OPERATING PRINCIPLE

Thermal brewers
Aurora

SINGLE LOW (SGL)

TWIN LOW (TWL)

SINGLE HIGH (SGH)

TWIN HIGH (TWH)

BRAVILOR BONAMAT

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1. General operation

The machine works according to a pump system developed by Bravilor Bonamat.

This system has the following advantages:

- Many of the parts ensuring correct dosing of the water are in a cold water circuit.
  This minimises the main cause of failures, being the forming of scale on the dosing valves.
- The float regulating the water level is also in the cold water circuit.
  This also minimises scaling.

2. Water dosing system

After having started a selection, the pump motor is controlled with a regulated time and speed. The pump rotor moves a certain amount of cold water from the cold water reservoir to the bottom of the boiler. This pushes the hot water in the boiler up towards the water selector. This selector chooses its position by means of a rotating movement. Dependent on the recipe, the water selector will also dose through the bypass and therefore choose a different position.

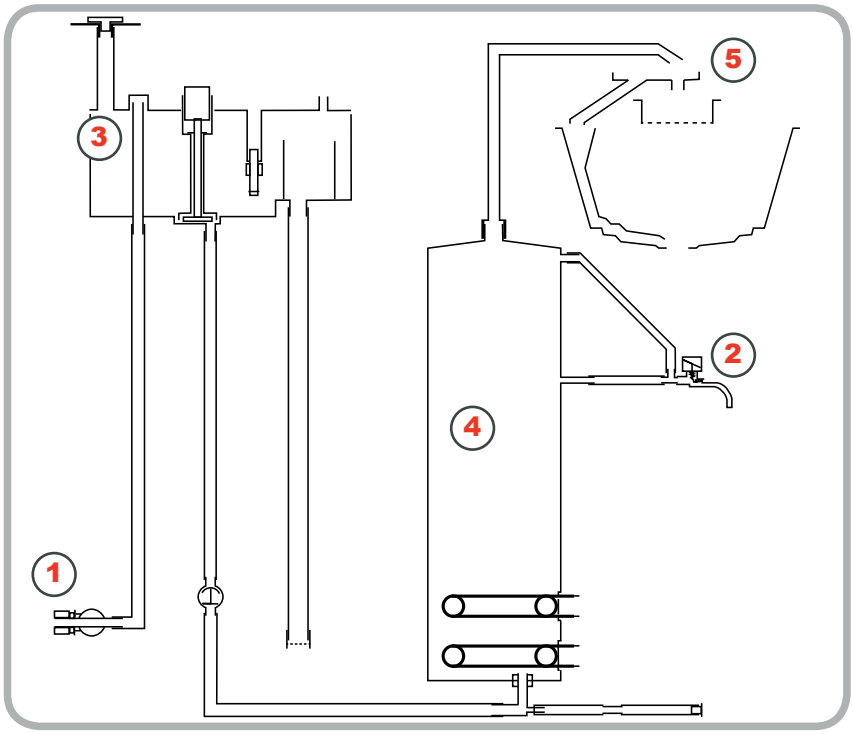


Fig.1 Water dosing system

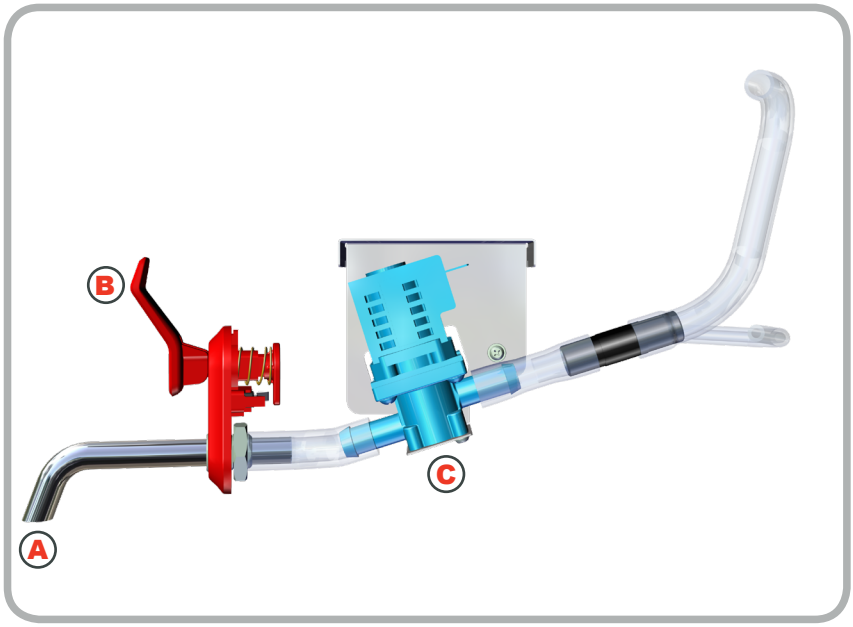


Fig.2 Hot water outlet

The water dosing system consists of the following main components:

1. Magnetic valve
2. Hot water outlet (Fig.2)
   - 2a. Hot water outlet
   - 2b. Tap including switch
   - 2c. Hot water valve
3. Float tank (Fig.3)
   - 3a. Float
   - 3b. Pump motor
   - 3c. Pump rotor
   - 3d. Encoder
4. Boiler (Fig.4)
   - 4a. Element
   - 4b. Temperature sensor (NTC)
   - 4c. Clixon
5. Hot water selector (Fig.5)
   - 5a. Water selector motor
   - 5b. Water distribution disc
   - 5c. Hall sensor
   - 5d. Top cover water selector (including electrodes for scaling detection)

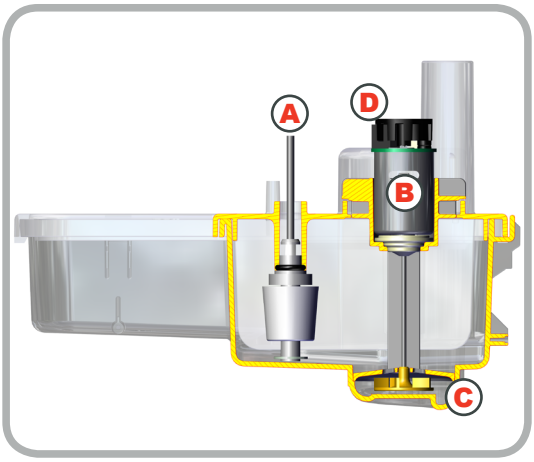


Fig.3 Float tank

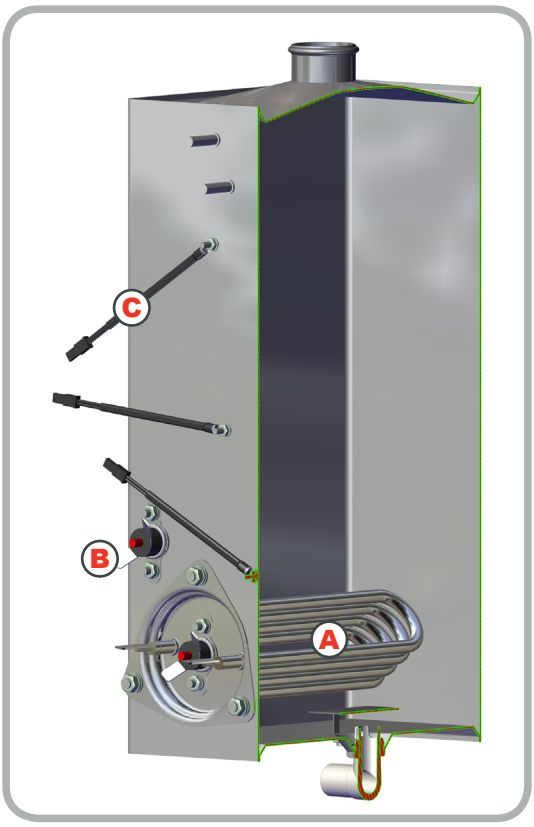


Fig.4 Boiler

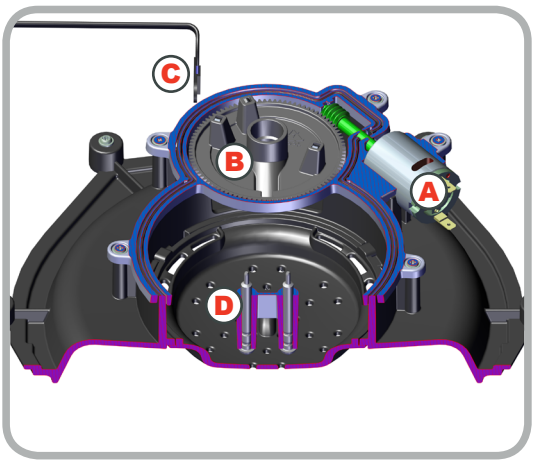


Fig.5 Hot water selector

3. Start up

3.1 Initialisation

The machine is switched on using the main switch. The display shows the version number of the software downloaded in the factory and after this the display will show all symbols and “init” to indicate that the machine starts initialisation. During this initialisation, the machine will run a standard routine to make sure that a number of essential components have been connected and are operating correctly. The machine will generate an error when a component has not been connected for any reason or is defective. When everything goes well, this process will take about 15 seconds.

3.2 Installation

When switching on the machine for the first time, the installation programme “first start” must be run. The machine will have to run its boiling point determination programme and while running this programme, hot water can come out of the outlet (see 3.4). Calibrate the pump motor after having run the boiling point determination programme.

This calibration will take place in 2 steps:

1. The machine will calibrate the pump motor for dosing on the coffee.
   The machine will dose through the filter pan. Collect the quantity of water to be dosed and enter this into the display.
   Repeat the procedure when the quantity deviates too much.
2. The machine will now calibrate the pump motor for dosing on the coffee and tapping hot water at the same time.
   The machine will now dose through the filter pan as well as through the hot water tap.
   Collect the quantity dosed through the filter pan and enter this quantity in the display.
   Repeat the procedure when the quantity deviates too much.

When both calibrations have been done, the machine is ready for use.

3.3 Fill

The float tank and the boiler are connected by a siphon hose. Together they form communicating vessels.

When the machine is switched on for the first time, the float tank is (Fig.3) empty and the float (Fig.3,A) is its low.

- The magnetic valve (Fig.1) is opened and fills the float tank with a pressure-independent speed with water. This filling speed is type-dependent, being 5 litres per minute for the Twin version and 6 litres per minute for the Single version.
- The water in the float tank runs through the hose below the float tank to the boiler.
- After the water level has pushed up the float, the water level in the float tank is equal to that of the boiler. The magnetic valve is switched off.

If the machine is a Twin version, the other side will now be filled following the same procedure.

Note:

► *As the float tank fills up faster than the water ‘drops’ into the boiler, the filling process will take place with short intervals.*

3.4 Boiling point determination programme

Hot water may come out of the filter pan while running this programme.

The machine automatically only runs the boiling point determination programme when using the machine for the first time. The boiling point of the water is now determined. This is necessary because the boiling point depends on the local atmospheric pressure. The boiling point at sea level will be about 100°C, whereas the boiling will drop to about 97°C at an altitude of 2000m. After having switched on the mains voltage, the water in the boiler will first be heated to about 75°C at full power (Fig.6,A).

Then the water in the boiler will be heated with reduced power to 85°C. During this period, the software will measure how quickly the water is heated.
Based on this measurement, the machine will heat up with a certain power until the temperature sensor on the outside of the boiler has not detected a temperature change for some minutes (Fig.6,B). After this period, the boiling point has been reached and the measured value is saved in the software.

The final operating temperature in the boiler will be 3°C below this point. Because the boiling point of water depends on the atmospheric pressure, it is necessary to run this programme at the location where the machine will be used. During the boiling programme, the display shows the current temperature with below this a flashing thermometer and a changing, increasing volume.

After a certain period (dependent on the power the machine has been connected to), the thermometer stops flashing to indicate that the boiling point has been determined.

Note:

► *While running the boiling point determination programme, it is very important that no panels have been removed from the machine.*
The fact is that this may influence the measurement and so cause a deviation in the temperature during normal use.

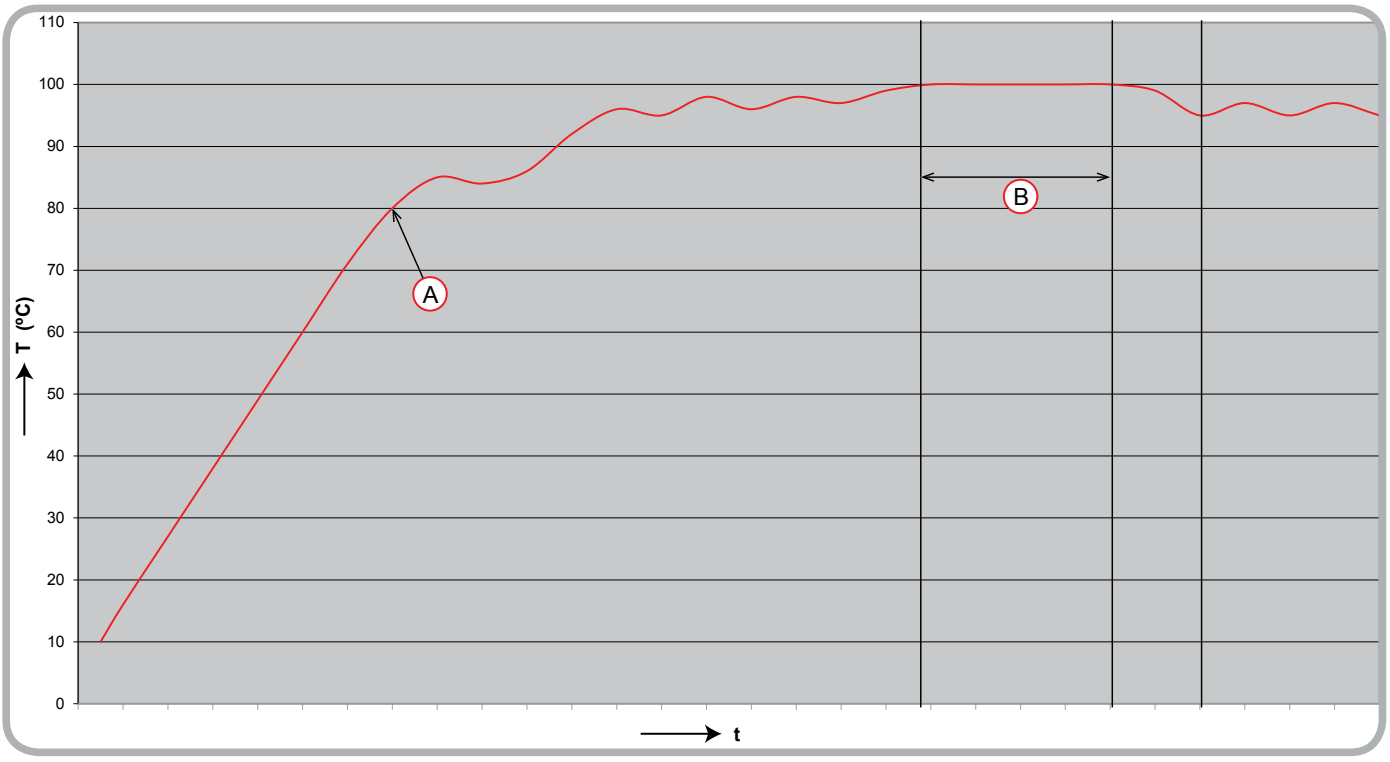


Fig.6 Boiling point determination programme

3.5 Heating

Now the system has been completely filled with water, a relays will enable the element.

The machine has been provided with a smart boiler routine, which basically works as follows:

- The lower temperature sensor measures the current temperature of the water.
  The temperature sensor makes sure that the water in the boiler is heated to the desired final temperature.
- The centre temperature sensor is responsible for releasing or not releasing the selections volume 2 and volume 3 for dosing.
- The upper temperature sensor is responsible for releasing or not releasing the volume 1 selection for dosing (if set, the airpot selection will be released as well).
- The heating switches off when the set temperature has been reached. Hot water has a lower specific weight than cold water. As a result, the hot water in the boiler will not flow back to the float tank through the siphon hose at the bottom. Therefore this part of the system will remain cold. This is very important because the parts in the float tank are sensitive to scaling.

3.6 Dosing

Dosing takes place when:

- The float is in the upper position.
- The uppermost temperature sensor measures a temperature higher than the blocking temperature.
- After having started a recipe, the pump motor (Fig.7) will for a certain period be controlled with a set speed (rpm), dependent on the programmed recipe.

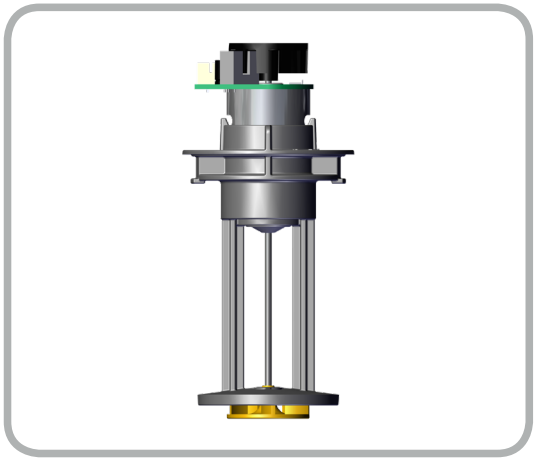


Fig.7 Pump motor + rotor

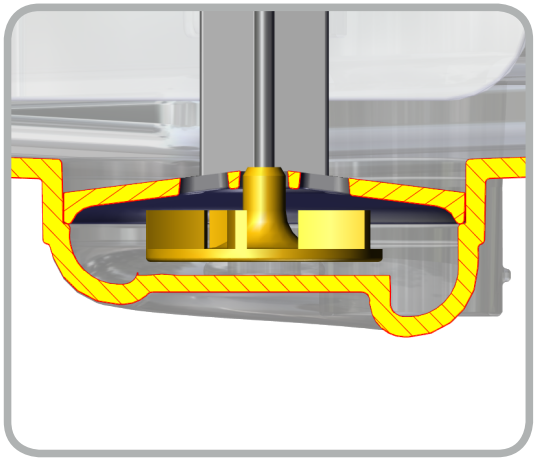


Fig.8 Pump housing

- The pump rotor rotates in the pump chamber that has been filled with water.
  This is formed by the bottom of the float tank and the bottom of the pump housing (Fig.8).
- The pump rotor pumps the water out of the pump chamber through the siphon hose at the bottom of the boiler.
- This presses the hot water out of the boiler.
- The float and the magnetic valve make sure that the correct level of water in the float tank is maintained and so water remains in the pump chamber.

The volume of moved liquid (output) is mainly determined by the time and speed of the pump motor. The software controls the time that the motor is on and this is very precise. The rotational speed of the motor is measured by an active revolution counter. Fig.9 shows that a disc has been mounted on the shaft of the pump motor (A=Encoder). This disc rotates at the same speed as the pump rotor. The encoder rotates between a light sensor (B) and interrupts a light beam each time. The interruption of the light beam is converted into electronically readable pulses.

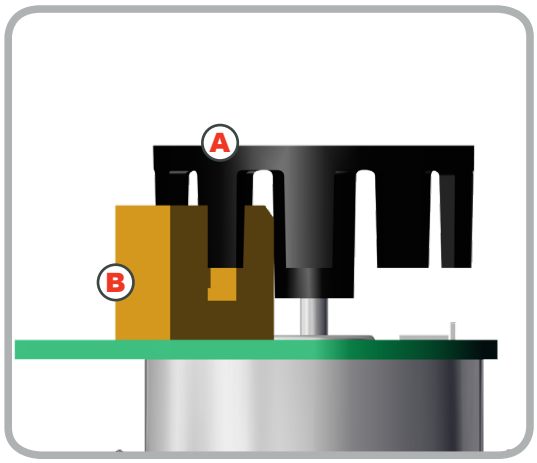


Fig.9 Encoder

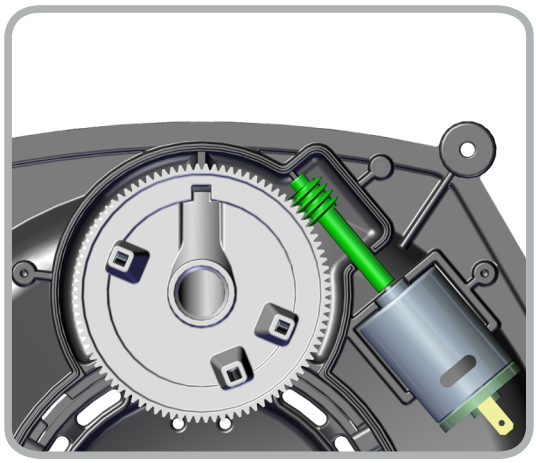


Fig.10 Water selector intern

This actively controls the rotational speed in order to guarantee that the rotational speed and therefore the water output remains constant during the time that the pump motor is on.

Select the dosed hot water:

- This machine has a hot water selector (Fig.10).
- This part is responsible for distributing the dosed water from the boiler in 2 directions, through the filter (for the coffee) or through the bypass (passing by the filter and the coffee).

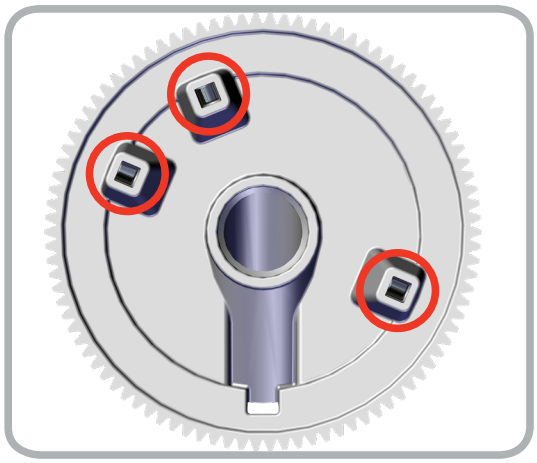


Fig.11 Water distribution disc with magnets

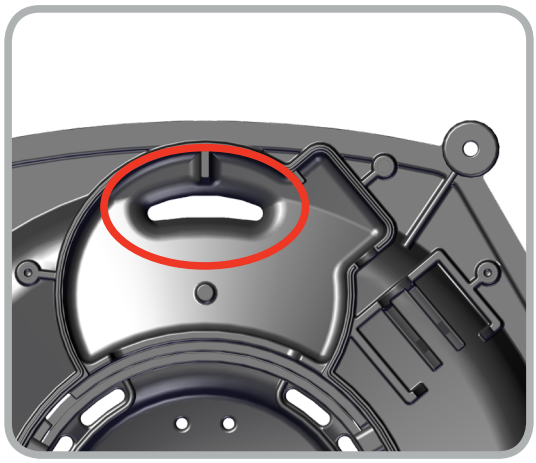


Fig.12 Bypass

After the machine has been switched on, the water selector will go to the home position following the procedure below:

- The water selector motor is controlled.
- This motor drives the water distribution disc with a plastic worm (Fig.10).
- The water distribution disc has 3 magnets (Fig.11) 2 of which are close together. The hall sensor detects all these magnets (Fig.5,C).
- The water distribution disc will always rotate min. 360 degrees to determine its position. The position for dosing through the bypass during the start-up of the machine is the home position (Fig.10).

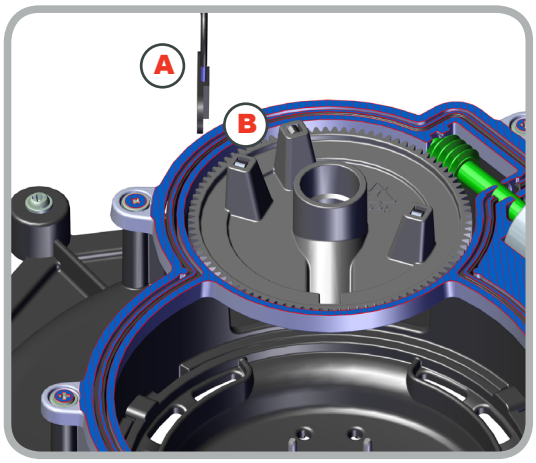


Fig.13 Position for coffee

Operation of the water selector when starting to make coffee:

- When a selection is made, the water selector motor is controlled. When the hall sensor (Fig.13,A) detects the magnets that are close together (Fig.13,B), the position for dosing on the coffee is determined.
- After the position has been determined, the pump motor is controlled.
- The dosed hot water is pumped into the top of the water selector (Fig.14,A).
- The water runs through the central hole of the distribution disc (Fig.14,B). Then it exits through the oblique hole at the bottom (Fig.14,C).
- Dependent on the recipe settings, the water selector can switch between dosing on the coffee and dosing through the bypass. This can be done several times while making coffee.

Note:

► *As soon as the water selector switches between dosing on the coffee or through the bypass, the pump will be switched off until the water selector has determined its position again.*

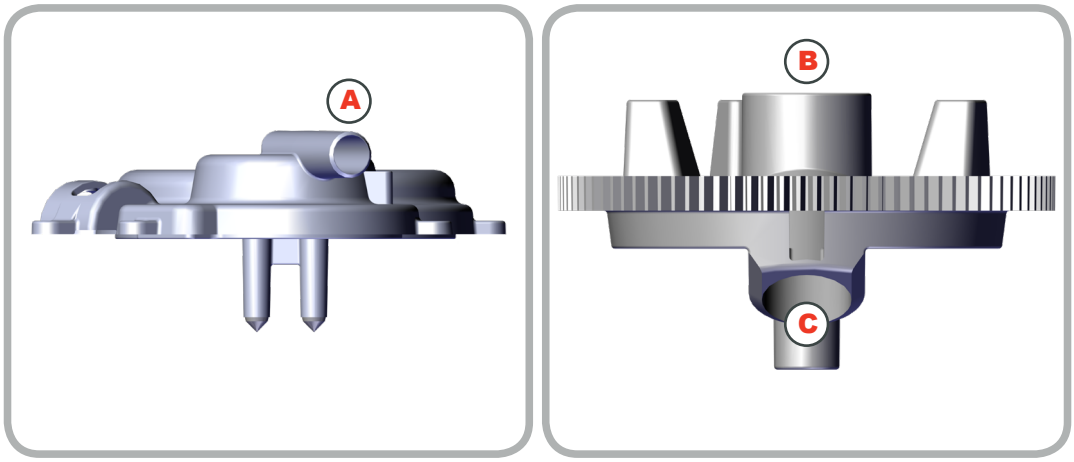


Fig.14 Water selector components

4. Extract

The water that is pumped through the spray head falls on the coffee. This water seeps down through the coffee and the filter paper. The basket in the filter pan prevents the filter paper from sticking to the bottom and the coffee from flowing to the outlet. The extraction of the coffee takes place during this process.
The extraction can be influenced in various ways. See the following chapter for this.

5. Recipes

With the Aurora it is possible to create own recipes for the extraction and strength of the coffee to your own taste.

For example, with these recipes you can vary the contact time, the strength and the temperature of the coffee. It is also possible to vary the dosing of water in different quantities and phases with various intervals.

- The contact time of the water with the coffee can be influenced by making the pump dose slowly (20ml/sec) or quickly (30ml/sec).
- The boiler temperature can be set separately for each recipe between 85°C and 97°C.
- Water dosing quantities and waiting times can be entered by means of “pre-infusion” and different “Pulse Brew” programmes.
  It is also possible to dose water outside the filter (also called bypass). This water will therefore be mixed with the made coffee and in this way the solution and strength of the coffee can be influenced.

All these variables have their influence on the final result.

In the machine a total of 25 recipes can be stored and each recipe can be given its own name. Each recipe consists of 3 volumes that can be selected for making coffee. For the low version of the Aurora also a fourth volume can be selected, being the airpot (2,2 litres).

5.1 Recipe settings

The variables that can be programmed in each recipe are:

- Coffee volume.
- The quantity of lost water in percentages (this refers to the water that remains behind in the coffee).
- The temperature of the water.
- The pump speed with which the water is dosed on the coffee. The speed can be set separately for the various programmes between low (20ml/sec) and high (30ml/sec).
- Pre-infusion, the first dosing programme for dosing the water on the coffee. This function is optional and the volume can be set between 100ml and 1000ml as well as the waiting time before the start of the next dosing.
- Various water dosing programmes PB1, PB2 and PB3 (also called the “Pulse Brew” programmes). For these pulse brew programmes different settings can be used for the volume and the waiting times. For each pulse brew programme 1 dosing volume can be set, but this can be dosed several times with waiting times between the dosings.
- It is possible, though, to use other volumes between the various pulse brew programmes.
- Drip time in seconds.

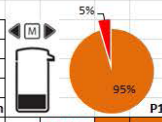
The bypass is not a variable that is to be entered, but the quantity of water that is to be dosed for this depends on the other settings. After having entered each dosing programme, the display will show how much water will be dosed through the bypass. If another dosing programme is entered as well, the quantity for the bypass will be adjusted again. The quantity of water for the bypass will always be dosed during the waiting times.
Eventually, the settings mentioned above will more or less influence the taste of the coffee.

5.2 Recipe build-up

Below an example is given of how a recipe can be built up:

Recipe	:					
Temperature	:	95°C				
Coffee (gr./l)	:	60				
Lost (%)	:	10				
Pumpspeed	:	P-i	Bp	P1	P2	P3
ml/sec	:	30	30	30	30	30

Position	:	■
Volume coffee (ml)	:	2000
Total water (ml)	:	2200
Volume coffee (gr.)	:	132,0
Setting	:	P-infusion



				P1				P2				P3						Total				
parameter	:	Volume	Wait	Bypass P-inf.	Cycli	Volume	Wait	Bypass P1	Cycli	Volume	Wait	Bypass P2	Cycli	Volume	Wait	Bypass P3	Afterdrip	Bypass Afterdrip	Water for coffee (ml)	Water for bypass (ml)	Water deliverytime	Total brewtime (sec)	min.
Brew 1	:	500	5	100	4	400	10	0									140	0	2100	100	115	255	4,25
Brew 2	:			0																			
Brew 3	:			0																			

Fig.15 Recipe build-up

The above-mentioned recipe can be fully calculated. See below for an example:

- The **coffee volume** has been set to 2000ml.
- The quantity of **lost water** has been set to 10% (the percentage may differ for each coffee type or the ground of the coffee).
- The machine will now dose a **total volume** of 2200ml water (2000ml + 10% = 2200ml).

Now it is known how much water the machine will dose and the various programmes can be used for this.

- ***Pre-infusion*** has been set to 500ml.
- ***P1*** has been set to 400ml and to 4x dosing (therefore here 4 x 400ml = 1600ml will be dosed with a set interval of 10 seconds between the 4 dosings).

The machine will now dose 500ml (Pre-infusion) + 1600ml (P1) = 2100ml water on the coffee.

In this example also 100ml will be dosed through the bypass.
2200ml (total volume) – 2100ml (set dosed volume) = 100ml.
The 100ml. (for the bypass) will be dosed in the waiting times.

The water dosing time can also be calculated based on the pump speed and the waiting times.
The correct drip time is to be determined by experience.
The total set time for the coffee = water dosing time + drip time.

5.3 Default recipes

A number of default recipes have been programmed in the factory.
These recipes can be used for making coffee immediately after installation.
3 different volumes have been programmed for each recipe.
Of course, the results of these recipes depend on various factors, such as the ground of the coffee, the quantity of coffee, the roasting of the coffee, etc.
If required, these recipes can be adjusted using the programme “change recipe”.

5.4 Programme recipes

There are 2 programmes for programming recipes, being build and program.

BUILD:

When using “build”, you can enter all variables yourself.
When all 3 volumes have been programmed, the recipe is saved.
Now coffee can be made using this recipe and you can determine if you like the recipe. After the recipe has been saved, it can be adjusted in the programme “change recipe”.

PROGRAM:

When using “program” coffee will be actually made.
A limited number of settings is to be entered.
These settings are:

- Total quantity of water.
- The quantity of lost water in percentages (this refers to the water that remains behind in the coffee).
- The temperature of the water.
- The pump speed for dosing.
- Pre-infusion (optional), the volume and the waiting time for this.
- Volume for the pulse brew programme.

The waiting times between the dosings and the drip time are determined by the creator of the recipe. As soon as the machine has finished dosing, the waiting time starts. The waiting time is determined by pressing the display and the next dosing will be started, if required.

Any dosing through the bypass will be dosed at the end of this programme.
This dosing through the bypass will with normal use just be given during the waiting times between the various dosings.
If required, these recipes can be adjusted using the programme “change recipe”.

5.5 Adjust recipes

If required, saved recipes can at all times be adjusted using the programme “change recipe”.
The various settings can be given a different value.

5.6 Upload/download recipes

Recipes can be uploaded from a machine to an RFID card using “upload” and then you can download this recipe using “download” to any other Aurora machine.
One single recipe can be uploaded from a machine to an RFID card, but it is also possible to upload all recipes in one go to an RFID card. The latter is called “bulk recipes”.

6. RFID

RFID (Radio Frequency identification) is a wireless system that uses radio frequency and electromagnetic fields to transfer data, without using any wires or batteries.
Settings and recipes can be transferred from a machine to an RFID card and vice versa. Recipes and/or settings can be transferred and recipes can be overwritten.
The RFID print is found on the left side of the machine (Fig.16).
For transferring data, hold the RFID card against the machine at the place intended for this.

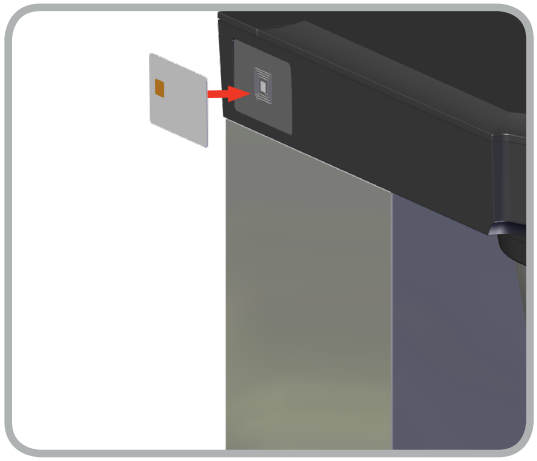


Fig.16 Place for holding the RFID card

Transferring data can only be done by going to the relevant setting in the programme.

Note:

► *If several recipes are transferred at once using an RFID card (bulk recipes), all existing recipes will be overwritten and be lost.*
Before actually overwriting the existing recipes, the display shows a message that needs confirmation. This message offers the possibility to cancel the overwriting of the existing recipes.

7. Hot water tap

The Aurora has a hot water tap (Fig.17).
This tap can be found on the front side of the machine.

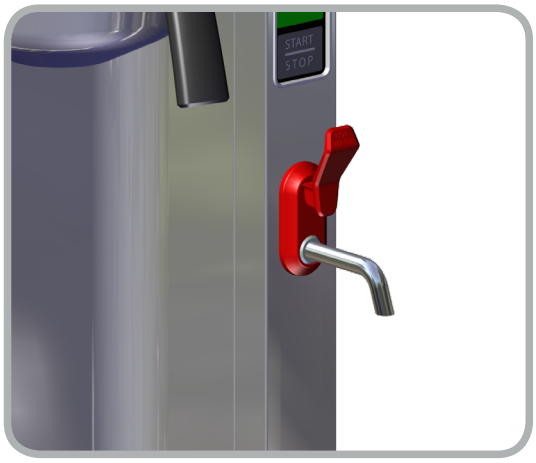


Fig.17 Hot water tap

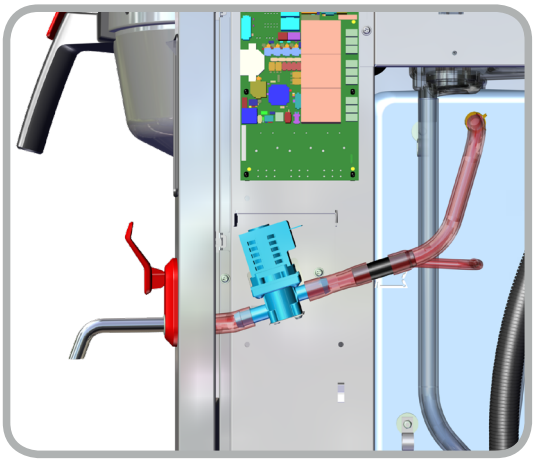


Fig.18 Hot water hose connections

The hot water tap has been connected to the same boiler as used for the coffee. With a Twin version this will be connected to the left boiler. The temperature of the hot water is determined by the setting of the used default recipe for coffee.
Operating the lever of the tap activates a switch behind the panel. This will generate a signal to the mainboard which in its turn will open the hot water valve and control the pump motor. Then hot water will flow out of the hot water outlet. The float and the magnetic valve make sure that the level in the float tank is maintained, so there will always be water in the hot water hose. As soon as the lever is released, the hot water valve will close and the pump motor will be switched off.
In order to make sure that the water in the hose between the boiler and the valve does not cool down when no hot water is tapped for some time, 2 hoses have been connected from the boiler (Fig.18) to a Y-piece for the hot water valve. The thickest hose is connected highest on the boiler; the thin hose is connected to the boiler about 15cm lower. As soon as the hot water valve is closed, the water will start circulating. This will happen because the colder surrounding air will cool the water in the hose. The cooled water will flow back into the boiler and the hot water will flow from the boiler into the other hose. In this way the temperature of the water will remain more or less constant.

7.1 Tap hot water while making coffee

As for making coffee and for tapping hot water the same pump motor and boiler are used, normally the dosing would deviate. Still it is possible to tap hot water while making coffee without causing a deviation in the dosing.
While making coffee the pump motor runs at a certain speed.
When hot water is tapped and the pump motor maintains its speed, the dosing for the coffee would change.
This problem is solved by simultaneous calibration of the dosing during the first installation.
When the calibration has been performed correctly, the pump motor will start running faster at the moment that simultaneous dosing takes place. When, for example, coffee is made, the pump motor runs at a certain speed. When the hot water tap is operated too, the pump motor will start running at a higher speed to make sure that no dosing deviations will occur. The pump motor will start running at its lower speed again after the hot water tap has been released.

8. Descaling signal

The machine has 2 different descaling signals:

- Descaling signal set based on the hardness of the water (continuous descaling symbol).
- Active descaling signal (flashing descaling symbol).

8.1 Descaling signal set based on the hardness of the water

Bravilor Bonamat BV recommends to correctly set this setting using the table in the manual or the table given below (Fig.19). The correct setting is to be set, because this can prevent excessive scaling on parts as much as possible. For setting the descaling signal based on the hardness of the water it is important to know the correct hardness of the water at the location the machine is used. If necessary, ask the local water company for the hardness of the water supplied or measure the harness of the water supplied on the spot. Enter the correct setting during the first installation. The registration of the number of litres running through the system is measured as the machine continuously registers how long the inlet valve is open. The inlet valve has a certain flow rate and this flow rate is independent of the pressure between 1 and 10 bar. This flow rate multiplied by the time that the inlet valve has been open is the number of litres that has run through the system. When the number of registered litres is higher than or equal to the programmed value, the descaling symbol will light up continuously on the LCD.

18	-	30	°dH	=	32	-	55	°TH	250 L.	66 Gal.
12	-	18	°dH	=	22	-	32	°TH	500 L.	132 Gal.
8	-	12	°dH	=	15	-	22	°TH	1000 L.	264 Gal.
4	-	8	°dH	=	7	-	15	°TH	1500 L.	396 Gal.
0	-	4	°dH	=	0	-	7	°TH	2000 L.	528 Gal.

Fig.19 Descaling setting table

	°dH / dGh	°e / °Clarck	°fH / °TH	ppm	gpg	mmol/l
1 °dH / dGh	1	1.253	1.78	17.8	1.04	0.179
1 °e / °Clarck	0.798	1	1.43	14,3	0.83	0.142
1 °fH / °TH	0.560	0.702	1	10	0.58	0.1
1 ppm	0.056	0.07	0.1	1	0.058	0.01
1 gpg	0.96	1.2	1,71	17,1	1	0.169
1 mmol/l	5.6	7.02	10	100	5.85	1

Fig.20 Water hardness conversion table

8.2 Active descaling signal

Depending on the use and water hardness, scale will be formed in the spray head in the course of time. The more scale builds up, the slower the water flows out of the spray container. Eventually the water will come into contact with the electrodes in the spray head.
A measurement will take place between these electrodes after each water dosing programme of a recipe.
When the electrodes in the spray head make contact, the descaling symbol will start flashing in the display after a water dosing programme.
When starting a new recipe, the descaling symbol will be reset until the electrodes make contact again. When the machine has been descaled, the water level drops fast enough from the spray container and the descaling signal will stop flashing.

9. Switched-mode power supply

The input voltage (mains voltage) supplied to the switched-mode power supply (Fig.21) may vary between 115VAC and 240VAC.
The output voltage of the switched-mode power supply is about 24VDC and it is independent of the input voltage as long as this is between 115VAC and 240VAC.

9.1 Operation of switched-mode power supply

The input voltage (mains voltage) is an alternating voltage, which is rectified and smoothed by the switched-mode power supply.
This rectified voltage is supplied to the primary coil of the transformer by means of a high-frequency pulsating electronic circuit.
The transformation ratio of this transformer determines the output voltage and the voltage coming from the secondary coil will be a (lower) alternating voltage.
This (lower) alternating voltage is then rectified and smoothed again, making the output voltage of the switched-mode power supply a rectified voltage.

However, by measuring the output voltage of the switched-mode power supply this can be adjusted if necessary.
This adjustment is done by varying the high-frequency pulsating electronic circuit at the primary coil of the transformer.
Due to this, it does not matter if the input voltage is 115VAC or 240VAC or somewhere in between. The switched-mode power supply has been externally secured with two 4A fuses.

Fig.21 Switched-mode power supply

10. Operating system

The operating system consists of a:

- Touch screen display
- Mainboard

10.1 Touch screen display

The touch screen display (Fig.22) is found on the front side of the machine and is connected to the mainboard using a flat cable.
The machine will be operated using the touch screen display.
The touch screen display includes a number of buttons for operating the machine and in some cases there is also a difference in the operation of the buttons when shortly pressing the button or when holding it. See for this the manual of the machine.

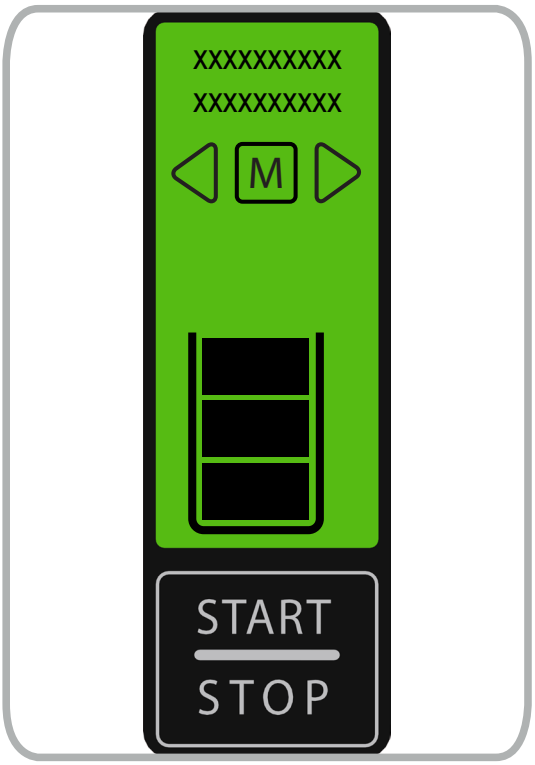


Fig.22 Touch screen display

10.2 Mainboard

The mainboard is at the back of the machine and it is powered by an external (switched) power supply. This board contains the machine's inputs and outputs.
Saved settings such as the recipe settings, counters, etc. are stored here.
When replacing this circuit board all customer-specific settings will be lost.
The mainboard also contains safety relays, which in case of an error interrupts the power supply to the components.

11. Hardware protection

The machine has a number of so-called hardware protections.

These protections prevent dangerous situations from occurring, such as overheating and/or water in the machine.

11.1 Overflow protection

This protection is found in the float tank and ensures that excess water caused by a too high water level flows to the bottom of the machine through the overflow and hose.

11.2 Back-flow protection

A pipe in the float tank sprays the water coming from the magnetic valve against the cover of the float tank. The water then flows into the float tank. This prevents water from flowing back into the system and ending up in the water pipe when the water pressure on the magnetic valve drops.

11.3 Boiling protection

The element is controlled by a relay on the mainboard.
A safety relay is connected to this relay in series.
If an error occurs and the element is still under voltage, the safety relay will interrupt the voltage (see electrical circuit diagram) and prevent the machine from boiling dry.

11.4 Boil-dry protection

The boil-dry protection has been mounted onto the element and to the outside of the boiler using a number of Clixons.
The number of Clixons is type-dependent and varies with the number of elements in the machine.
If for any reason the control does not switch off the boiler, the Clixons will make sure that the voltage on the element is mechanically switched off and so prevent overheating.

12. Software protection

The machine is equipped with software protection; the software monitors all the input and output of the machine throughout the whole process. If situations occur that are not allowed, the software intervenes. As a result, the machine switches off and an error message appears on the display.

The error message can be reset by turning the machine off and on. If the error message keeps coming back, further investigation need to be done to solve the problem. To solve the problem, it should be noted that error messages may have different causes. This means that the cause of the problem can be a defective component. But, it can also be caused by the location (where the machine is situated).

For possible solutions to these error messages, see the error list below.

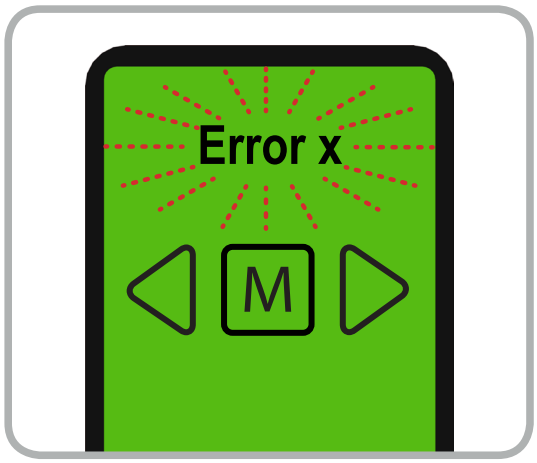


Fig.23 Display with error message

Error 1. Not available

Error 2. Temperature in boiler too high:

- If the temperature sensor (NTC) measures a value that is outside its range (0 Ohm or infinity), the machine is switched off and 'Error 2' appears in the display.

Error 3. Magnetic valve is open without selection:

- If the inlet valve is activated 3 times without starting a receipt or tapping hot water, there is either a leak in the water system or the water is boiling. The machine switches off and 'Error 3' is displayed.

Error 4. Automatic BoilingPoint Program takes too long:

- If the automatic BoilingPoint program takes too long, the machine switches off and 'Error 4' is displayed.

Error 5. Water selector in wrong position:

- If the magnets on the water rotation disc are not detected by the hall sensor or the time of detection is too long, the machine switches off and 'Error 5' is displayed.

Error 6. Magnetic (inlet) valve is opened too long:

- If the float tank takes too long to fill, whatever the reason, the machine will switch off and 'Error 6' is displayed.

Error 7. Not available

Error 8. Communication error between both circuit boards:

- Communication takes place when the machine is starting up and when it is used. communication takes place through a flat cable between the touch screen display and the control board. If communication fails, Error 8 is displayed.

Error 9. Pump motor rotates too slow or does not rotate at all:

- The pump motor is rotating during machine start−up and during use. If the light sensor detects none or too little pulses, the machine will switch off and ’Error 9’ is displayed.

Error 10. Not available

Error 11. Not available

Error 12. Not available

Error 13. Button on the touch screen keeps pressed

- IIf the software gets a signal that a button on the touch screen is being pressed for 30 seconds, the machine will switch off and ’Error 13’ is displayed

Error 14. Heating element keeps heating

- If the heating element heats up but it’s not switched on by the software, the machine will switch off and ’Error 14’ is displayed.

Error 15. Heating element doesn’t heat up:

- If the heating element is switched on by the software but the boiler doesn’t heat up the machine will be switched off and ’Error 15’ is displayed.

13. Programming

The programming of the Aurora has 2 levels.
A user menu and a chief menu.

13.1 User menu

In order to get access to the user menu, press the **M** key in the display and hold it for 1 second.
The following options will now be accessible:

Section	CMD	Description
1	Default recept:	Select the brewer left or right with the arrows ◄ or ► (only for the Twin version).
		Select the required default recipe and conform by pressing the **M** key and holding it.
2	Counters:	Read the various counter results.
2.1	Total counters:	Read the total counters.
2.2	Day counters:	Read and reset the day counters..
3	Info:	Various data concerning version numbers.
3.1	Machine version:	Single low, Single high, Twin low of Twin high.
3.2	BldCfg:	Configuration version.
3.3	PdPn:	Product number of the mainboard.
3.4	PdSn:	Serial number of the mainboard.
3.5	PdFwPn:	Product number of the firmware.
3.6	PdFwBld:	Firmware build version.

13.2 Chief menu

In order to get access to the chief menu, press the **M** key and the volume key in the display and hold them for 1 second.

The following options and sub-options will now be accessible:

Section	CMD	Description
1	Info:	Various data concerning version numbers.
1.1	Machine version:	Single low, Single high, Twin low of Twin high.
1.2	BldCfg:	Configuration version.
1.3	PdPn:	Product number of the mainboard.
1.4	PdSn:	Serial number of the mainboard.
1.5	PdFwPn:	Product number of the firmware.
1.6	PdFwBld:	Firmware build version.
2	Counters:	Read the various counter results.
2.1	Total counters:	Read the total counters.
2.2	Day counters:	Read and reset the day counters.
2.3	Wfilter vol:	Read and reset the number of litres water used by the filter.
2.4	Wfilter tht:	Read and reset the number of days that the filter has been placed.
2.5	Descaling counter:	Select the brewer left or right with the arrows ◄ or ► (only for the Twin version).
		Read the descaling counter.
3	Descaling:	Descaling programme (see the manual for further information about the descaling programme).
4	Recipe:	Various options with respect to the recipes.
4.1	Select recipe:	Set de default used recipe.
4.2	Delete recipe:	Delete existing recipes.
4.3	Change recipe:	Adjust existing recipes.
4.4	Create recipe:	Create recipes by manually entering all variables.
4.5	Programme recipe:	Create recipes by entering certain variables and then making coffee. The waiting times are set by pressing the display.
4.6	Download recipe:	Download recipes into the machine by means of an RFID card.
4.7	Upload recipe:	Transfer recipes from the machine to an RFID card.
5	Settings:	Various settings, eco, water filter, descale, clean, language, unit, time, download and upload.
5.1	Eco settings:	Various eco settings.
5.1.1	Temp. settings:	Temperature settings in the eco position. This can be set to 10°C or 60°C.
5.1.2	Day setting:	Set the days on which the machine should go to the eco position and also the enabled and disabled times of the different days.
5.1.3	Eco setting (active/not active):	Eco active/not active.
5.2	Water filter settings:	Various water settings.
5.2.1	Wfilter counter (volume):	Set the maximum number of litres the water filter can use.
5.2.2	Wfilter counter (days):	Set the maximum number of days the water filter can be used.
5.3	Descaling settings:	Descaling setting.
5.3.1	Descaling counter (volume):	Set after how many litres the machine needs descaling.

Section	CMD	Description
5.4	Cleaning settings:	Cleaning setting.
5.4.1	Counter (days):	Set after how many days the machine must generate a message for cleaning.
5.5	Language settings:	Set the language (if possible to be downloaded using an RFID card when this language is available).
5.6	Unit settings:	Volume and temperature setting.
5.6.1	Volume:	Set the volume unit in ml/l (millilitres/litres) or fl oz/gal (fluid oz/gallons).
5.6.2	Temp:	Set the temperature unit in °C (degrees Celsius) or °F (degrees Fahrenheit).
5.7	Time settings:	Time and date setting.
5.7.1	Year:	Set the year.
5.7.2	Month:	Set the month.
5.7.3	Day:	Set the day (of the month).
5.7.4	Format 24h/12h:	Set the format of the clock, 24 hours or 12 hours clock.
5.7.5	Time:	Set the time.
5.8	Download settings:	Download settings into the machine by means of an RFID card.
5.9	Upload settings:	Transfer settings from the machine to an RFID card.
6	Service menu:	Various service settings.
		Accessing the service menu requires a code. This is by default set to 0000.
6.1	Error list:	Read the error history.
6.2	Service counters:	Read and reset all counter positions.
6.3	Calib:	Calibration menu.
6.3.1	Calibrate flow:	Pump calibration.
6.3.2	Calibrate temperature:	Temperature calibration (boiling point determination programme).
6.4	I/O test:	Programme for testing various parts.
6.4.1	Pump:	Pump RPM, Set the pump speed.
		Attention! *When the speed exceeds a certain value the pump will start moving water to the filter pan.*
		FB Pump, feedback from the light sensor on the pump in RPM.
6.4.2	Float:	Read if the reed switch of the float is open or closed, this is indicted by “on” or “off”.
6.4.3	W inlet:	Read if the inlet valve is open or closed. This is indicated by “on” or “off”.
6.4.4	Temp:	Read the temperature measured by the 3 temperature sensors on the boiler.
6.4.5	HW tap:	Read whether the hot water switch is open or closed.
		Switch the hot water valve on and off.
		Attention! *Make sure that when switching on the hot water valve, water actually comes out of the hot water tap without operating the hot water lever.*
6.4.6	Relays:	Switch relays and safety relays on and off. The safety relays are on the mainboard.
6.4.7	W select:	Set the water selector to the various positions.
6.4.8	Descale:	Read if the electrodes of the scaling detection make or do not make contact.

Section	CMD	Description
6.5	Default factory settings:	Various factory settings.
6.5.1	Install:	Reset the machine to the first installation. The temperature and the pump are to be calibrated again.
6.5.2	Factory:	Reset the machine to the factory test programme. This resets the machine to the test programme for the factory.
		Attention! *This programme must at all times be carried out by an authorised person.*
		By entering the wrong settings, the mains can be overloaded and this can even cause a fire.
		Bravilor Bonamat BV does not accept any liability for any damage and/or injury caused by entering the wrong settings.
6.5.3	Reset all counters:	Reset all counter positions.
6.5.4	Language:	Download/upload/remove a language.
6.6	Change code:	Adjust the code. This code is used for accessing the service menu.
6.7	Contact:	Adjust any contact data.
7	Contact:	Read the contact data.

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