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(54) Method to supply clear rinse in a dishwasher

(57) The invention concerns a method for the dosed supply of clear rinse to the clear rinse bath in the tub of a dishwasher during the clear rinse cycle, whereby an optical sensor monitors the foam concentration of the clear rinse bath. An overdose of clear rinse is avoided during the clear rinse cycle according to the invention in that a setpoint is given for the foam concentration in the clear rinse bath for the dosed supply of clear rinse, whereby the actual value of the foam concentration in the clear rinse bath measured by the optical sensor during the clear rinse cycle is compared with the given setpoint, and whereby clear rinse is supplied to the clear rinse bath continuously or at intervals until the measured actual value corresponds to the given setpoint.

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Description

[0001] The invention concerns a method for the dosed supply of clear rinse in the rinsing cycle to the clear rinse bath in the tub of a dishwasher where the foam concentration of the clear rinse bath is monitored with an optical sensor.

[0002] As illustrated in DE 198 31 688 C1, optical sensors are used in dishwashers to monitor the tub content for water, turbidity, air and foam to correspondingly influence the dishwasher program. The program is continued or changed depending on the various contents of the tub.

[0003] The washing program includes several cleaning and rinsing cycles that are terminated with a clear rinse cycle. The cleaned dishes in the tub are supplied with a clear rinse bath containing clear rinse. The customer sets the dose to give a general amount of clear rinse. This frequently causes an overdose and the unnecessary use of clear rinse. In addition, when the dose is insufficient, the desired clear rinse effect is frequently not attained. Manually dosing the clear rinse does not take into account the quality of the clear rinse. This can produce a high foam concentration which lowers the pump pressure and increases noise.

[0004] The problem of the invention is to improve the method as cited above to easily prevent overdosing the clear rinse in the clear rinse cycle, and allow the quality of the clear rinse to be automatically evaluated when dosing.

[0005] This problem is solved according to the invention by providing a setpoint for the foam concentration in the clear rinse bath for the dosed supply of clear rinse, using the optical sensor to compare the actual value of the foam concentration in the clear rinse bath with the given setpoint during the clear rinse cycle, and supplying clear rinse continuously or at intervals to the clear rinse bath until the determined actual value corresponds to the given setpoint.

[0006] The existing optical sensor is used in a simple matter to automatically dose the clear rinse during the clear rinse cycle. Since a setpoint is given for the foam concentration, overdosing is prevented, and the quality of the clear rinse, i.e. the increased foam, is automatically taken into account. As is known, poor-quality clear rinses produce more foam; hence the supply of clear rinse is automatically reduced when the given setpoint for the foam concentration is reached. A dosing mechanism is not necessary since the supply of clear rinse during the clear rinse cycle only has to be released or blocked, and it is stopped when the setpoint is reached by the actual value of the foam concentration.

[0007] In one embodiment, the foam concentration setpoint can be manually fixed by the user or by the machine manufacturer in the program.

[0008] In another embodiment, a feed amount of clear rinse or a feed time for the supply of clear rinse is set for the comparison of the actual value and setpoint and the supply of clear rinse is interrupted and a display shows "Add clear rinse" when the actual value does not reach the given setpoint, in such case the monitoring circuit in the clear rinse container of the dishwasher can be abandoned since the "Add clear rinse" display is taken over by the automatic foam concentration monitoring system. If the actual value does not reach the given setpoint, it is an indication that more clear rinse is required.

[0009] If the "Add clear rinse" display is triggered by a comparator circuit that is active while the clear rinse is being supplied until the setpoint is reached and is only shut off when the actual value reaches the given setpoint, the display indicates the end of the supply of clear rinse. When the display shuts off, the user sees that the supply of clear rinse has properly terminated and that the given setpoint is attained.

[0010] The invention will now be further explained with reference to an exemplary embodiment of an automatic, dosed clear rinse supply for a dishwasher shown in the drawing as a block diagram.

[0011] The dishes to be washed are placed in a tub 13. A program control controls the washing and rinsing cycles by supplying, heating and draining the washing and rinsing bath in a familiar matter which will therefore not be described in detail.

[0012] At the end of the washing and rinsing cycles, a clear rinse cycle starts in which the tub 13 is fed clear rinse bath and clear rinse. The tub 13 has an optical sensor 14 that monitors the foam concentration in the clear rinse bath and sends a corresponding actual value T_{act} to a comparator circuit 11. A setpoint T_{set} for the foam concentration can be entered manually by the user into an input device, or the manufacturer can set it in the program. The comparator circuit 11 emits an output signal A1 that communicates the ongoing supply of clear rinse as long as the actual value T_{act} has not reach the setpoint T_{set}. When the actual value T_{act} detected by the sensor 14 corresponds to the given setpoint T_{set}, the output signal A1 is terminated. This is a recognisable indication of the terminated proper supply of clear rinse. The supply of clear rinse can be continuous or in intervals, and the supply only has to be released or blocked. As shown in the block diagram, the comparator circuit 11 controls a clear rinse dispensing device 12 from which the clear rinse is sent to the tub 13.

[0013] Once the clear rinse cycle has started, a time can be set for the clear rinse supply during which the actual value T_{act} can reach the given setpoint T_{set}. If this does not occur, it can be deduced that the clear rinse dispensing device 12 does not have any more clear rinse required for the supply. The display then remains on beyond the given time and shows that more clear rinse is needed.

[0014] A specific quantity of clear rinse can be set for the clear rinse cycle, however. If this is not sufficient to reach the set foam concentration, the output signal A1 can also show that more clear rinse is needed.

[0015] The automatic supply of clear rinse limits the

amount of clear rinse to the required amount and also saves clear rinse. In addition, the level of the clear rinse container does not have to be monitored to indicate that clear rinse is needed. Beyond the optical sensor that is already used to control the program, only a slight amount of additional control is required for the automatic, dosed supply of clear rinse.

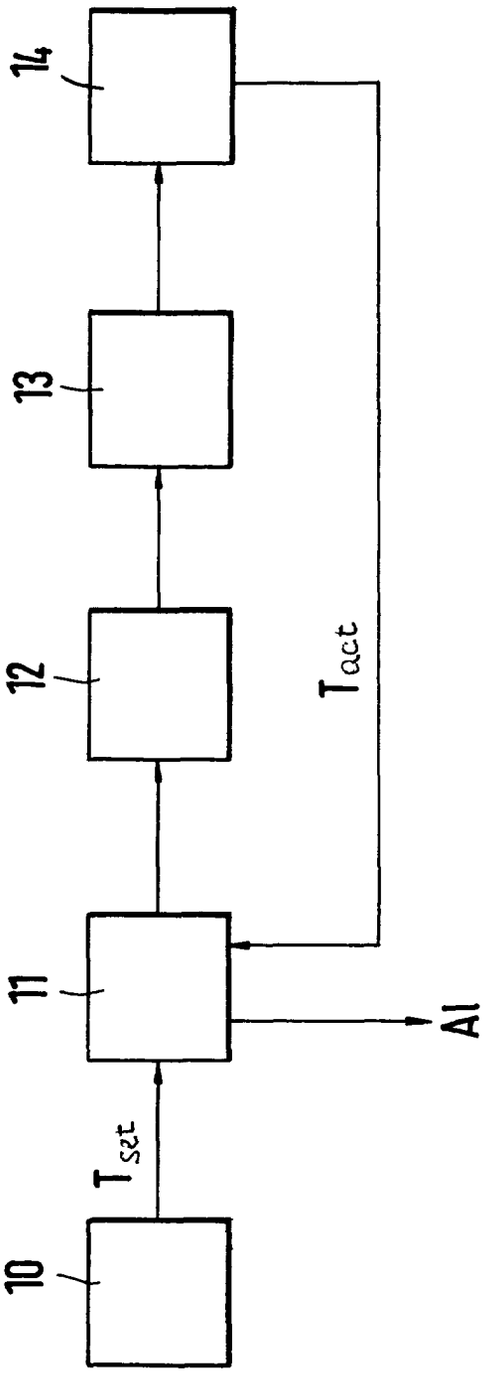
Claims

1. A method for the dosed supply of clear rinse to the clear rinse bath in a dishwasher tub during the clear rinse cycle, whereby an optical sensor monitors the foam concentration of the clear rinse bath,
characterised in that
a setpoint (T_{set}) is given for the dosed supply of clear rinse for the foam concentration in the clear rinse bath;
whereby the actual value (T_{act}) of the foam concentration in the clear rinse bath measured by the optical sensor (14) during the clear rinse cycle is compared with the given setpoint (T_{set});
and whereby clear rinse is supplied to the clear rinse bath continuously or at intervals until the measured actual value (T_{act}) corresponds to the given setpoint (T_{set}).

2. A method according to claim 1,
characterised in that
the setpoint (T_{set}) is set manually by the user, or it is set in the program by the machine manufacturer.

3. A method according to claim 1 or 2,
characterised in that
for the comparison of the actual value (T_{act}) to the setpoint (T_{set}), a quantity of supplied clear rinse or a supply time for the supply of clear rinse is set, and whereby the supply of clear rinse is interrupted and "Add clear rinse" is displayed when the actual value (T_{act}) does not reach the given setpoint (T_{set}).

4. A method according to one of claims 1 - 3,
characterised in that
the display "Add clear rinse" is triggered by a comparator circuit (11) that is active while the clear rinse is being supplied until the actual value (T_{act}) reaches the setpoint (T_{set}) and is only terminated when the given setpoint (T_{set}) is reached.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T_{act}
T_{set}
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