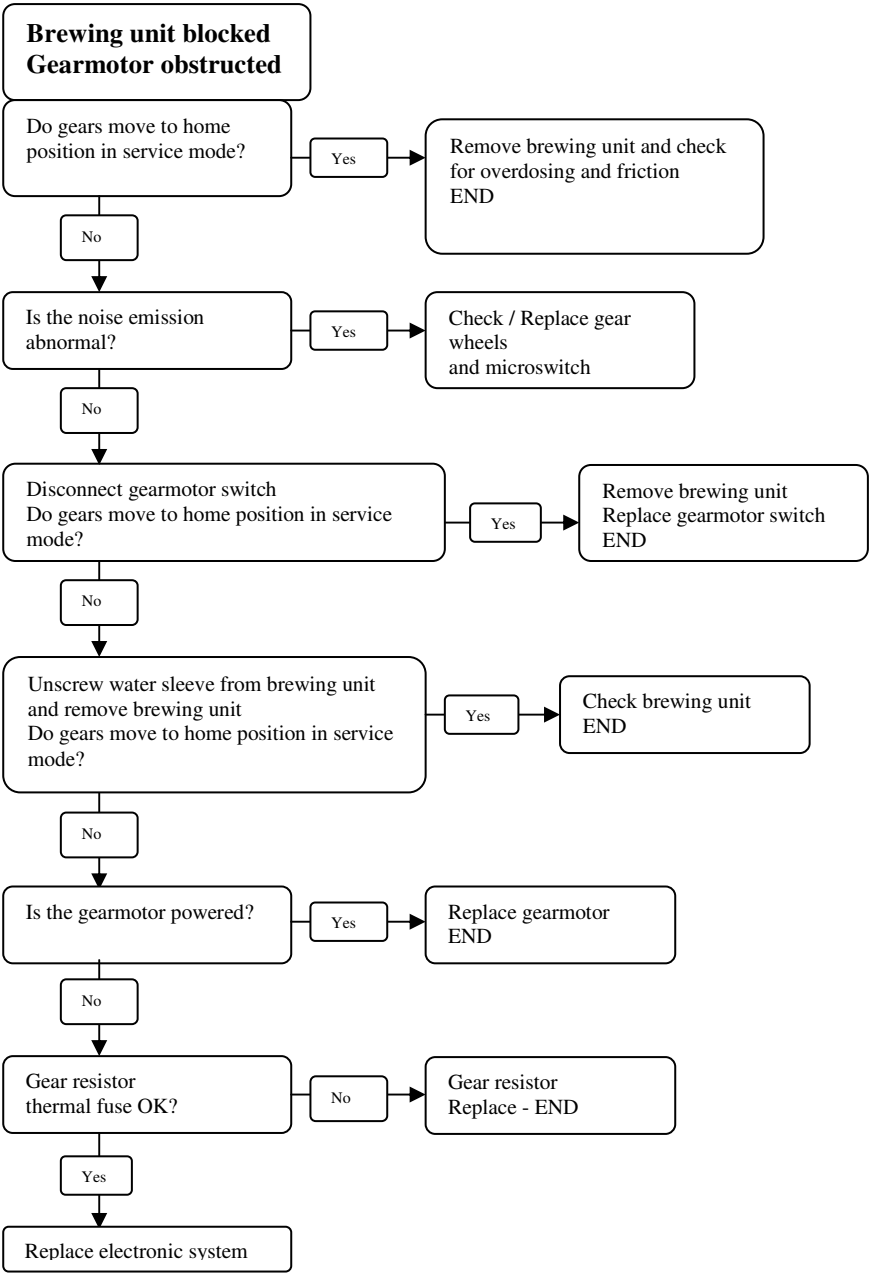



Yes
Set coarser grind
- Is coffee dispensing
complete?
No
Grind can be made
coarser
No
Yes
Does coffee have enough froth /
Do dregs have correct
consistency?
No
Test motor retainer -
OK?
Yes
Yes
No
END
Replace grinding disc
END
Lock motor retainer
into place - END

1.4. **Water low** (red LED lights up)

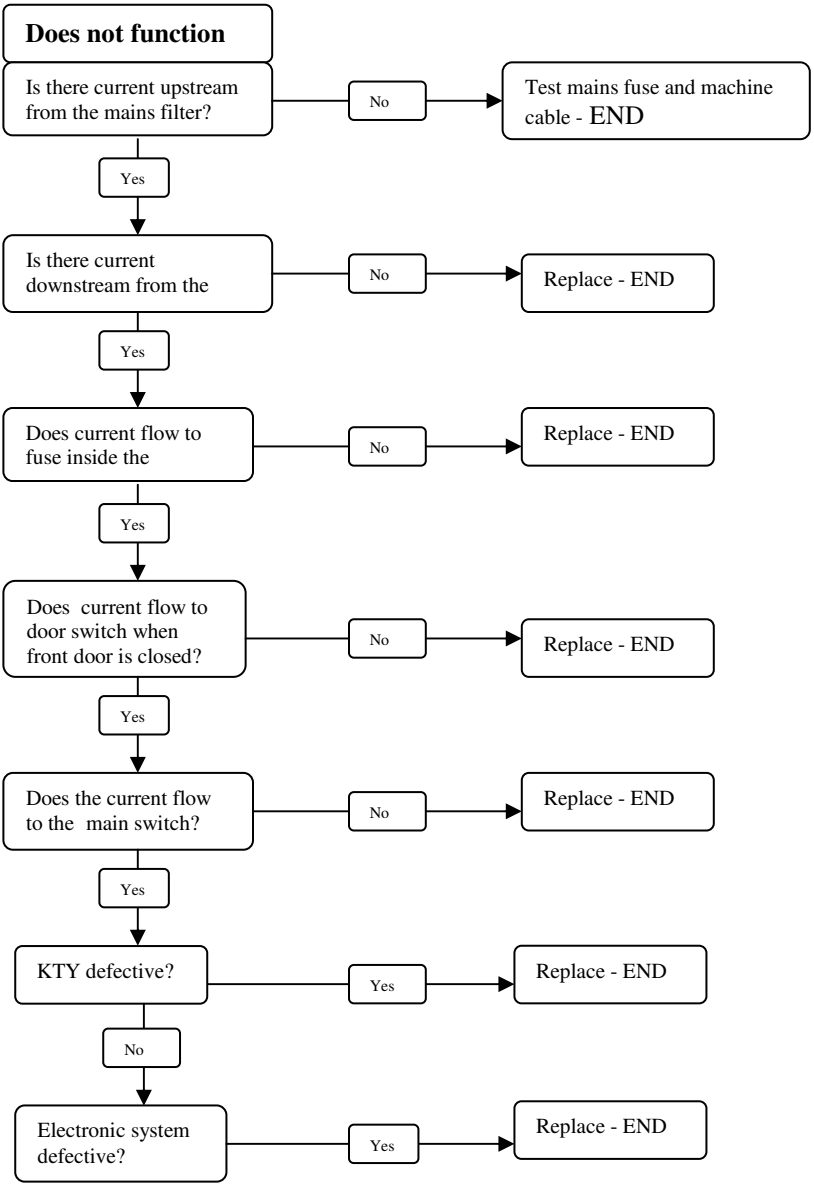


1.5 Brewing unit blocked / Gears blocked

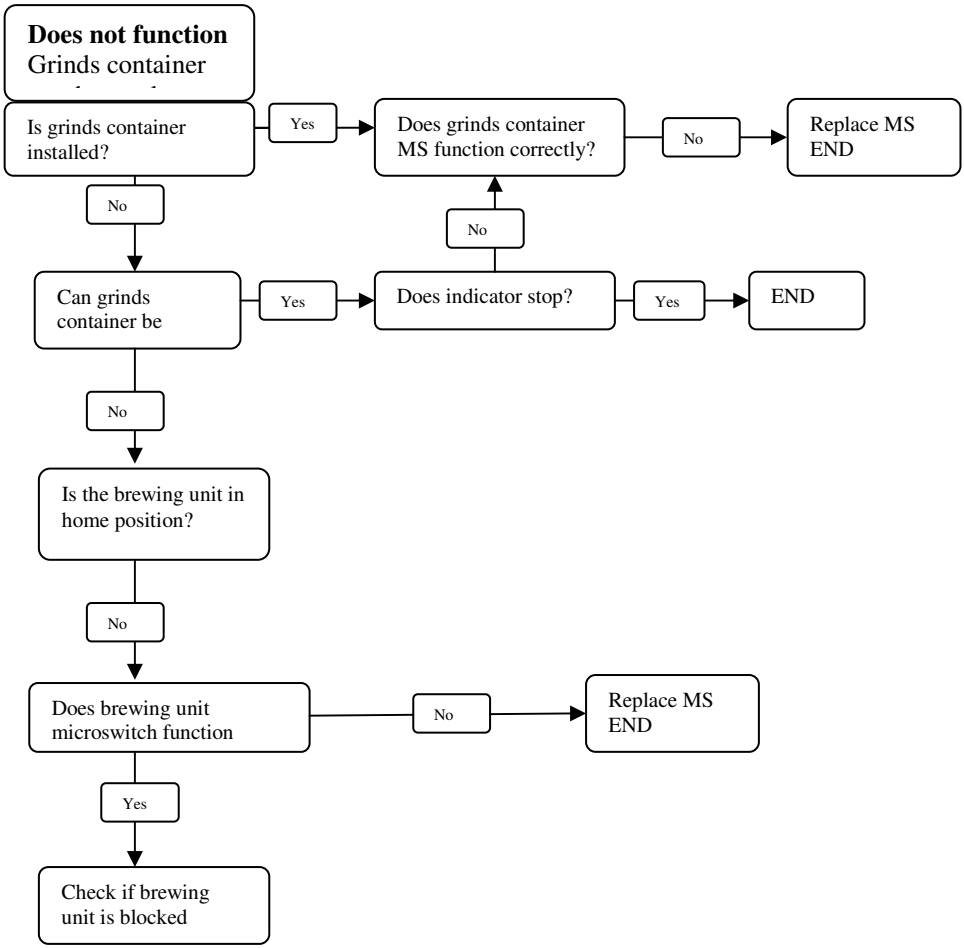


2. Error detection (Vienna Digital)

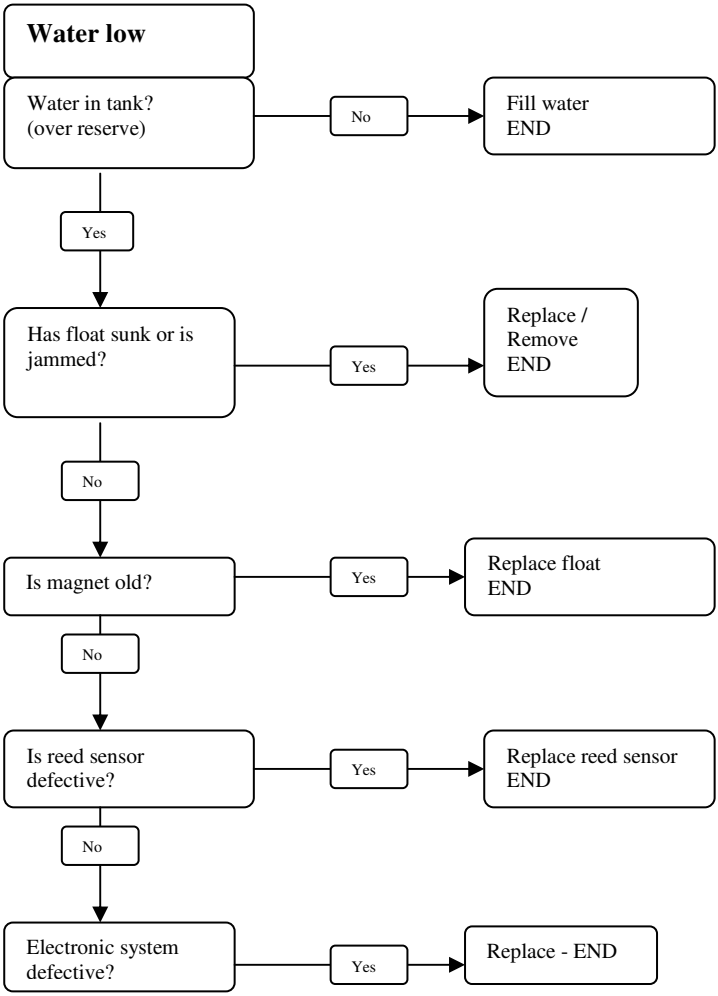
2.1 Machine does not function



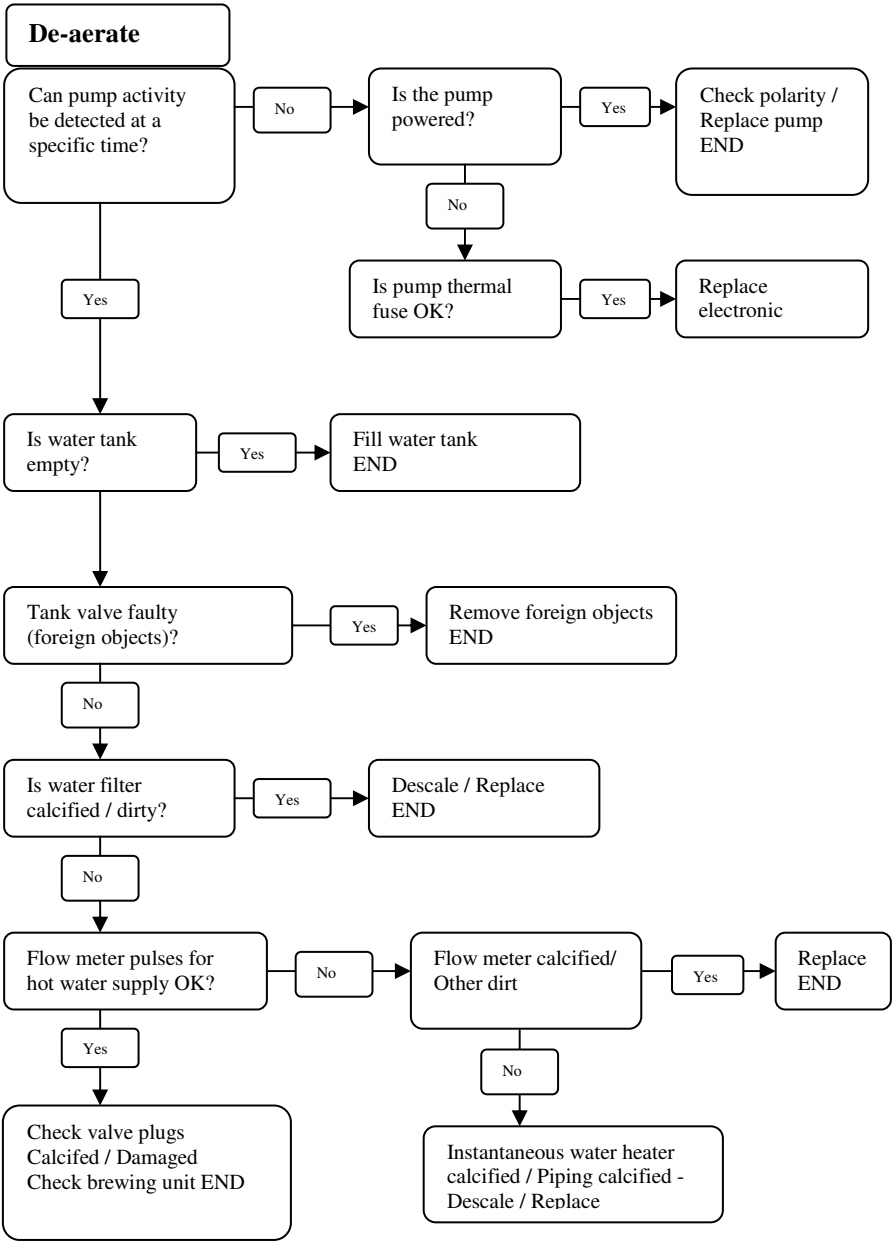
2.2. Machine does not function (Indicator: grinds container not detected)



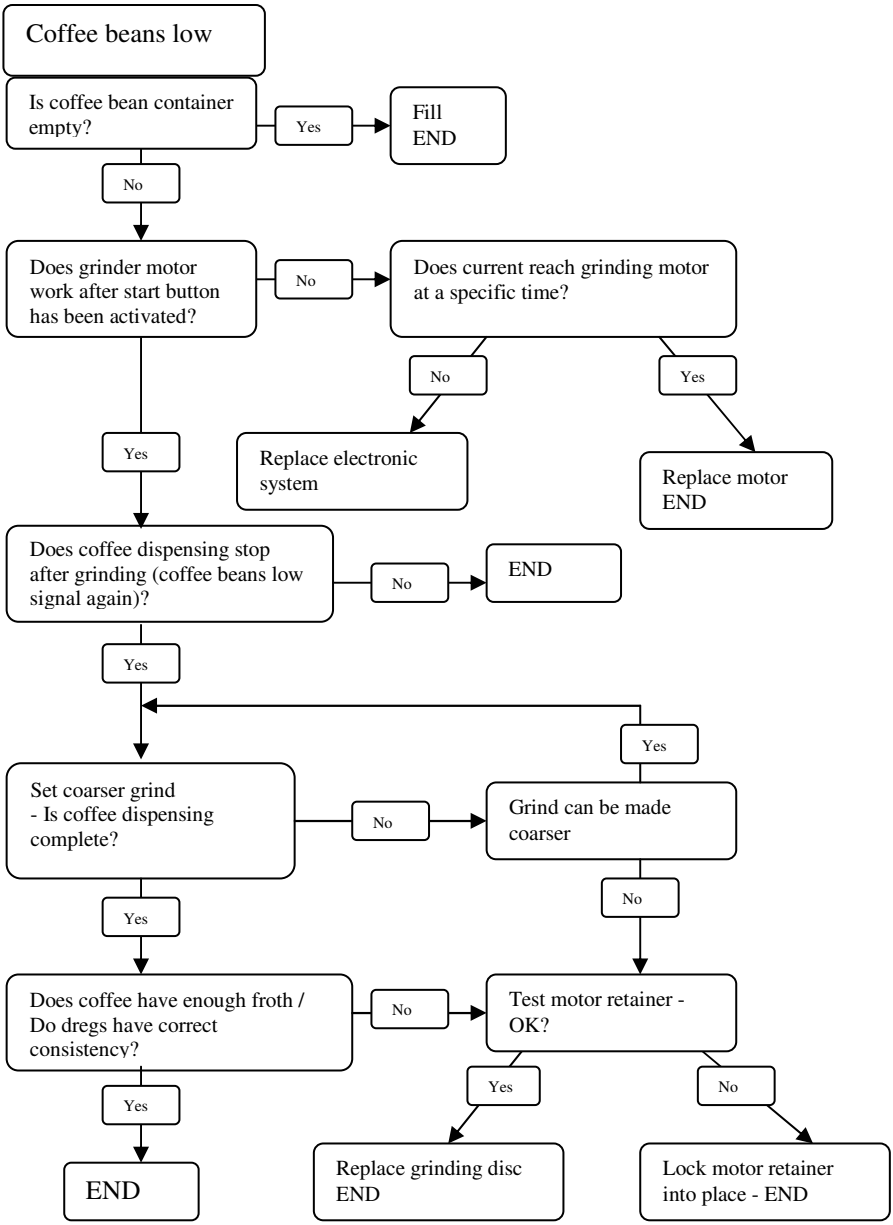
2.3. Water low


Water low
Water in tank? (over reserve)
No
Fill water
END
Yes
Has float sunk or is jammed?
Yes
Replace / Remove
END
No
Is magnet old?
Yes
Replace float
END
No
Is reed sensor defective?
Yes
Replace reed sensor
END
No
Electronic system defective?
Yes
Replace - END

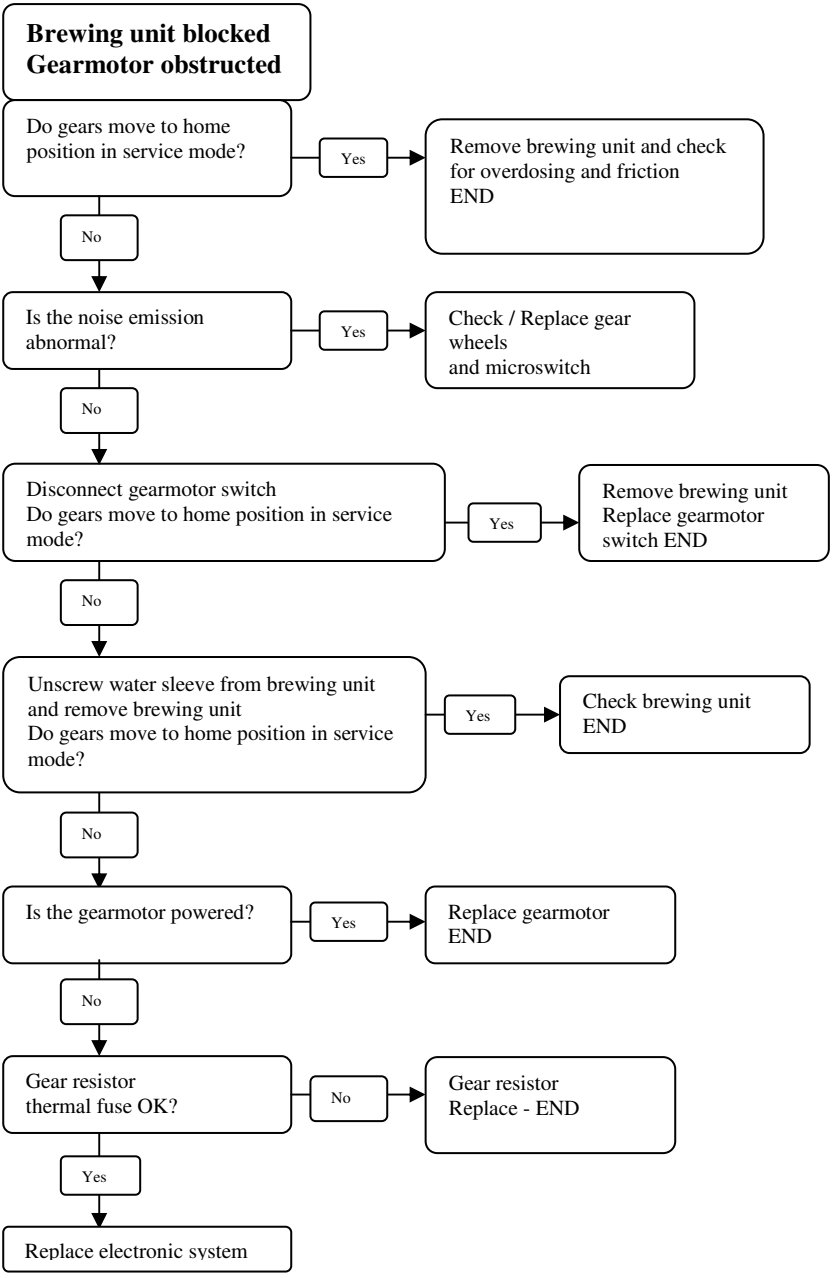
2.4. De-aerate


De-aerate
Can pump activity be detected at a specific time?
No
Is the pump powered?
Yes
Check polarity / Replace pump END
No
Is pump thermal fuse OK?
Yes
Replace electronic
Yes
Is water tank empty?
Yes
Fill water tank END
Tank valve faulty (foreign objects)?
Yes
Remove foreign objects END
No
Is water filter calcified / dirty?
Yes
Descale / Replace END
No
Flow meter pulses for hot water supply OK?
No
Flow meter calcified/ Other dirt
Yes
Replace END
Yes
Check valve plugs Calcifed / Damaged Check brewing unit END
No
Instantaneous water heater calcified / Piping calcified - Descale / Replace

2.5 Coffee Beans Low indicator



2.6. Brewing unit blocked / Gears blocked



CHAPTER 8
REPAIRS /
SERVICE SCHEDULE

1. Repairs schedule:

The repairs schedule, together with the service schedule, lists all relevant activities to be performed in an efficient sequence.

	Activity
1	Visual check (transport damage)
2	Record of machine data
3	Functional check / Error analysis
4	Opening of machine
5	Visual check (leakages)
6	Mechanical systems check (functional test)
7	Defect detection
8	Modifications check
9	Service operations according to service schedule
10	Internal cleaning
11	Functional test (with open machine / leakage test)
12	Assembly
13	Final test according to test schedule
14	Steam off (winter)
15	External cleaning
16	Lubrication of brewing unit
17	Insulation test
18	Documentation

2. Service schedule:

Service activities

R = Replace C = Clean VC = Visual check
AT = Acoustic test D = Descale A = Adjustment

Component	**Activity**	**Equipment**
Water filter	R	
Lip seal / Water tank	R	
Coffee return flow valve	R	
Valve spring	R	
Valve plug O-ring	R	
Valve plug O-ring	R	
Filter (brewing unit)	C / VC	Grease solvent
Hose connections	VC	
Pump	VC / AT	
Gearmotor	AT / VC	
Grinder	C / A	Vacuum cleaner / brush
Doser	C	Vacuum cleaner / brush
Water circuit	D	Descaler (Saeco)
HWD valve	VC / R	
Water outlet (valve plug)	C	Grease solvent / brush
O-ring (boiler connection / instantaneous water heater)	R	

3. Final test:

Test	Procedure	Equipment	Instruction	Tolerance
Cup fill volume	2-3 cups on expresso setting	Measuring beaker	Equal quantity	15%
Cup fill volume	2-3 cups on coffee setting	Measuring beaker	Equal quantity	15%
Noise emission			Empirical value Standard noise	
Froth quantity	Carefully froth coffee in cup until froth separates		Froth cover must subsequently close completely	
Froth colour			Textured light brown	
Temperature	Measurement of dispensed coffee stream	Temperature - measuring device	84 ˚C	± 4 ˚C
Grind level	Check grain size of coffee grinds		See Training	
Hot water	Dispense hot water			
Steam function	Dispense steam			
Water Low indicator	Remove tank		Fill water tank indicator	
Grinds Container Absent indicator	Remove grinds container		Grinds Container Absent indicator	
Coffee Beans Low indicator	Start coffee programme - coffee bean container empty		Coffee Beans Low indicator	
Insulation test			HG 701	

CHAPTER 9
DISASSEMBLY

1. Disassembly of the housing

a) Remove the water tank and the coffee bean container cover.
b) Remove the two fixing screws (1) of the coffee bean container.

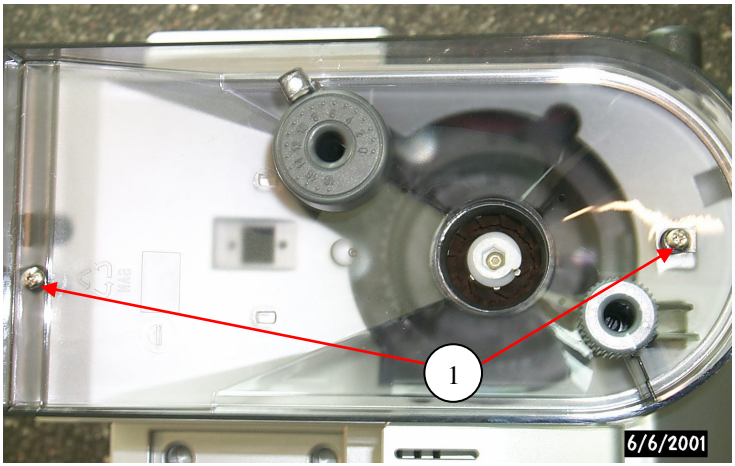


Fig. 1

c) Remove the housing screw (1) under the water tank (Torx/T10).
d) Remove the housing screw (2) under the coffee bean container.

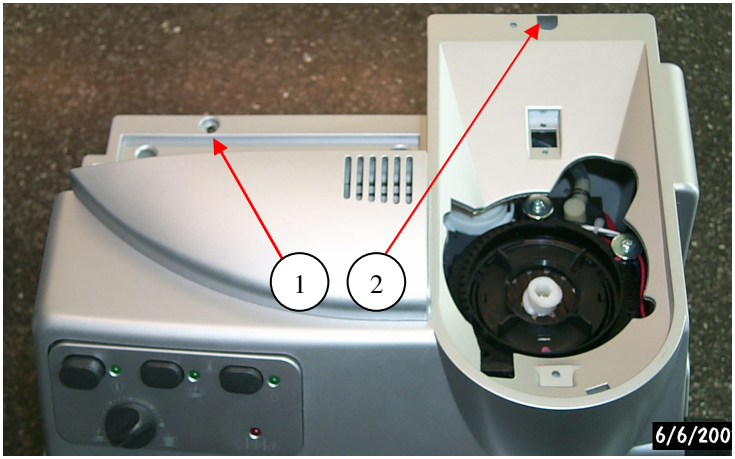


Fig. 2

e) Remove the two bottom housing screws (1). Pull the housing left of the electronic system slightly forwards and lift.

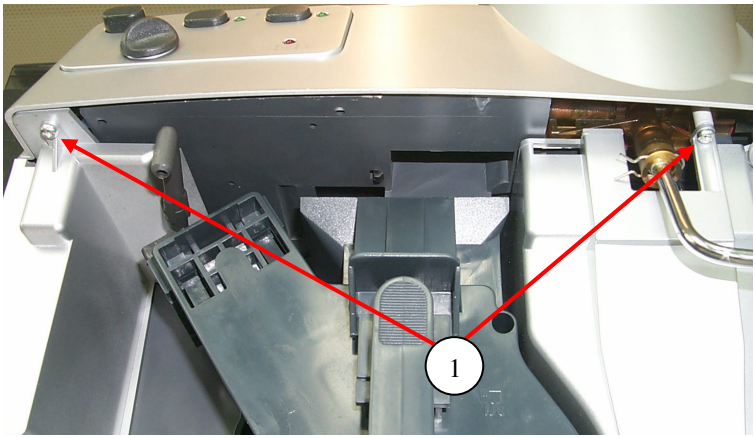


Fig. 3

f) Move the upper housing slightly to the left so that the notch (1) of the steam dial is visible on the right side of the machine. Release the steam dial using a sharp object and remove.

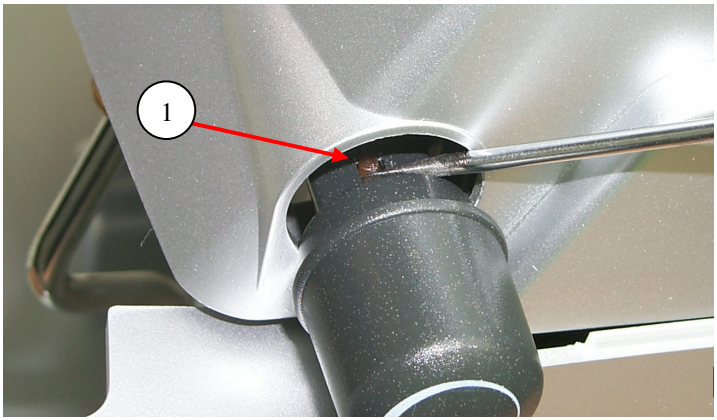


Fig. 4

g) Remove housing and pull water hose off.

2. Disassembly of the base plate

a) Release the base plate from the underside of the machine using a screw driver (see Fig. 5) and remove it from the housing.

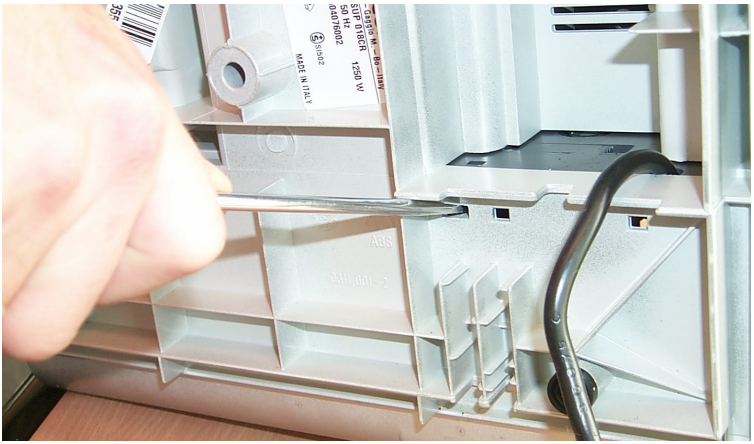


Fig. 5

3. Disassembling the electronic system

a) Remove sealing felt (1).

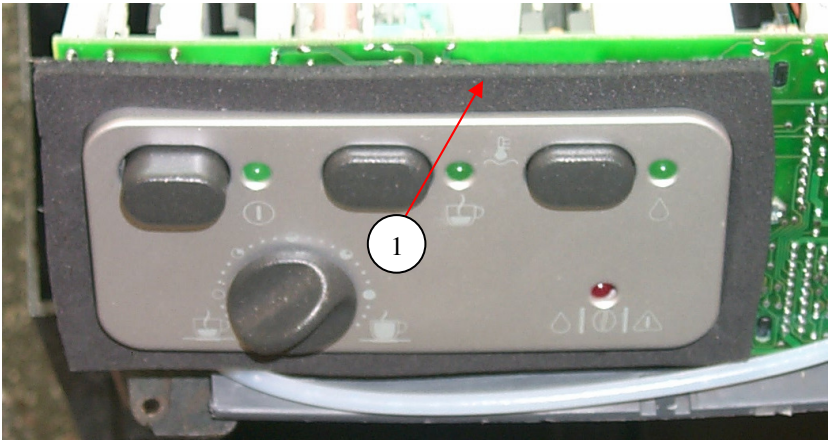


Fig. 6

b) Using a small screw driver, remove the three plastic tabs (2) of the button panel housing and remove housing carefully,

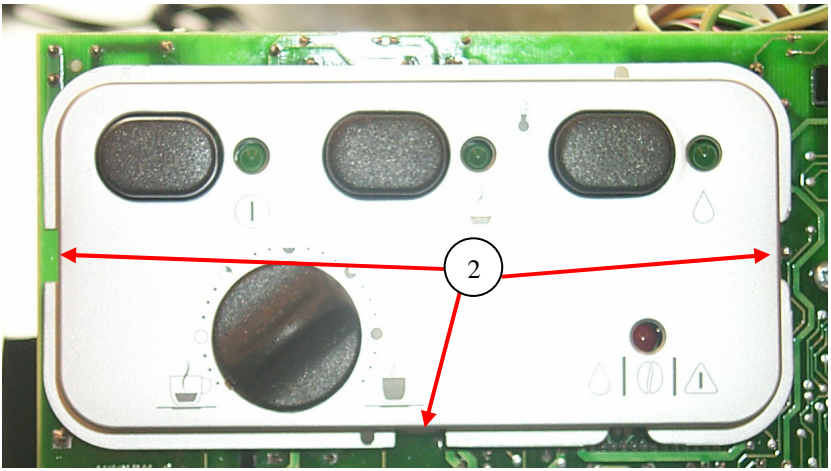


Fig. 7

c) Number the connections on the control board and remove.

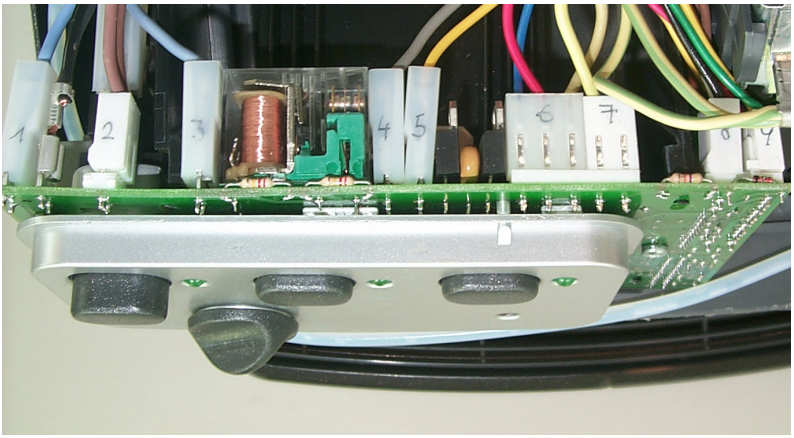


Fig. 8

d) Remove the two fixing screws (1) and remove the electronic system .

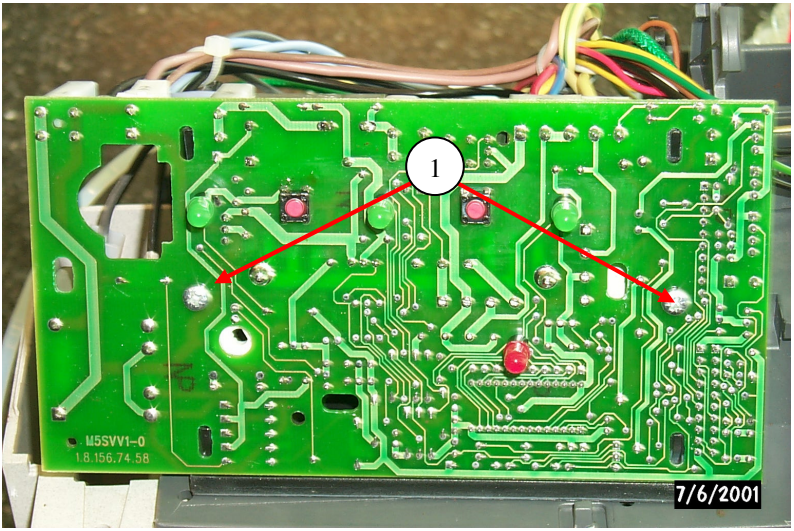


Fig. 9

4. Disassembling the doser

a) Using a screwdriver, release the fastening tab and push dosing magnet out of its fitting.

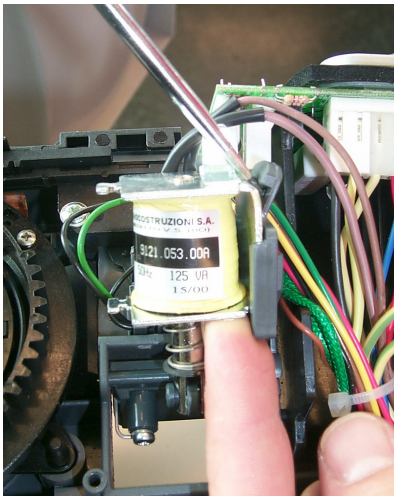


Fig. 10

b) Using a screwdriver, first push the doser flap out of the open bearing end. Then perform the same operation on the opposite side.

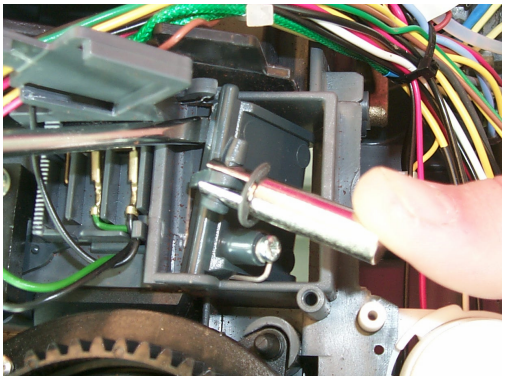


Fig. 11

5. Disassembling doser switch

a) Unscrew the fixing screw (1); release the four fastening tabs on the underside of the base plate and remove the electronic system housing.

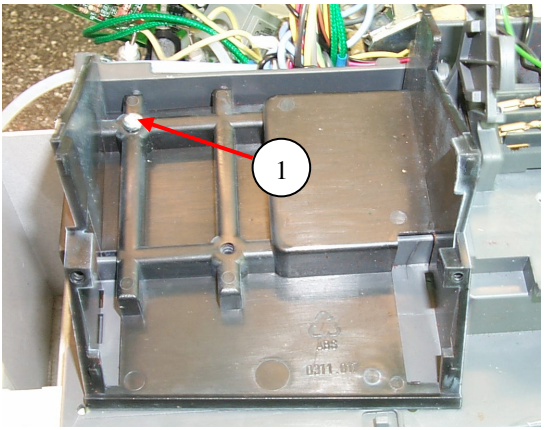


Fig. 12

b) Lift the doser adjustment lever slightly and push the doser switch fitting out of the guide towards the left (front view in Fig. 13).

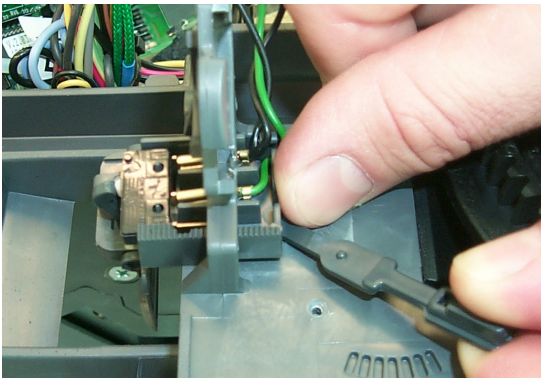


Fig. 13

c) Push doser switch out of its fitting and remove plug connector.

6. Disassembling HWD valve

a) Remove the HWD switch by pressing together the two fastening tabs (1) on the underside of the mounting plate (see Fig. 14).

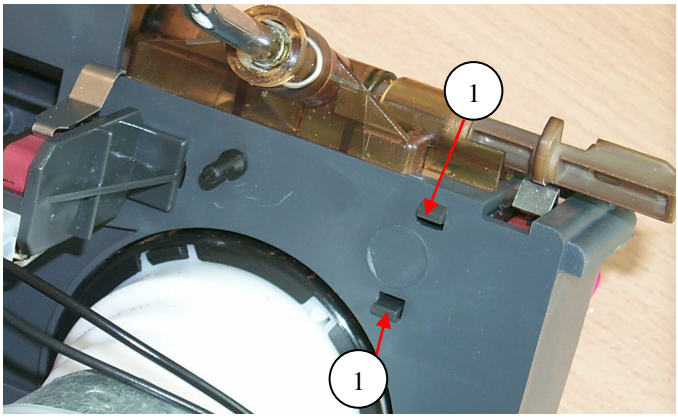


Fig. 14

b) Using a small screwdriver, remove the HWD system and push out of its fitting towards the right (see Fig. 15).

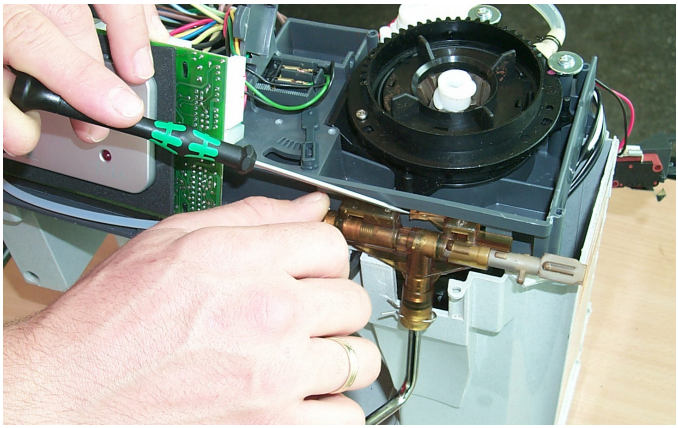


Fig. 15

c) Remove the HWD spindle by lightly pressing on the fastening tab (1) (by means of a small screwdriver) and push out of the spindle housing towards the right.
d) Disconnect the hose clip (2).

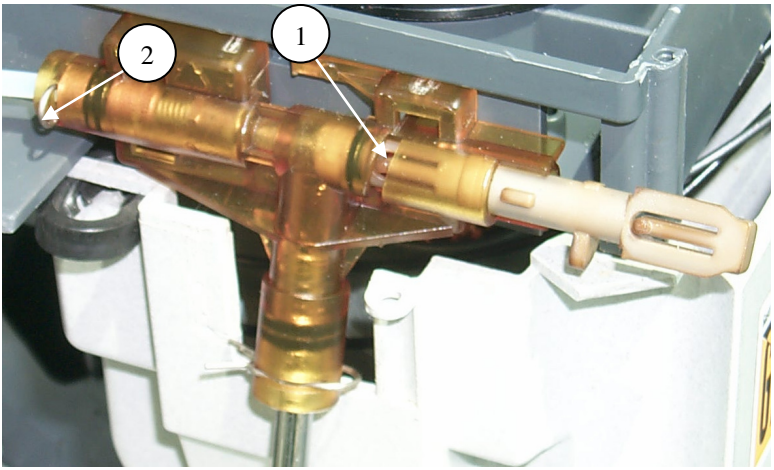


Fig. 16

e) Remove valve components from valve housing.

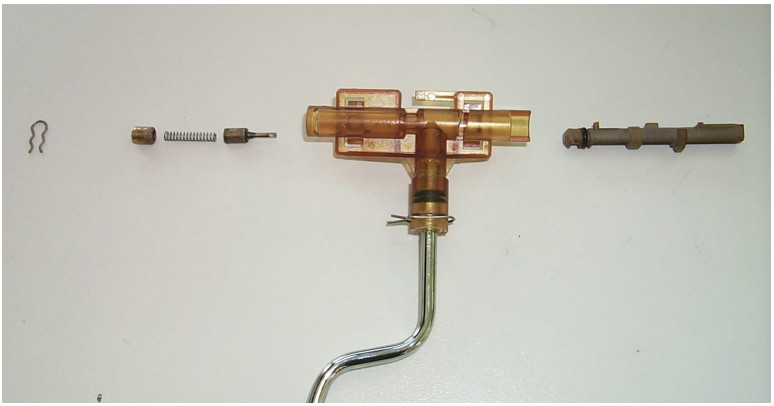


Fig. 17

7. Disassembling the grinder

a) Remove the two fixing screws (1). Remove the fixing screw on the upper grind adjustment ring (2).

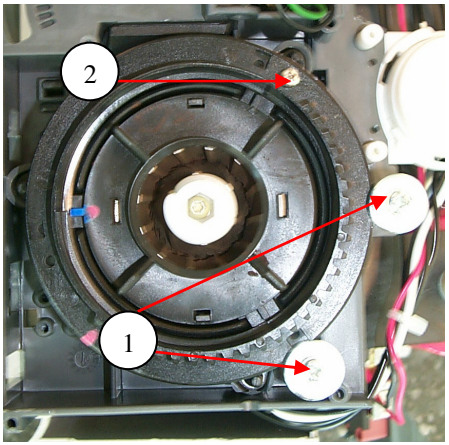


Fig. 18

b) Release the three fastening tabs (1) on the underside and remove the upper grind adjustment ring (2).

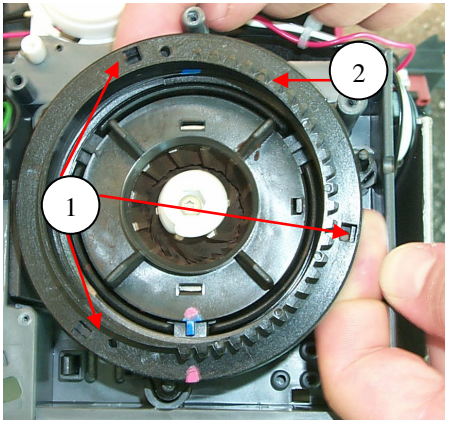


Fig. 19

c) Turn the grinding adjustment ring (1) clockwise until the three lugs of the grinding disc fitting (2) are clearly visible and remove the upper grinding disc from the grinder.

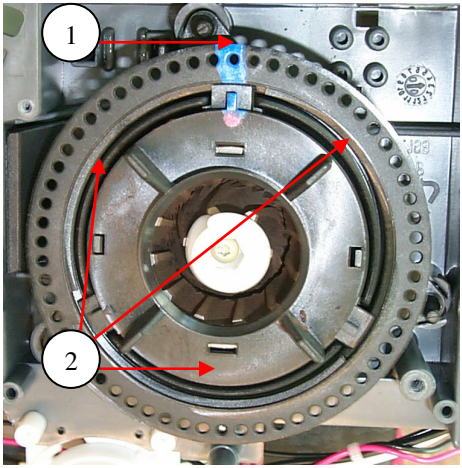


Fig. 20

d) Remove the fixing screw (1) of the grinding cone (note: left thread) and carefully remove the grinding cone (friction clutch).

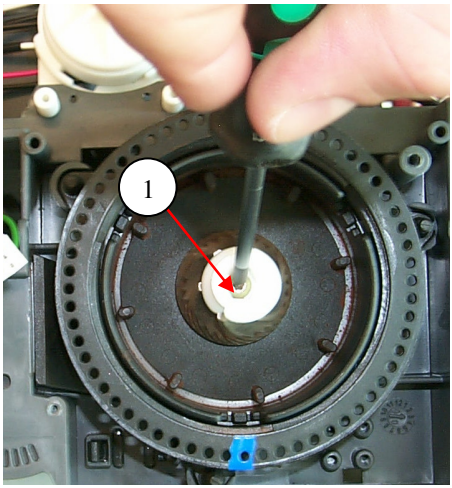


Fig. 21

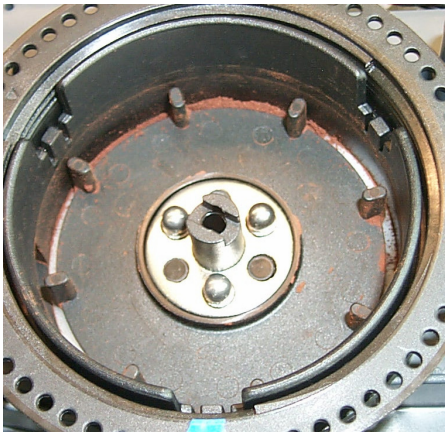


Fig. 22

e) Carefully remove the clutch disc.

Fig. 23

f) The sealing felt can then be cleaned.

8. Adjusting the grinder

a) Install the grinding ring onto its fitting so that the marking (1) on the grinding adjustment ring and the ring fitting (2) are adjacent to one another.

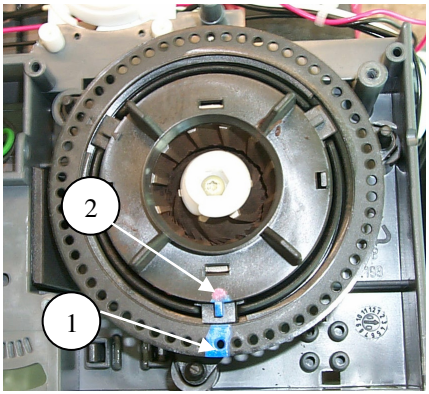


Fig. 24

b) Turn the grinding adjustment ring clockwise until a certain friction can be felt.

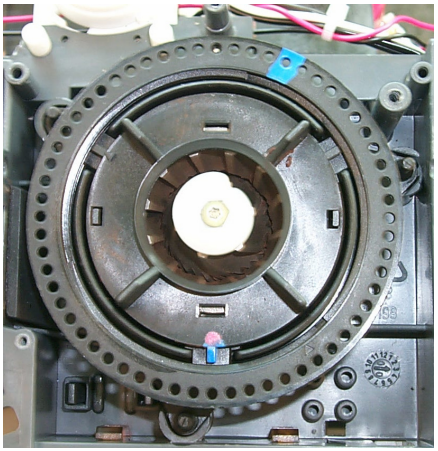


Fig. 25

c) Turn about 12-14 notches in an anti-clockwise direction and check the grind level by making a test coffee (Crema / dregs grain size). Adjust the grind level as required (max. 3-5 notches). Install the upper grind level ring so that the marking on the upper grind adjustment ring (1) is next to the steam button. Screw locking screw (2) in as illustrated. (Set the coffee bean container to grind level 8)

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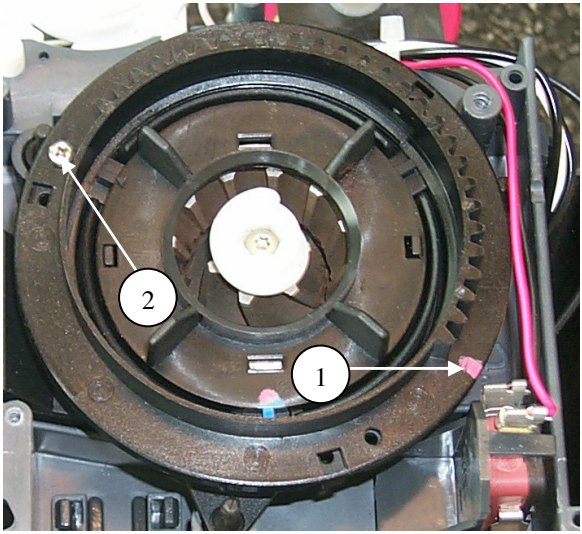

Fig. 26

9. Disassembling the pipe heating system (only for Cafe Crema)

a) Remove fixing screw (1).

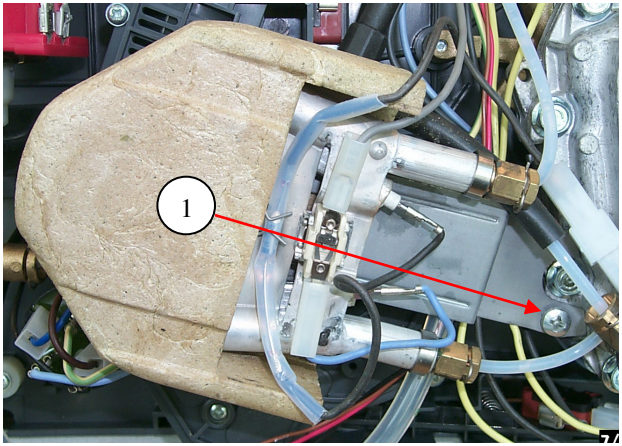

Fig. 27

b) Remove from the connection piece the two locking springs (1) located at the hose connections (have a container available for catching the residual water).

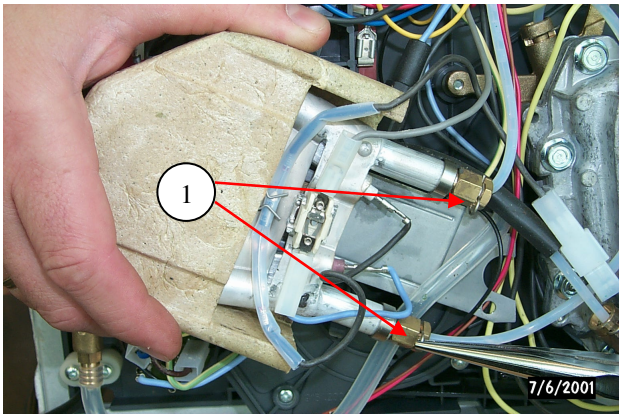

Fig. 28

10. Disassembling the boiler

a) Remove from the hose connections the two locking springs (1) and pull the hoses out of their connections
(have a container available for catching the residual water).

b) Remove the two connector plugs (2) of the gear resistor.

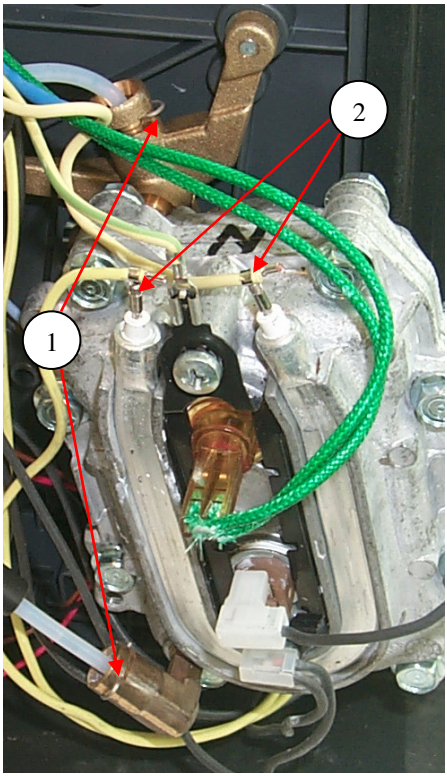

Fig. 29

c) Unscrew the two screws (1) of the thermostat fitting and remove the thermostat and thermal sensor (Fig. 30)**.**
Attention: The metal cylinder (Fig. 31/1) of the thermal sensor (KTY) must be transferred from the old KTY to the new KTY when the KTY is replaced!

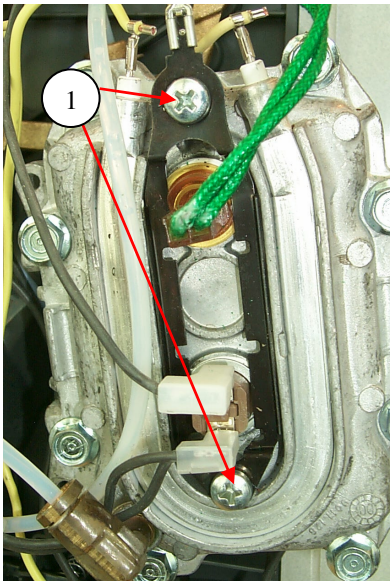

Fig. 30

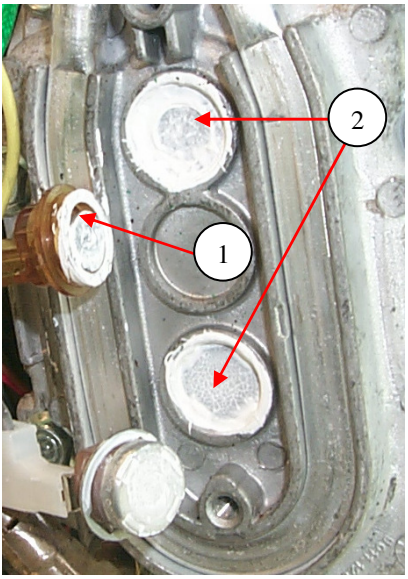

Fig. 31

d) When re-assembling ensure that sufficient heat conductive paste is used (Fig. 31/2).

e) Remove the two connections of the boiler heating system on the underside of the boiler (1) **Attention:**The boiler heating system connection can be distinguished from the gear resistor
by a green marking (2)! Take note of this when re-assembling
(to avoid damage to the electronic system).

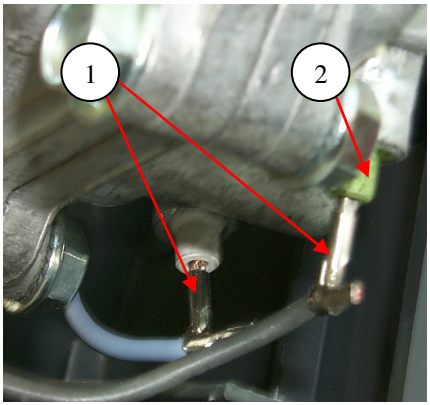

Fig. 32

f) Remove the three boiler fixing screws (1) and remove the boiler from the machine.

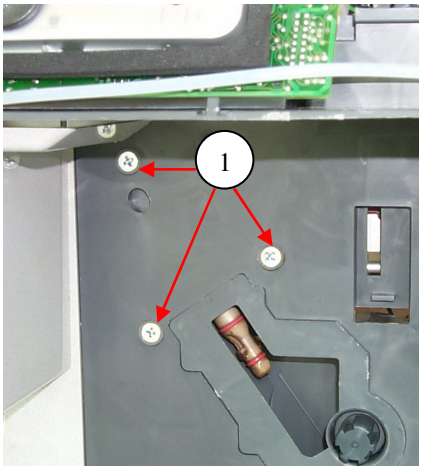

Fig. 33

11. Disassembling the gears

Unscrew the seven screws (1) of the gear cover and remove cover.

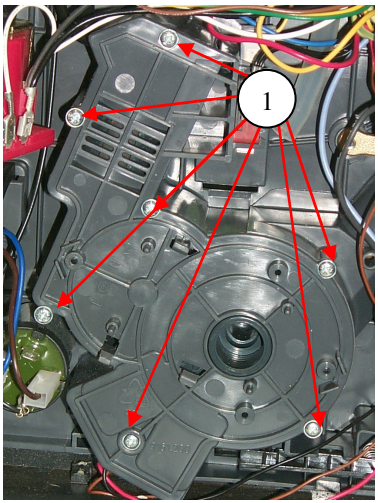

Fig. 34

When replacing the gear wheel ensure that the arrow on the large gear wheel points towards the microswitch. The brewing unit cannot be installed in this position. (Install all components, switch on machine - gears go to home position - install brewing unit.) The small gear wheel can be assembled as required.

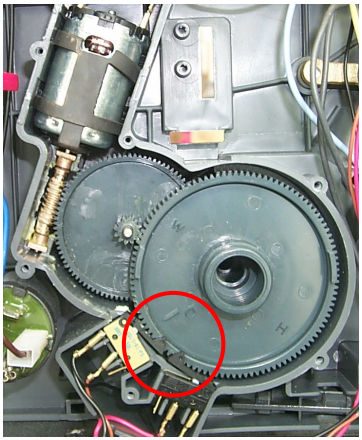

Fig. 35

CHAPTER 10
CIRCUIT DIAGRAMS