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(54) **DISHWASHER**

(57) Dishwasher comprising: a compartment (10) for containing a load of crockery; operating members (100) adapted to wash said load; a processing unit (50) configured for: determining an estimate (X) of said load; determining a work program of said operating members (100) as a function of at least said estimate (X).

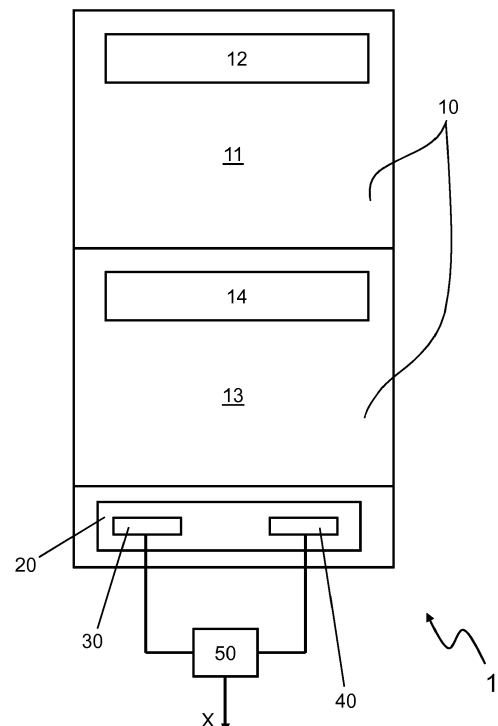


FIG. 1

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Description

[TECHNICAL FIELD]

[0001] The present invention relates to a dishwasher.

[0002] In particular, the present invention relates to a dishwasher wherein the operating parameters of the work program are determined as a function of an estimate of the load in the dishwasher itself.

[0003] The invention further relates to a method for setting a program of a dishwasher.

[PRIOR ART]

[0004] As is known, a dishwasher works by loading predefined quantities of water, heating the loaded water, and spraying the crockery loaded inside the dishwasher itself with the heated water. Washing operations are typically carried out by using detergents as well. A work cycle may include, after discharging the used water, one or more rinses with cold water and a last rinse with hot water, which is also useful for drying the load.

[0005] Within this technical frame, the Applicant observed that known dishwashers often use excessive quantities of water and/or the wash cycles last much longer than would actually be necessary. In other words, the Applicant noticed that, in some situations, it would be possible to obtain sufficiently clean crockery even by using smaller quantities of water and/or by executing shorter cycles.

[OBJECTS AND SUMMARY OF THE INVENTION]

[0006] It is therefore one object of the present invention to provide a dishwasher which can optimize its own operation in terms of water consumption and/or in terms of work cycle duration.

[0007] This and other objects are substantially achieved through a dishwasher as described in the appended claims.

[0008] A basic idea of the present invention provides for making an estimate of the load inside the dishwasher and for selecting/setting the work program according to at least said estimate.

[0009] In this way, by appropriately determining the operating parameters of the work program, water consumption and/or cycle duration can be reduced without affecting the quality of the wash.

[0010] In accordance with one aspect of the invention, a dishwasher comprises:

- a compartment for containing a crockery load;
- operating members adapted to wash said load;
- a processing unit configured for:

- determining an estimate of said load;
- determining a work program of said operating members as a function of at least said estimate.

[0011] Preferably, said processing unit is configured for setting programs wherein a smaller quantity of water is loaded for smaller values of said estimate.

[0012] Preferably, said processing unit is configured for setting shorter programs for smaller values of said estimate. Preferably, said processing unit is configured for: determining a turbidity parameter representative of the turbidity of water that has interacted in a predetermined manner with said load;

determining said work program also as a function of said turbidity parameter.

[0013] Preferably, said operating members comprise:

- a tub for containing water for washing said crockery;
- a heating element for heating said water;

said dishwasher further comprising a sensor for detecting a main parameter representative of a temperature of said water. Preferably, said processing unit is configured for:

- determining a first parameter representative of a heating speed of said water;
- determining a second parameter representative of a difference between a nominal value and an actual value of a characteristic parameter of said heating element;
- determining said estimate as a function of at least said first parameter and said second parameter.

[0014] Preferably, said heating element comprises an electric resistor, said characteristic parameter being preferably

an electric parameter of said electric resistor.

[0015] Preferably, said processing unit is configured for controlling a stabilization step prior to the detection of the water temperature, which step is necessary for determining said load estimate.

[0016] Preferably, said processing unit is further configured for: determining a third parameter representative of a difference between a nominal value and an actual value of a power voltage supplied to said dishwasher; determining said estimate also as a function of said third parameter.

[0017] Preferably, in order to determine said first parameter, said processing unit is configured for:

setting a temperature range for said water;

measuring the time necessary for said water to cover said temperature range under the action of said heating element.

[0018] Preferably, in order to determine said first parameter, said processing unit is configured for:

setting a reference time interval;

measuring the water temperature variation that has occurred within said reference time interval.

[0019] Preferably, said compartment comprises:

an upper portion;

a lower portion.

[0020] Preferably, said operating members comprise:

an upper sprayer associated with said upper portion;

a lower sprayer associated with said lower portion. Preferably, said processing unit is configured for determining said first parameter during a time interval when said water circulates through said upper sprayer without circulating through said lower sprayer.

[0021] Preferably, during said stabilization step the water circulates through said upper sprayer without circulating through said lower sprayer.

[0022] Preferably, in order to determine said third parameter, said processing unit is configured for:

determining an average value of said power voltage;

determining a difference between said average value and said nominal value;

determining said third parameter as a function of said difference between the average value and the nominal value.

[0023] In accordance with a further aspect of the invention, a method for setting a program of a dishwasher comprises:

determining an estimate of a load contained in a compartment of said dishwasher;

determining, as a function of at least said estimate, a work program of operating members of said dishwasher, said operating members being adapted to wash said load.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0024] Further features and advantages will become more apparent from the following detailed description of a preferred but non-limiting embodiment of the invention.

[0025] This description will refer to the annexed drawings, which are also provided merely as explanatory and non-limiting examples, wherein:

- Figure 1 shows a block diagram of a dishwasher in accordance with the invention;
- Figure 2 shows a graph representative of operating steps of the dishwasher of Figure 1;
- Figures 3a-3b show a flow chart representative of an implementation of the invention;
- Figures 4a-4d, 5a-5d, 6a-6d show graphs representative of work cycles of the dishwasher of Figure 1.

[0026] The drawings show different aspects and embodiments of the present invention and, where appropriate, similar structures, components, materials and/or elements are designated in the various drawings by the same reference numerals.

[DETAILED DESCRIPTION OF THE INVENTION]

[0027] With reference to the annexed drawings, reference numeral 1 designates as a whole a dishwasher according to the present invention.

[0028] The dishwasher 1 comprises, first of all, a compartment 10 for containing a load of crockery.

[0029] Into the compartment 10, in a *per se* known manner, one or more racks and baskets can be placed for positioning the crockery to be washed.

[0030] Preferably, the compartment 10 comprises an upper portion 11 and a lower portion 13.

[0031] The dishwasher 1 further comprises operating members 100 adapted to wash said load.

[0032] Preferably, the operating members comprise an upper sprayer 12, associated with the upper portion 11 of the compartment 10, and a lower sprayer 14, associated with the lower portion 13 of the compartment 10.

[0033] During the operating steps of the wash cycle carried out by the dishwasher 1, water is sprayed into the compartment 10 through the sprayers 12, 14.

[0034] Note that the water sprayed by the upper sprayer 12 typically hits both the crockery in the upper portion 11 and the crockery in the lower portion 13.

[0035] Instead, the water sprayed by the lower sprayer 14 only hits the crockery in the lower portion 13.

[0036] Preferably, the operating members 100 further comprise a *per se* known tub 20 that contains the water used for washing the crockery arranged in the compartment 10. The tub 20 can be positioned at a bottom wall of the compartment 10, i.e. the wall that delimits the bottom of the lower portion 13.

[0037] The tub 20 collects the water sprayed by the sprayers 12, 14, which is then recirculated.

[0038] When the dishwasher 1 is in operation, the water contained in the tub 20 is made to circulate within the compartment 10 through the sprayers 12, 14, thus washing the crockery loaded in the compartment 10.

[0039] Preferably, the operating members 100 further comprise a heating element 30 adapted to heat the wash water.

[0040] Preferably, the heating element is associated with the tub 20. By way of example, the heating element 30 may be immersed in the tub 20.

[0041] Preferably, the heating element 30 is an electric resistor. Merely by way of example, the heating element may have a power output in the range of 1,500W to 2,000W.

[0042] Preferably, the dishwasher 1 further comprises a sensor 40 adapted to detect a main parameter MP representative of the temperature of the wash water.

[0043] The sensor 40 may be associated with the tub 20 and, conveniently, may be immersed therein.

[0044] By way of example, the sensor 40 may be a negative temperature coefficient (NTC) resistor. In this case, the main parameter MP which is directly detected is the electric resistance of the component; based on a function and/or preset table, the temperature of the water is then indirectly determined. In particular, the value made available by the NTC resistor is typically in analogue format, and is converted into digital format prior to being suitably processed.

[0045] Thanks to the above-described structural/functional elements, as well as other elements that will not be described herein since they are well known to those skilled in the art, the dishwasher 1 can carry out wash cycles aimed at washing the crockery loaded in the compartment 10. A control and management printed circuit board is conveniently included for controlling the various elements in order to execute the different steps of the work programs. Said electronic board may comprise, or coincide or be associated with, the processing unit 50, which is schematically shown in Figure 1. According to the invention, the processing unit 50 is advantageously configured for determining an estimate X of the load in the compartment 10, and for determining a work program of the operating members 100 as a function of at least said estimate X.

[0046] In other words, the processing unit 50 can estimate the total weight of the crockery loaded in the compartment 10.

[0047] This information, as will become apparent below, can advantageously be used for setting/adjusting/modifying operating parameters of the dishwasher 1.

[0048] In particular:

for lower values of the estimate X, a smaller quantity of water is preferably loaded during the wash cycle;

for lower values of the estimate X, shorter programs are preferably set.

[0049] The process carried out for achieving the estimate of the load in the dishwasher 1 is diagrammatically shown in Fig. 2. Preferably, at the beginning a given quantity of water is loaded into the tub 20 (step A).

[0050] Merely by way of example, a quantity of water comprised between 3 and 6 litres may be loaded; for example, such quantity may be approx. 4 litres.

[0051] At this stage, the water temperature is substantially constant and virtually coincides with the temperature of the mains water.

[0052] The water temperature is then advantageously increased by the heating element 30 as the water circulates within the compartment 10 (step B).

[0053] Preferably, both the upper sprayer 12 and the lower sprayer 14 are used in this step, in particular in an alternate manner (when one sprayer is used, the other remains idle).

[0054] When the sensor 40 detects a preset temperature (e.g. between approx. 34°C and approx. 37°C), the so-called stabilization step begins (step C).

[0055] During the stabilization step, the heating element 30 is kept on. Therefore, the water temperature will gradually keep rising.

[0056] Preferably, only the upper sprayer 12 is used during the stabilization step. In this manner, the loaded water will have the possibility of interacting with all the crockery loaded in the compartment 10.

[0057] The Applicant believes that the stabilization step is particularly advantageous because it has been experimentally verified that, at the transitions from one sprayer to the other, an irregular trend of the temperature detected by the sensor 40 can be observed. This may lead to unreliable detections, resulting in a less accurate load estimate. On the contrary, the stabilization step is useful because the machine will wait for the sensor 40 to be able to provide correct and accurate temperature readings.

[0058] When the sensor 40 detects a preset basic temperature (e.g. between approx. 38°C and approx. 41°C), the actual analysis begins, which is aimed at determining the estimate X of the load in the dishwasher 1 (step D).

[0059] During the analysis period, the heating element 30 is kept on. The analysis step ends when the sensor 40 detects a target temperature, e.g. between 43°C and 46°C.

[0060] Based on the data detected during the analysis step, the processing unit 1 will determine a first parameter P1 representative of a wash water heating speed.

[0061] By way of example, in order to determine the first parameter P1, the processing unit 50 is configured for:

setting a water temperature range TMP; preferably, the extremes of said temperature range TMP are said basic temperature and target temperature;

measuring the time t necessary for the water to cover said temperature range TMP under the action of the heating element 30.

[0062] The first parameter P1 may advantageously coincide with the time t necessary for the water to cover the temperature range TMP.

[0063] It is also envisaged that, in order to determine the first parameter P1, the processing unit 50 is configured for: setting a reference time interval; measuring the water temperature variation that has occurred within said reference time interval.

[0064] In this manner it is also possible to calculate the first parameter P1.

[0065] Preferably, during the analysis period only the upper sprayer 12 is used, without using the lower sprayer 14.

[0066] The processing unit 50 is further configured for determining a second parameter P2 representative of a difference between a nominal value and an actual value of a characteristic parameter of the heating element 30.

[0067] As aforesaid, the heating element 30 may comprise or consist of an electric resistor; the characteristic parameter may thus be an electric parameter of said electric resistor, such as power or resistance.

[0068] The second parameter P2 is useful for taking into account the fact that the heating element 30 may have actual characteristics (resistance, power) which differ from the nominal ones.

[0069] By way of example, the nominal value of the electric power of the heating element 30 may be comprised between 1,500W and 2,000W. For example, said nominal value may be 1,800W.

[0070] The second parameter P2 can thus be calculated as follows:

$$P2 = (\text{actual power value} - \text{nominal power value}) * C1$$

where C1 represents a suitable weight, e.g. comprised between -0.055 s/W and -0.065 s/W.

[0071] The estimate X can thus be calculated as a function of the first parameter P1 and of the second parameter P2.

[0072] In practice, the sum of the values of P1 and P2 can be compared with appropriate threshold values, e.g. defining a comparison table, which relate possible values of said sum to corresponding values of the estimate X.

[0073] In the preferred embodiment also a third parameter P3 is determined, which is representative of a difference between a nominal value and an actual value of a power voltage supplied to the dishwasher 1.

[0074] Conveniently, the estimate X is determined also as a function of the third parameter P3.

[0075] In particular, the third parameter P3 may be calculated as follows:

an average power voltage value is determined;

a difference between said average value and said nominal value is determined;

the third parameter P3 is determined as a function of this difference.

[0076] By way of example, the nominal power voltage value may be set to 230 V.

[0077] Preferably, the average power voltage value is calculated over the time interval corresponding to the analysis step (step D). The third parameter P3 can be calculated as follows:

$$P3 = (\text{actual average voltage value} - \text{nominal voltage value}) * C2$$

where C2 represents a suitable weight, e.g. comprised between -0.95 s/V and -0.98 s/V.

[0078] The value of the estimate X can thus be determined as a function of the sum of the parameters P1, P2, P3, based on appropriate preset threshold values/tables.

[0079] The sum of the parameters P1, P2, and possibly the third parameter P3, can be imagined as a "normalized time" expressing the water heating time, appropriately corrected (i.e. "normalized") in the light of further factors that are taken into account.

[0080] By way of example, three normalized time intervals may be defined, each one corresponding to a different load estimate X:

Normalized time (s)	Load (kg)
<95	0-9
95-120	9-18
>120	18-27

[0081] Once the weight of the load inside the compartment 10 has been estimated, the operating parameters of the dishwasher 1 can be adjusted accordingly.

[0082] This adjustment can be made by selecting a work program among a plurality of preset programs, or by modifying the values of the individual parameters that define a particular program. Preferably, the processing unit 50 is further configured for determining a turbidity parameter T representative of the turbidity of the water that has interacted in a predetermined manner with the load in the compartment 10.

[0083] Advantageously, also the turbidity parameter T is used for determining the parameters of the work cycle of the operating members 100.

[0084] Preferably, the turbidity parameter T is determined after the analysis period for estimating the load.

[0085] In particular, after the water has reached the target temperature, the heating element is kept on (step E) in order to further increase the temperature.

[0086] Preferably, in this step only the lower sprayer 14 is used, without using the upper sprayer 12.

[0087] Once the final temperature has been reached, which is preferably higher by 1-2 °C than the above-mentioned target temperature, the water turbidity analysis (step F) is carried out in a *per se* known manner, which for this reason will not be described any further.

[0088] The work program and/or the values of specific operating parameters can then be adjusted as a function of the load estimate X and as a function of the turbidity of the water.

[0089] In general, a work program of the dishwasher 1 comprises:

- a first water loading step, wherein a certain quantity of water is loaded;
- a heating step, wherein the heating element 30 is kept on to progressively increase its own temperature and hence the temperature of the loaded water; during this step one or both sprayers are activated; then, preferably, the load is first estimated, followed by the turbidity detection;
- a holding step, wherein one or both sprayers are kept active, while the heating element 30 is turned off (the water temperature, however, is still relatively high, due to the previous heating step);
- a discharge step, wherein the previously loaded water is discharged;
- a second water loading step, wherein water is loaded again;
- a second heating step, wherein the heating element 30 is turned on again, together with the sprayers; this step is the so-called hot rinse, which is also useful for drying the crockery;
- a second discharge step, wherein the water loaded in the second loading step is discharged.

[0090] This qualitative structure of a work program is shown in Figures 4a-4b; 5a-5b; 6a-6b.

[0091] In some cases, the work program may comprise a further holding step (Figures 4c-4d; 5c, 5d; 6c, 6d), separated from the previous holding step by a short heating ramp.

[0092] In some cases, the work program may comprise at least one rinsing step (the so-called cold rinse), interposed between the first discharge step and the second loading step. During the cold rinse, water is loaded which is not heated, the sprayers are activated, and, after a predefined time, the water is discharged (Figures 4c-4d; 5c, 5d; 6c, 6d).

[0093] In some cases, the work program may comprise a second cold rinse (Figures 4d, 5d, 6d), similar to the first one and carried out immediately after it, i.e. before the hot rinse.

[0094] As aforesaid, different programs/values can be set depending on turbidity and on the load estimate.

[0095] The turbidity values can be divided, for example, into four ranges.

[0096] A table like the one shown below merely by way of explanatory example can be stored into a memory register associated with the processing unit 50:

		TURBIDITY (T)			
		0% (T0)	50% (T1)	100% (T2)	150% (T3)
ESTIMATE X (kg)	0-9 (X1)	Z1 (Fig. 4a)	Z2 (Fig. 4b)	Z3 (Fig. 4c)	Z4 (Fig. 4d)
	9-18 (X2)	Z5 (Fig. 5a)	Z6 (Fig. 5b)	Z7 (Fig. 5c)	Z8 (Fig. 5d)
	18-27 (X3)	Z9 (Fig. 6a)	Z10 (Fig. 6b)	Z11 (Fig. 6c)	Z12 (Fig. 6d)

[0097] In brief: Figures 4a-4d correspond to values of the load estimate comprised between 0 and 9 kg (X=X1); each figure represents the cycle corresponding to a respective turbidity value (T0, T1, T2, T3). Figures 5a-5d correspond to values of the load estimate comprised between 9 and 19 kg (X=X2); each figure represents the cycle corresponding to a respective turbidity value (T0, T1, T2, T3). Figures 6a-6d correspond to values of the load estimate comprised between 18 and 27 kg (X=X3); each figure represents the cycle corresponding to a respective turbidity value (T0, T1, T2, T3).

[0098] Figure 2 essentially represents the initial part of each cycle shown in Figures 4a-4d, 5a-5d, 6a-6d. Quantities are shown on the axes in a different scale, and the inclination of the graph is different from that of the graphs shown in Figures 4a-4d, 5a-5d, 6a-6d.

[0099] Let us consider as a reference, for example, the program Z1, corresponding to minimum turbidity and minimum load.

[0100] As turbidity increases, the cycle may undergo one or more of the following changes:

- longer duration of the holding step;
- increased number of holding steps;
- increased number of rinses;
- increased wash temperature.

[0101] As aforesaid, as the load estimate increases, the cycle may undergo one or more of the following changes:

- increased quantity of water loaded in one or more loading steps;
- longer duration of the holding step(s).

[0102] More in detail:

- when switching from turbidity T0 to turbidity T1, the length of the holding step and the wash temperature increase; these changes are preferably independent of the load estimate value;
- when switching from turbidity T1 to turbidity T2, the wash temperature increases, a holding step is added, and a cold rinse is included; these changes are preferably independent of the load estimate value;
- when switching from turbidity T2 to turbidity T3, the length of the second holding step (i.e. the one at higher temperature) increases and a second cold rinse is added; these changes are preferably independent of the load estimate

value.

[0103] As far as the load estimate is concerned:

when switching from estimate X1 to estimate X2, the quantity of water used for the hot rinse increases; these changes are preferably independent of the turbidity value;
when switching from estimate X2 to estimate X3, the length of both holding steps increases.

[0104] The details pertaining to each program can be gathered from the diagrams shown in Figures 4a-4d; 5a-5d; 6a-6d.

[0105] Note that the operating parameters may also be adjusted without "discretizing" the values of the estimate X and/or the turbidity values: for each point in the estimate X / turbidity plane (i.e. for each pair of specific values of estimate X and turbidity), it is possible to determine a corresponding specific value of one or more operating parameters of the dishwasher 1.

[0106] It must be underlined that this also applies to embodiments which only take into account the load estimate X, disregarding the turbidity value: for each specific value of the estimate X, a specific value will be determined for one or more operating parameters of the dishwasher 1.

[0107] Figures 3a-3b show a flow chart representative of the operations carried out in one embodiment of the invention.

[0108] The process starts (Start) at step F1.

[0109] As aforesaid, water is loaded into the tub 20 (step F2).

[0110] The water temperature is then checked (step F3): if said temperature, which is preferably detected by the sensor 40, turns out to be higher than the preset temperature that defines the beginning of the stabilization step, then no load analysis will be carried out, and a program will be set by default which is suitable for a maximum load.

[0111] Otherwise, if the detected temperature is lower than the preset temperature, then the heating element 30 will be activated (step F4) and a generic wash cycle will be started (step F5).

[0112] A check will then follow to verify if a predefined timeout has expired (step F6).

[0113] If the timeout has expired, a wash program for a maximum load will be set, and a heating timeout routine will be executed (step F16).

[0114] If not, a further check of the water temperature will be made (step F7).

[0115] If the water temperature is lower than the preset temperature for the start of the stabilization step, the process will return to the washing step F5.

[0116] If the water temperature exceeds the preset temperature for the start of the stabilization step, then a wash will start by using the upper sprayer 12 only (step F8).

[0117] A preset timer will then be checked (step F9).

[0118] If the timeout has expired, then the already described step F16 will be carried out.

[0119] If the timeout has not expired, then the water temperature will be checked (step F10).

[0120] If the temperature is still lower than the basic temperature (i.e. the temperature that defines the end of the stabilization step and the beginning of the analysis step), then the process will go back to the washing step F8, using the upper sprayer 12 only.

[0121] If the water temperature has reached the basic temperature, then the actual analysis step will be started by reading the power voltage (step F11).

[0122] At step F12 a further check is carried out on a timeout similar to the previous ones.

[0123] If the timeout has not expired, the temperature is checked at step F13.

[0124] If the temperature remains lower than the target temperature (which defines the end of the analysis step), then the process will go back to reading the power voltage (step F11).

[0125] If the water temperature has reached the target temperature, then the analysis will be complete and the load estimate X can be calculated (step F14).

[0126] Once the appropriate parameters have been defined on the basis of the estimate X, the wash can continue (step F15).

[0127] The invention achieves significant advantages.

[0128] First and foremost, the dishwasher according to the invention can operate in an optimized manner in terms of water consumption and work cycle duration.

[0129] The invention also allows estimating in a particularly accurate manner the load contained in the machine and the cycle time necessary for the execution of the envisaged operations.

Claims

1. Dishwasher comprising:

a compartment (10) for containing a crockery load;
operating members (100) adapted to wash said load;
a processing unit (50) configured for:

- 5 determining an estimate (X) of said load;
determining a work program of said operating members (100) as a function of at least said estimate (X).
2. Dishwasher according to claim 1, wherein said processing unit (50) is configured for setting programs wherein a smaller quantity of water is loaded for smaller values of said estimate (X).
- 10 3. Dishwasher according to claim 1 or 2, wherein said processing unit (50) is configured for setting shorter programs for smaller values of said estimate (X).
- 15 4. Dishwasher according to any one of the preceding claims, wherein said processing unit (50) is configured for:
determining a turbidity parameter (T) representative of the turbidity of water that has interacted in a predetermined manner with said load;
determining said work program also as a function of said turbidity parameter (T).
- 20 5. Dishwasher according to any one of the preceding claims, wherein said operating members (100) comprise:
a) a tub (20) for containing water for washing said crockery;
b) a heating element (30) for heating said water;
said dishwasher further comprising a sensor (40) for detecting a main parameter (MP) representative of a
25 temperature of said water;
wherein said processing unit (50) is configured for:
determining a first parameter (P1) representative of a heating speed of said water;
determining a second parameter (P2) representative of a difference between a nominal value and an actual
30 value of a characteristic parameter of said heating element (30);
determining said estimate (X) as a function of at least said first parameter (P1) and said second parameter (P2).
- 35 6. Dishwasher according to claim 5, wherein said heating element (30) comprises an electric resistor, said characteristic parameter being preferably an electric parameter of said electric resistor.
7. Dishwasher according to claim 5 or 6, wherein said processing unit (50) is configured for controlling a stabilization step prior to the detection of the water temperature, necessary for determining said load estimate (X).
- 40 8. Dishwasher according to any one of claims 5 to 7, wherein said processing unit (50) is further configured for:
determining a third parameter (P3) representative of a difference between a nominal value and an actual value of a power voltage supplied to said dishwasher (1);
determining said estimate (X) also as a function of said third parameter (P3).
- 45 9. Dishwasher according to any one of claims 5 to 8, wherein, in order to determine said first parameter (P1), said processing unit (50) is configured for:
setting a temperature range (TMP) for said water;
50 measuring the time (t) necessary for said water to cover said temperature range (TMP) under the action of said heating element (30).
- 55 10. Dishwasher according to any one of claims 5 to 9, wherein, in order to determine said first parameter (P1), said processing unit (50) is configured for:
setting a reference time interval;
measuring the water temperature variation that has occurred within said reference time interval.

11. Dishwasher according to any one of the preceding claims, wherein said compartment (10) comprises:

an upper portion (11);

a lower portion (13);

wherein said operating members (100) comprise:

an upper sprayer (12) associated with said upper portion (11);

a lower sprayer (14) associated with said lower portion (13).

12. Dishwasher according to claim 11, wherein said processing unit (50) is configured for determining said first parameter (P1) during a time interval when said water circulates through said upper sprayer (12) without circulating through said lower sprayer (14).

13. Dishwasher according to claim 12, wherein during said stabilization step the water circulates through said upper sprayer (12) without circulating through said lower sprayer (14).

14. Dishwasher according to any one of claims 8 to 13, wherein, in order to determine said third parameter (P3), said processing unit (50) is configured for:

determining an average value of said power voltage;

determining a difference between said average value and said nominal value;

determining said third parameter (P3) as a function of said difference between the average value and the nominal value.

15. Method for setting a program of a dishwasher, comprising:

determining an estimate (X) of a load contained in a compartment (10) of said dishwasher (1);

determining, as a function of at least said estimate (X), a work program of operating members (100) of said dishwasher (1), said operating members (100) being adapted to wash said load.

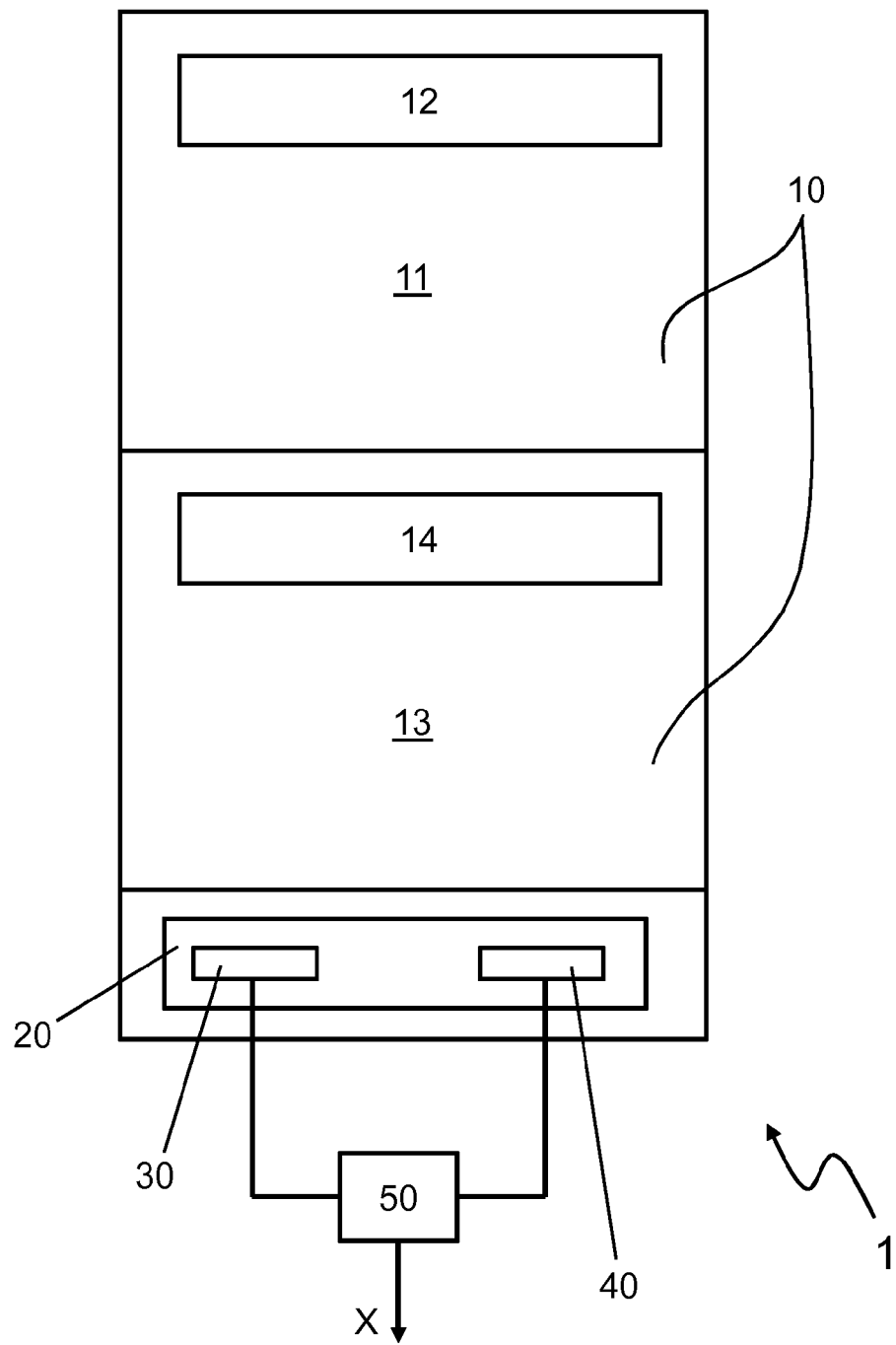


FIG. 1

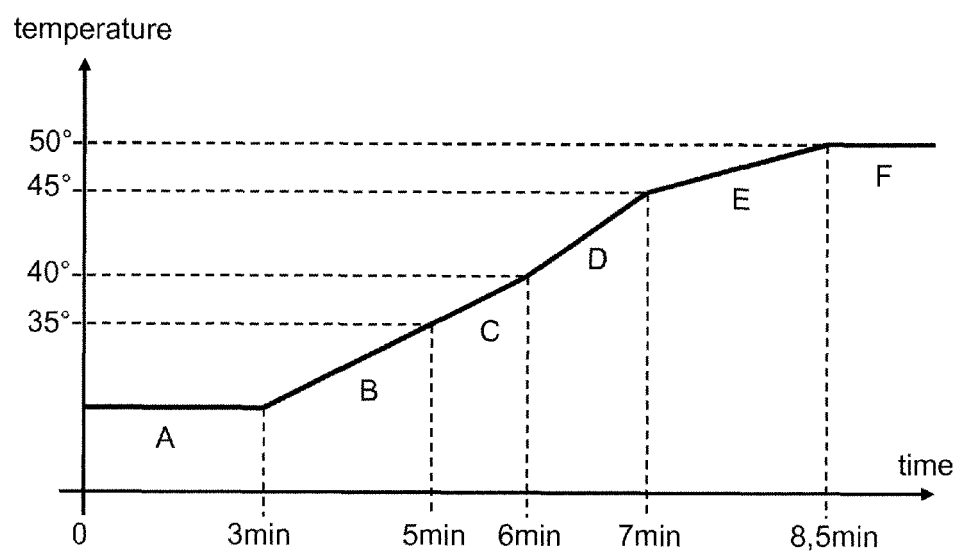


FIG. 2

FIG. 3a

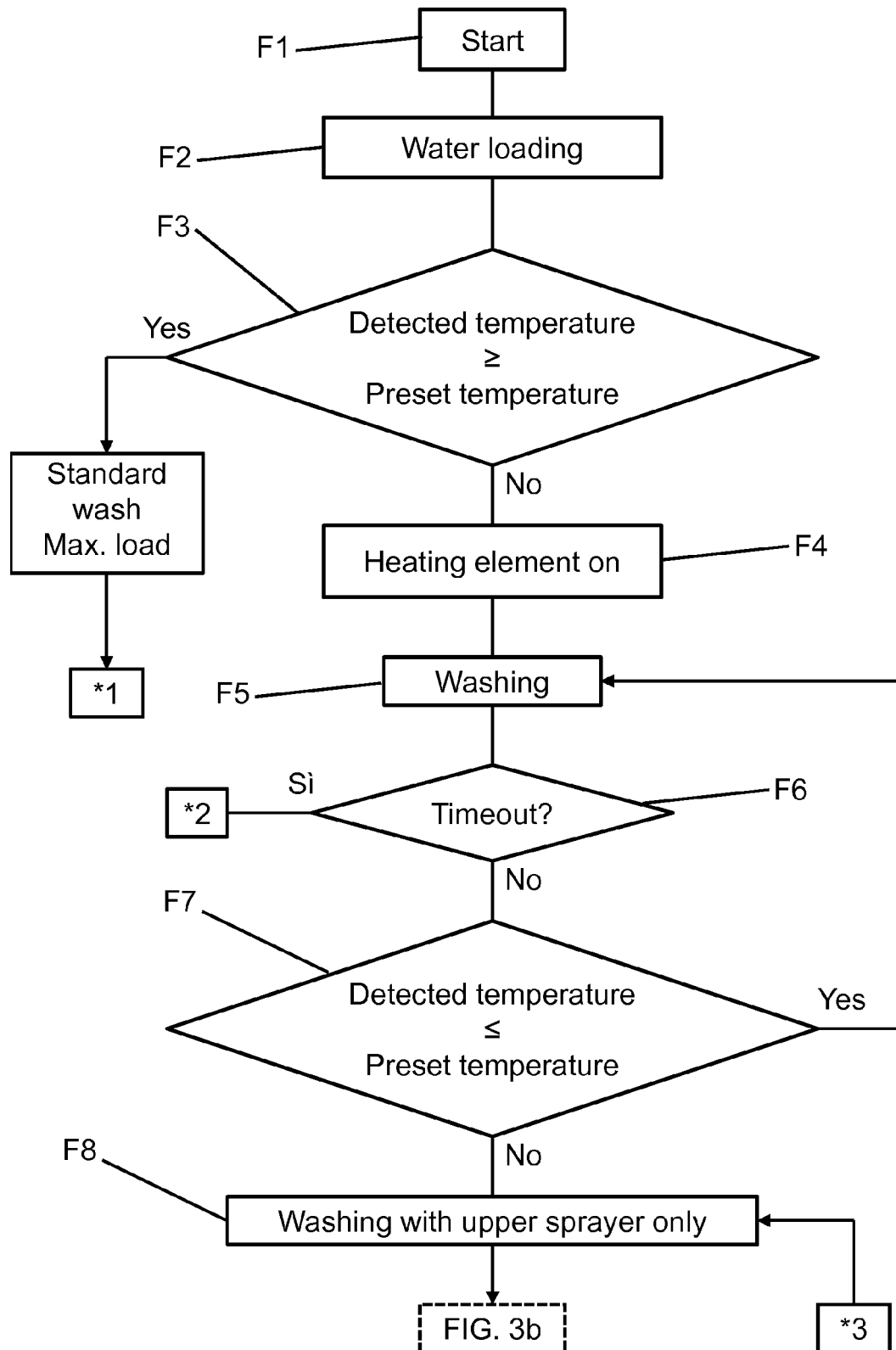
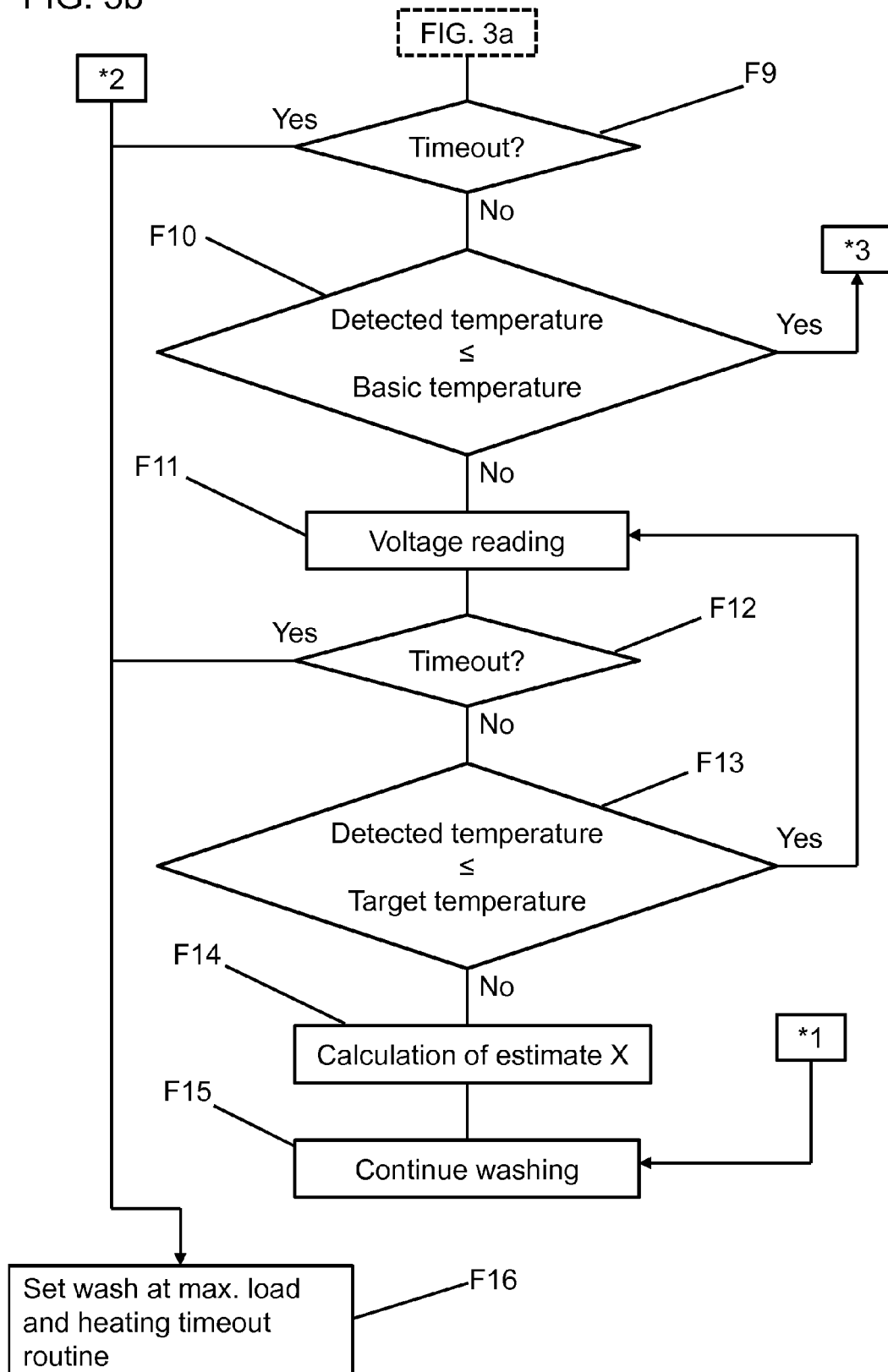


FIG. 3b



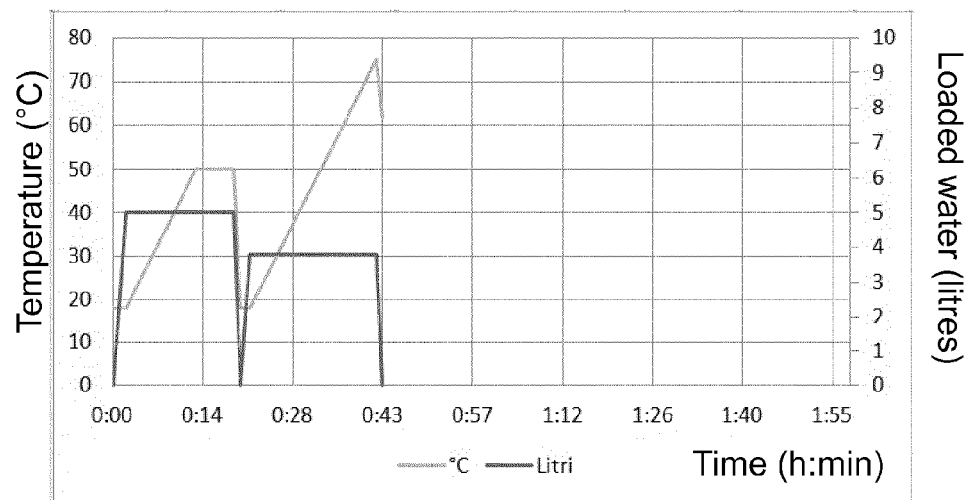


FIG. 4a

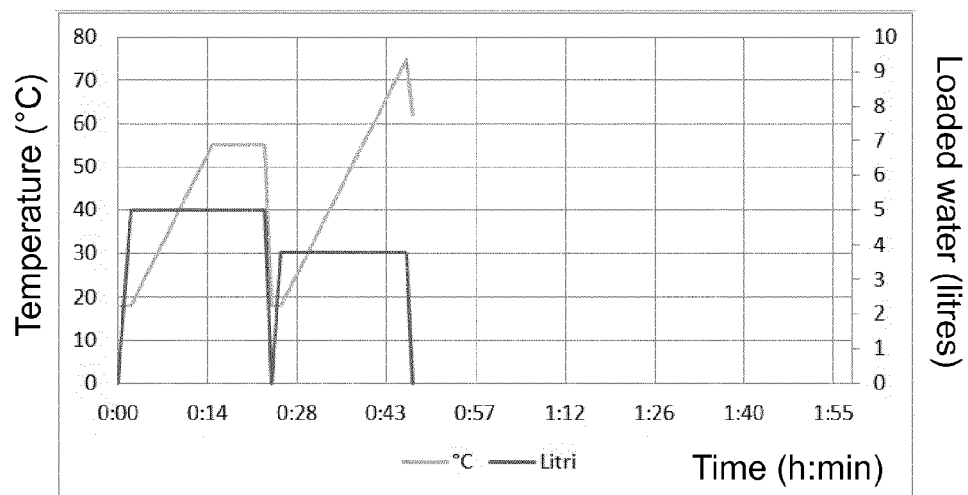


FIG. 4b

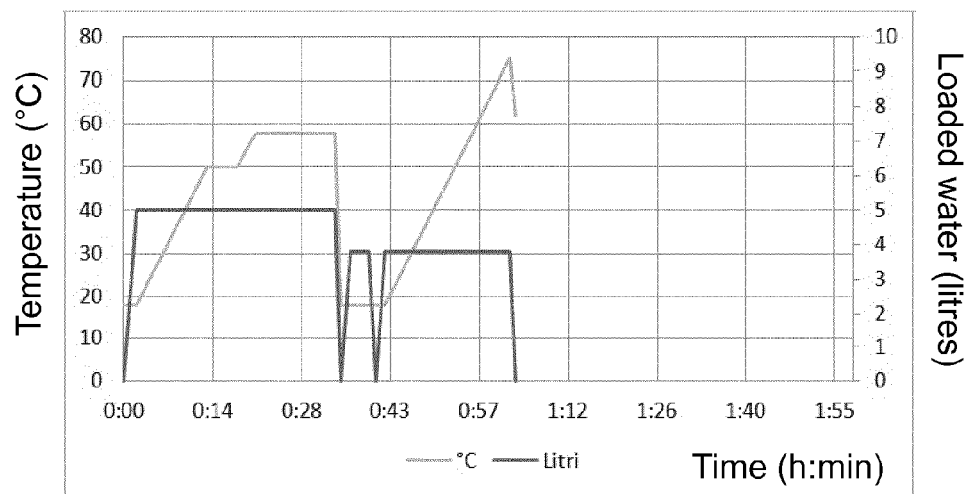


FIG. 4c

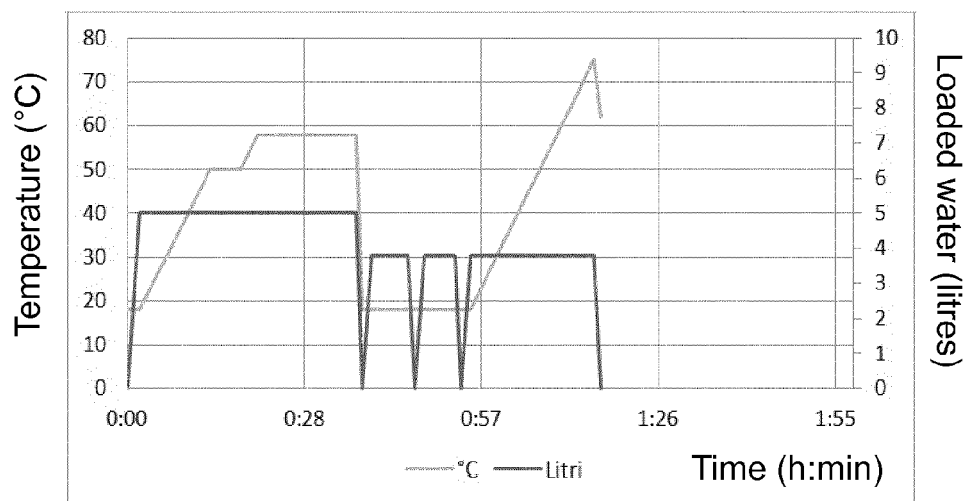


FIG. 4d

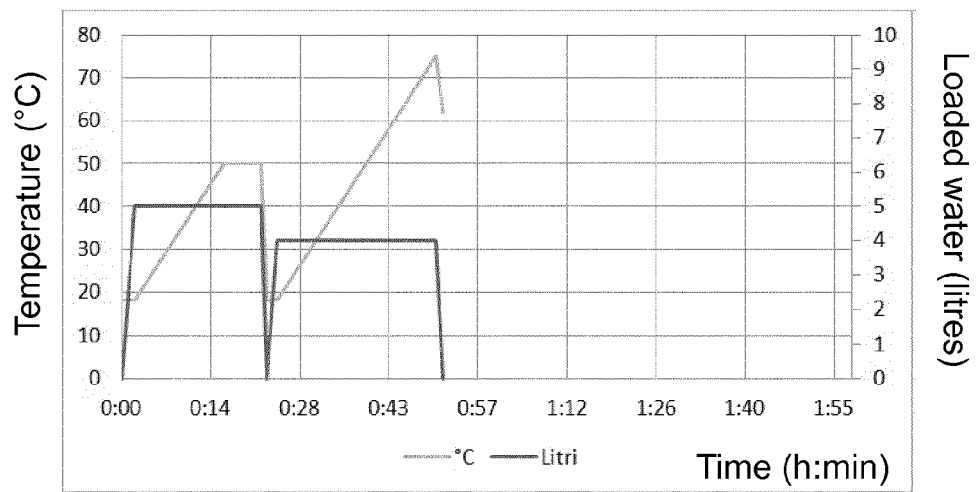


FIG. 5a

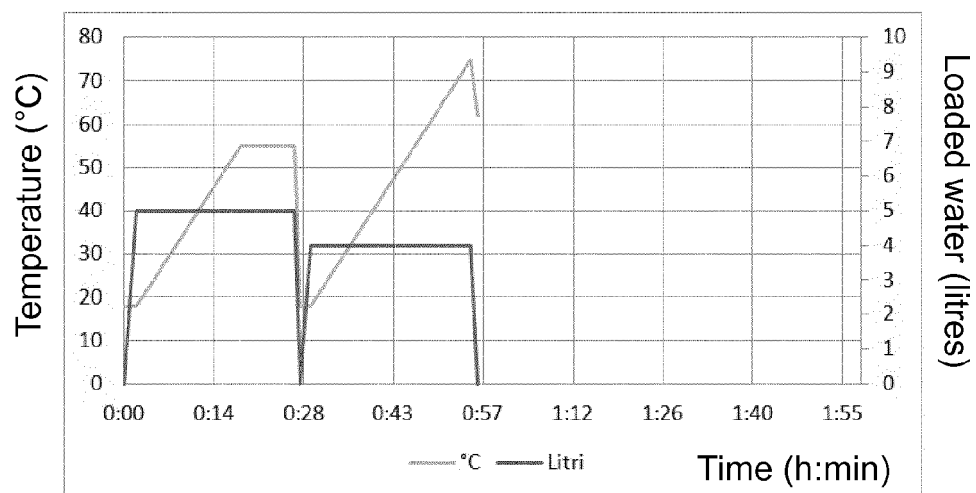


FIG. 5b

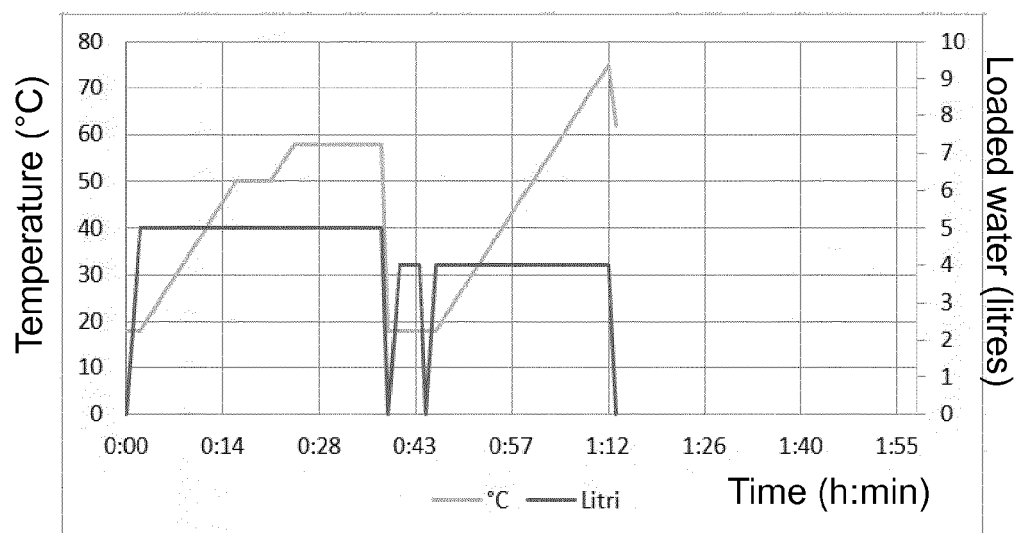


FIG. 5c

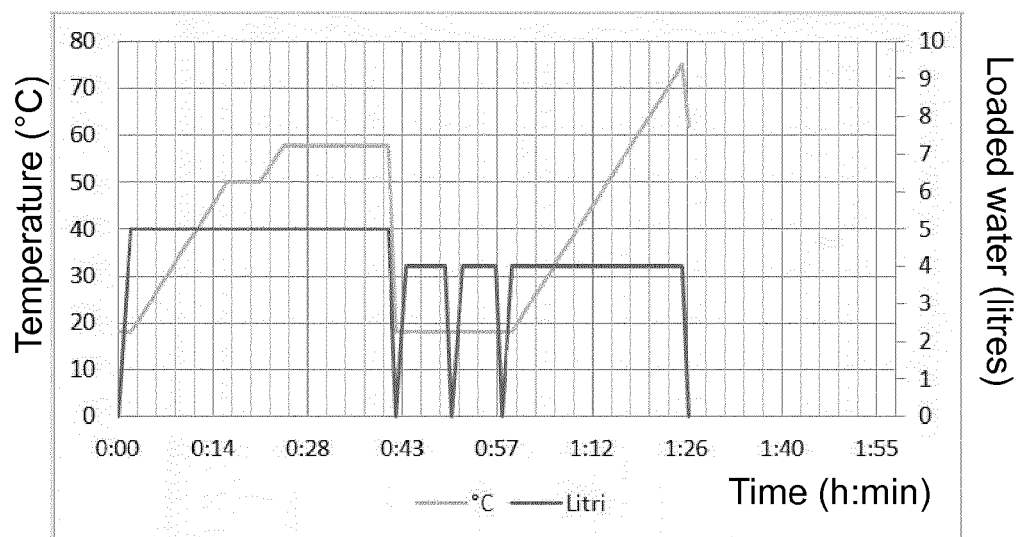


FIG. 5d

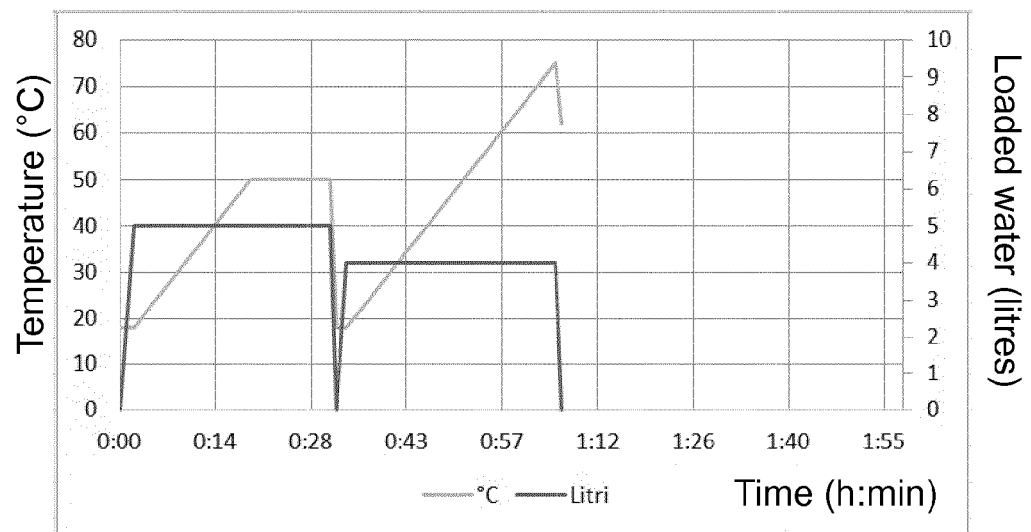


FIG. 6a

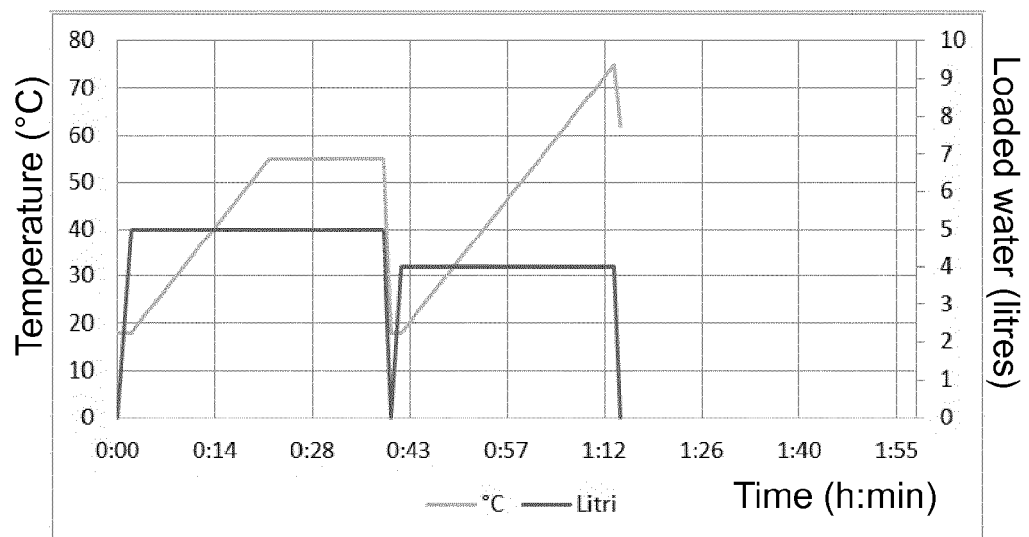


FIG. 6b

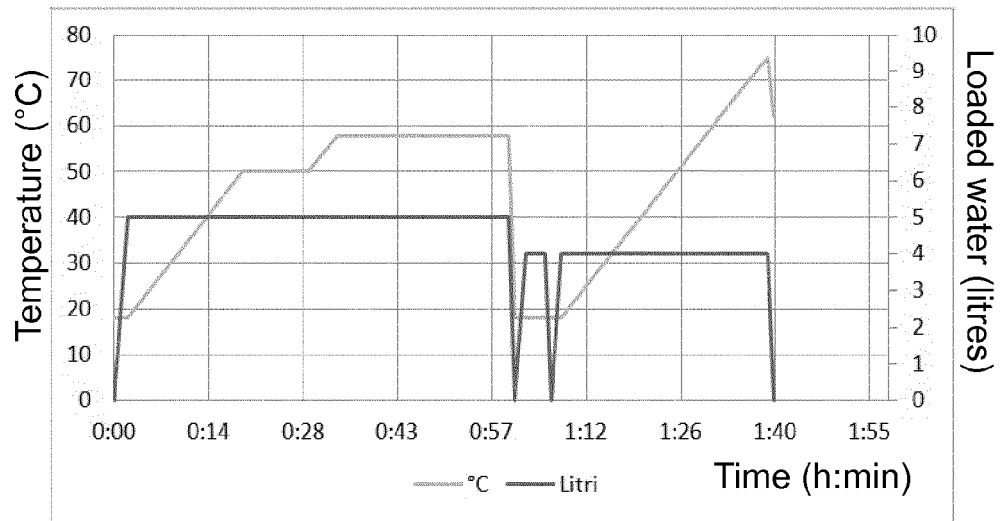


FIG. 6c

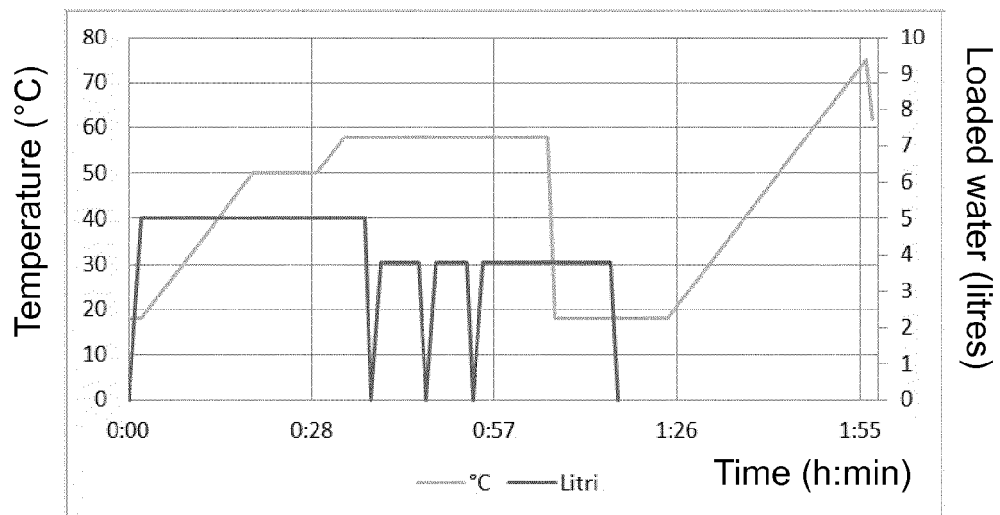


FIG. 6d



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Place of search Munich		Date of completion of the search 18 March 2016	Examiner Lodato, Alessandra
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