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(54) APPLIANCE SYSTEM AND METHOD FOR MANAGING AN APPLIANCE SYSTEM

(57) An appliance system comprising:
• an induction hob (2);
• an electric oven (3);
• a power management device (4) configured to selectively limit the electrical power absorbed by the induction hob (2) on the basis of the operating conditions of the electric oven (3) and on the basis of a predefined value of maximum overall absorption (PMax).

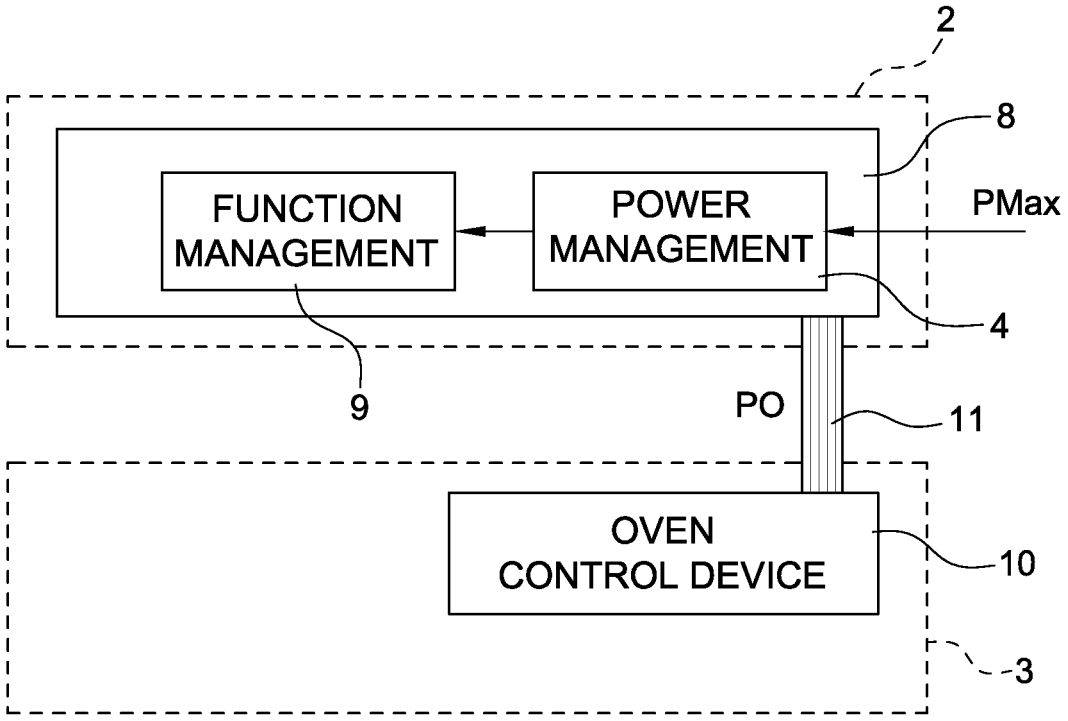

FIG. 2

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Description

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority from Italian patent application no. 102022000012035 filed on June 7, 2022, the entire disclosure of which is incorporated herein by reference.

TECHNICAL FIELD

[0002] The present invention concerns an appliance system and a method for managing an appliance system.

BACKGROUND

[0003] The simultaneous use of appliances can lead to overload of the domestic power supply. When the domestic power supply limit is overloaded, the circuit breaker trips in order to disconnect the appliance.

[0004] Domestic power supplies are provided with meters having limited available power, generally between 3 and 6 kW. The available power is the maximum level of power that can be drawn from the circuit; when this level is exceeded, the circuit trips.

[0005] Frequent tripping of the circuit entails inconvenience for the user and risk of damage to the user devices powered by the domestic power supply when the circuit trips.

[0006] It is therefore essential to limit tripping of the circuit due to overload.

[0007] In recent years an increasing number of families have chosen not to use domestic gas for cooking and heating in order to reduce consumption and limit emissions harmful for the environment.

[0008] In these cases, induction hobs are used in place of gas hobs. They are an optimal choice in financial terms, in terms of energy efficiency and also safety since they are electrically operated and, heating the pans via a magnetic field without using a flame, they limit domestic accidents.

[0009] However, despite the efficiency and practicality of the induction cooking system, many people are still reluctant to use induction hobs due to the very high electrical power absorbed by the coils.

[0010] The operation of a single burner of an induction hob absorbs approximately 2000 W if used at maximum power, with even higher consumption peaks during start-up. However, if set to a lower power, the operation of a single burner consumes less electricity, in the order of 600W.

[0011] Simultaneous use of all the cooking areas, on the other hand, results in high electricity consumption.

[0012] The use of an induction hob can therefore significantly increase the power required from the domestic power supply, with an increase in the risk of the circuit tripping if other appliances are also operating.

SUMMARY

[0013] An object of the present invention is therefore to provide an appliance system, in which the risk of overloading the domestic power supply is limited.

[0014] In accordance with said objects, the present invention concerns an appliance system comprising:

- an induction hob;
- an electric oven;
- a power management device configured to selectively limit the electrical power absorbed by the induction hob on the basis of the operating conditions of the electric oven and on the basis of a predefined value of maximum overall absorption.

[0015] A further object of the invention is to provide a method for managing an appliance system which is capable of avoiding overload of the domestic power supply in a simple and inexpensive manner.

[0016] In accordance with said objects, the present invention concerns a method for managing an appliance system in accordance with claim 15.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] Further characteristics and advantages of the present invention will become clearer from the following description of a non-limiting embodiment example thereof, with reference to the figures of the attached drawings, in which:

figure 1 is a schematic view of an appliance system in accordance with the present invention;
figure 2 is a schematic view of a detail of the appliance system according to the present invention;
figure 3 is a schematic view of a detail of the appliance system in accordance with a variation of the present invention.

DESCRIPTION OF EMBODIMENTS

[0018] In figure 1, the reference number 1 indicates an appliance system comprising an induction hob 2, an electric oven 3 and a power management device 4.

[0019] In the non-limiting example described and illustrated here, the system 1 does not comprise further appliances.

[0020] In accordance with a variation not illustrated, the system 1 comprises one or more further appliances such as, for example, dishwasher and/or microwave oven and/or washing machine and/or refrigerator, etc. connected to the same power management device 4.

[0021] In the non-limiting example described and illustrated here in figure 1, the induction hob 2 and the electric oven 3 share the same electrical supply as they are integrated in one single free-standing structure normally defined "cooker" in technical jargon.

[0022] It is understood that the induction hob 2 and the electric oven 3 can be arranged in separate structures, for example built into different units of the same kitchen. In this case, the electrical supply of the electric oven and induction hob will probably not be shared.

[0023] The power management device 4 is configured to selectively limit the electrical power absorbed by the induction hob 2 on the basis of the operating conditions of the electric oven 3 and on the basis of a predefined value of maximum overall absorption PMax.

[0024] The value of maximum overall absorption PMax is preferably defined during installation by a skilled operator by means of a suitable set-up interface. The value of maximum overall absorption Pmax generally fluctuates between 2KW/h and 6KW/h. It is understood that, in accordance with a variation not illustrated, the definition of the value of maximum overall absorption Pmax can be adjusted also by the user via an interface integrated in the induction hob 2 and/or in the electric oven 3.

[0025] The power management device 4 is configured to receive data on the operating status of the electric oven 3 and, on the basis of said data, regulate the cooking functions of the induction hob 2 so as to maintain the electrical power absorption of the induction hob 2 at values below an operating limit L as the difference between the value of maximum overall absorption PMax and the value of maximum current absorption PO of the electric oven 3, i.e. L=PMax-PO.

[0026] Regulation of the cooking functions of the induction hob 2 entails switching to cooking levels that do not exceed the operating limit L.

[0027] It is understood that, in the case of power management of further appliances, the power management device 4 can regulate the operating functions also of other appliances on the basis of an absorption priority level assigned to each appliance. For example, if the power management device receives operating data also from a dishwasher, it can be configured to regulate the cooking functions of the induction hob 2 so as to maintain the electrical power absorption of the induction hob 2 at values below an operating limit L as the difference between the value of maximum overall absorption PMax and the sum of the value of maximum current absorption PO of the electric oven 3 and the value of maximum current absorption PD of the dishwasher, i.e. L=PMax-(PO+PD). Alternatively, according to the current cooking function of the induction hob and the current function of the dishwasher, the power management device 4 can also regulate the function of the dishwasher by setting it to pause mode, so as not to interfere with the cooking level desired by the user.

[0028] With reference to figure 2, relative to a non-limiting example, the power management device 4 is integrated in a control device 8 of the induction hob 2.

[0029] The control device 8 of the induction hob 2 therefore comprises the power management device 4 and a function management module 9, which receives limitation signals from the power management device 4.

[0030] The power management device 4 receives the data on the operating status of the electric oven 3 from a control device 10 of the electric oven 3.

[0031] Preferably, the communication between the control device 10 of the electric oven 3 and the control device 8 of the induction hob 2 is via a communication BUS 11.

[0032] In the non-limiting example described and illustrated here, the BUS 11 uses a LIN communication protocol.

[0033] Preferably, the power management device 4 interrogates the control device 10 of the electric oven 3 at a predetermined frequency (generally in the order of milliseconds) about its operating state.

[0034] The electric oven 3 replies to the interrogations from the power management device 4 with a value of maximum current power absorption PO associated with the current cooking function.

[0035] In other words, the electric oven 3 provides its own maximum absorbable power level PO associated with the current cooking function.

[0036] If the electric oven 3 is in pyrolysis mode, the power management device 4 interrupts operation of the induction hob 2 or forces operation at very low power. This avoids excessively high operating temperature values.

[0037] If the induction hob 2 is in stand-by, the power management device 4 is not active.

[0038] According to a variation not illustrated, the electric oven 3 can provide the current power absorption level associated with the current cooking function instead of the maximum level, to reduce the limitations of the induction hob 2 only to situations in which it is actually necessary. Said solution, however, could require an increase in the interrogation frequency of the electric oven 3 to avoid delays in managing the limitation of the induction hob 2 and would also require an evaluation of the current power variation of the electric oven 3 to avoid continuous fluctuations in the cooking functions of the induction hob 2.

[0039] According to a further variation not illustrated, the electric oven 3 provides only the current cooking function and the power management device 4 determines the absorption level associated with the current cooking function of the electric oven 3 on the basis of a stored data library.

[0040] According to a variation not illustrated, the communication between the power management device 4 and the control device 10 of the electric oven 3 is via wireless mode.

[0041] Figure 3 illustrates a variation of the present invention in accordance with which the power management device 4 is integrated in the control device 10 of the electric oven 3 and sends limitation signals L to the control device 8 of the induction hob 2.

[0042] Preferably, the control device 8 of the induction hob 2 interrogates the control device 10 of the electric oven 3 at a predetermined frequency (generally in the

order of milliseconds) about the required limitation level.

[0043] The control device 10 of the electric oven 3 replies to the interrogations by the control device 8 of the induction hob 2 with a limitation value L calculated as described previously on the basis of the maximum current absorption value PO of the electric oven 3.

[0044] In this case, if the induction hob 2 is in standby, the power management device 4 is not interrogated and does not send limitation signals L.

[0045] Lastly it is evident that modifications and variations can be made to the system and to the management method described here without departing from the scope of the attached claims.

Claims

1. An appliance system comprising:

   • an induction hob (2);
   • an electric oven (3);
   • a power management device (4) configured to selectively limit the electrical power absorbed by the induction hob (2) on the basis of the operating conditions of the electric oven (3) and on the basis of a predefined value of maximum overall absorption (PMax).

2. The system according to claim 1, wherein the power management device (4) is configured to receive data relating to the operating status of the electric oven (3) and, on the basis of this data, calculate an operating limit (L) as the difference between the predefined value of maximum overall absorption (PMax) and a maximum current absorption value (PO) of the electric oven (3).

3. The system according to claim 2, wherein the power management device (4) is configured to feed the operating limit (L) to a function management module (9) of a control device (8) of the hob (2).

4. The system according to any one of the preceding claims, wherein the electric oven (3) comprises a control device (10) and wherein the power management device (4) receives data on the operating status of the electric oven (3) from the control device (10) of the electric oven (3).

5. The system according to claim 4, wherein the control device (10) of the electric oven (3) sends to the power management device (4) at least one maximum current absorption value (PO) associated with the current cooking function.

6. The system according to claim 4, wherein the control device (10) of the electric oven (3) sends to the power management device (4) the current cooking function and the power management device (4) determines the maximum current absorption value (PO) associated with the current cooking function of the electric oven (3) on the basis of a stored data library.

7. The system according to any one of claims 2 to 6, wherein the power management device (4) interrupts operation of the induction hob (2) or calculates a very low operating limit (L) to force operation of the induction hob (2) at a very low power when the electric oven (3) is in pyrolysis mode.

8. The system according to any one of the preceding claims, wherein the power management device (4) is integrated into a control device (8) of the induction hob (2).

9. The system according to claim 8, wherein communication between the control device (10) of the electric oven (3) and the power management device (4) is via a communication BUS (11) or via wireless communication.

10. The system according to claim 8 or 9, wherein the power management device (4) interrogates the control device (10) of the electric oven (3) at a predetermined frequency about its operating state.

11. The system according to any one of claims 1 to 7, wherein the power management device (4) is integrated in a control device (10) of the electric oven (3).

12. The system according to claim 11, wherein communication between the power management device (4) and the control device (8) of the induction hob (2) is via a communication BUS or via wireless communication.

13. The system according to claim 11 or 12, wherein the control device (8) of the induction hob (2) interrogates the power management device (4) with a predetermined frequency about the required limitation level and the power management device (4) replies to the interrogations from the control device (8) of the induction hob (2) with an operating limit (L).

14. The system according to any one of the preceding claims, comprising at least one further appliance; the power management device (4) being configured to selectively limit the electrical power absorbed by the induction hob (2) and/or the at least one further appliance on the basis of the operating conditions of the electric oven (3), on the basis of a predefined value of maximum overall absorption (PMax) and on the basis of a priority level of absorption assigned to each further appliance.

15. A method for managing an appliance system provid-

ed with an induction hob (2) and with an electric oven (3);
the method comprising selectively limiting the electrical power absorbed by the induction hob (2) on the basis of the operating conditions of the electric oven (3) and on the basis of a predefined value of maximum overall absorption (PMax).

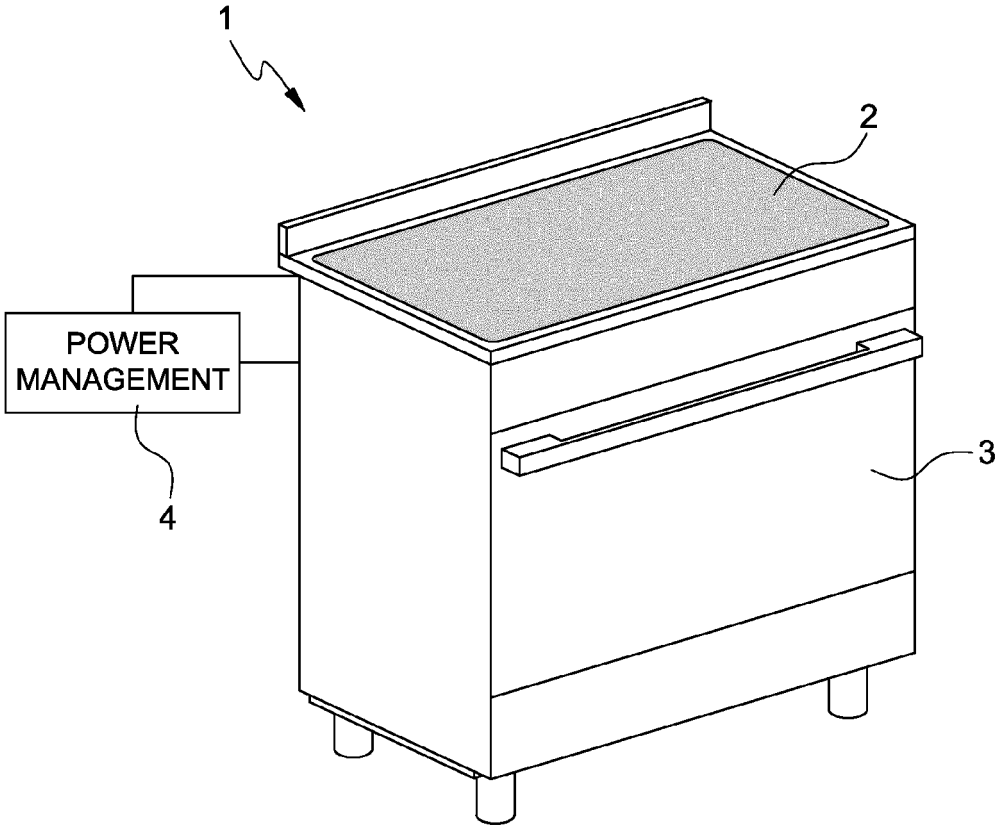
1
2
POWER
MANAGEMENT
4
3

FIG. 1

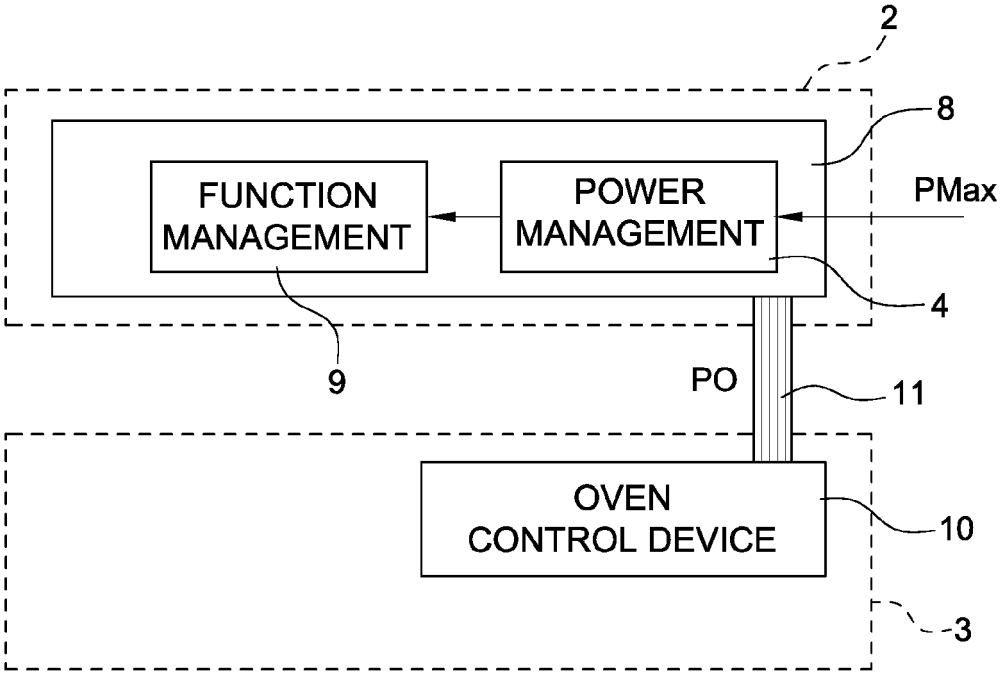
2
8
FUNCTION
MANAGEMENT
POWER
MANAGEMENT
PMax
4
9
PO
11
OVEN
CONTROL DEVICE
10
3

FIG. 2

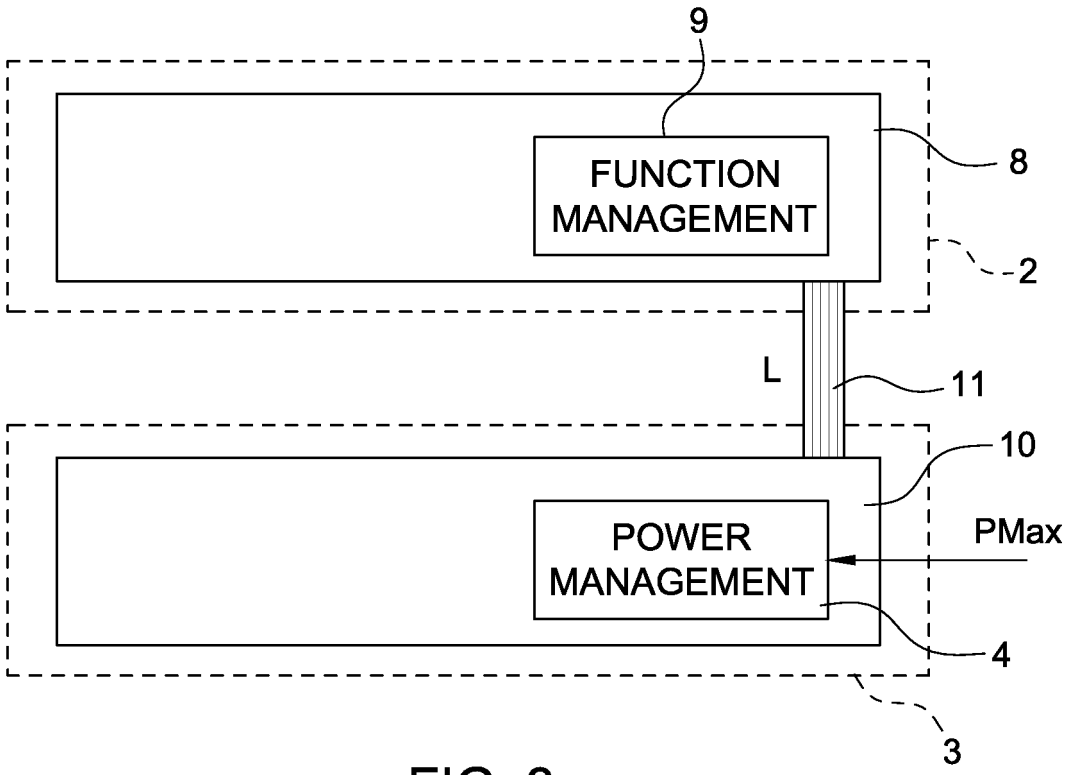

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 23 17 7218

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 September 2023	Jalal, Rashwan

CATEGORY OF CITED DOCUMENTS

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