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Choi et al.(10) **Pub. No.: US 2007/0107140 A1**(43) **Pub. Date: May 17, 2007**(54) **METHOD AND APPARATUS FOR
CONTROLLING STANDBY POWER OF
WASHING MACHINE**(75) Inventors: **Gyoo Cheol Choi**, Changwon-si (KR);
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WASHINGTON, DC 20006 (US)(73) Assignee: **LG ELECTRONICS INC.**, Seoul (KR)(21) Appl. No.: **11/478,380**(22) Filed: **Jun. 30, 2006**(30) **Foreign Application Priority Data**

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(57)

ABSTRACT

A method and apparatus for controlling standby power of a washing machine, which is located in a remote place and can be remotely controlled by a user, is provided. The apparatus includes a communication unit, a power supply, and a controller. The communication unit performs data communication with a monitoring device that performs remote control and monitoring of the washing machine. The power supply supplies needed power to the washing machine. When a wash cycle is terminated or a power-off command is input during data communication with the monitoring device through the communication unit, the controller determines whether to supply main power to the washing machine according to a user setting and controls the power supply according to the determination. The user can set whether to supply main power when a wash cycle has been terminated or a power-off command has been input, achieving easy and efficient standby power control.

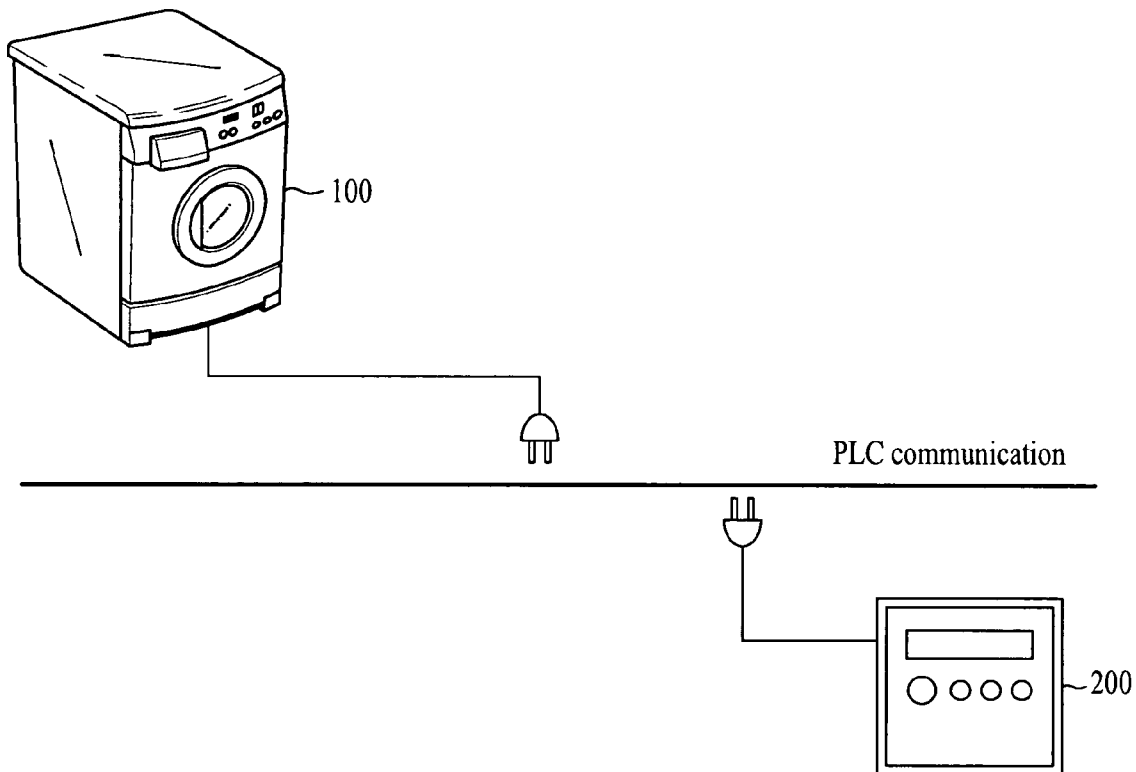


FIG. 1

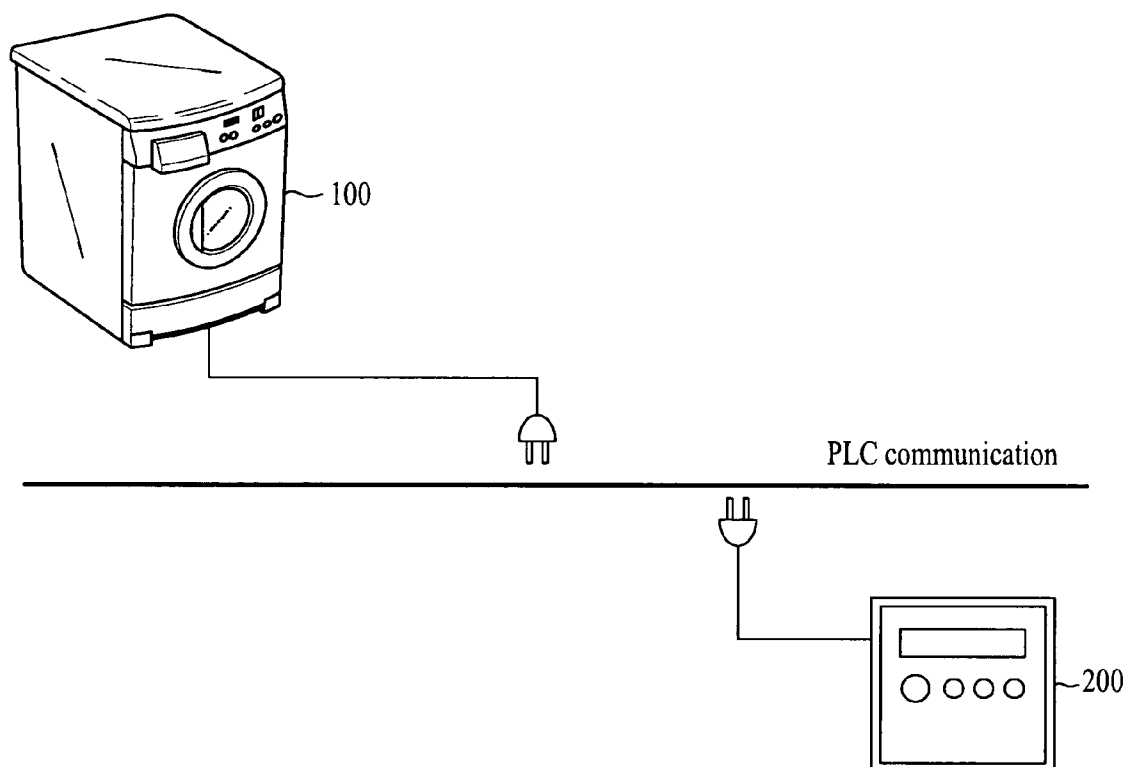


FIG. 2

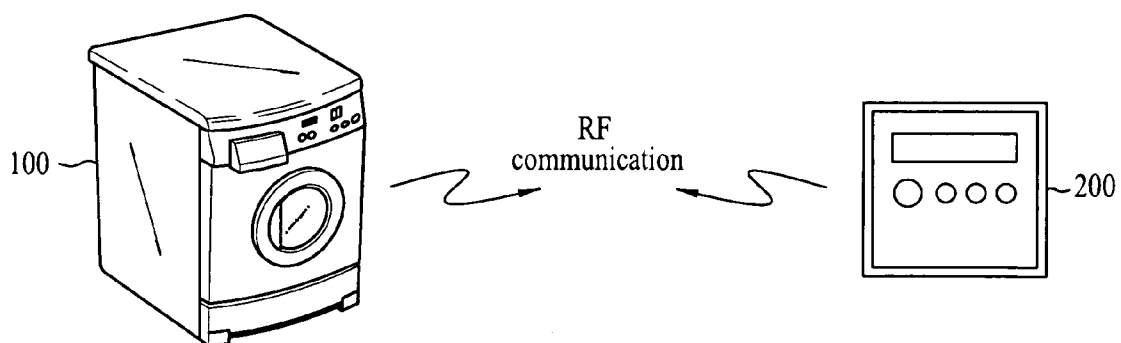


FIG. 3

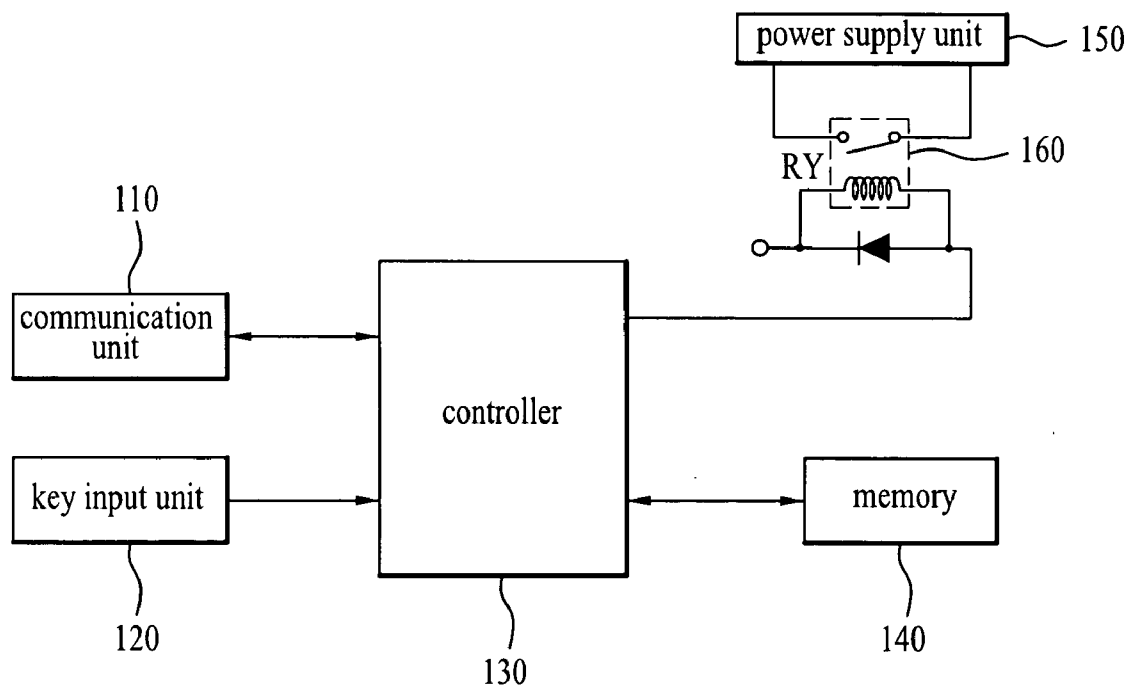
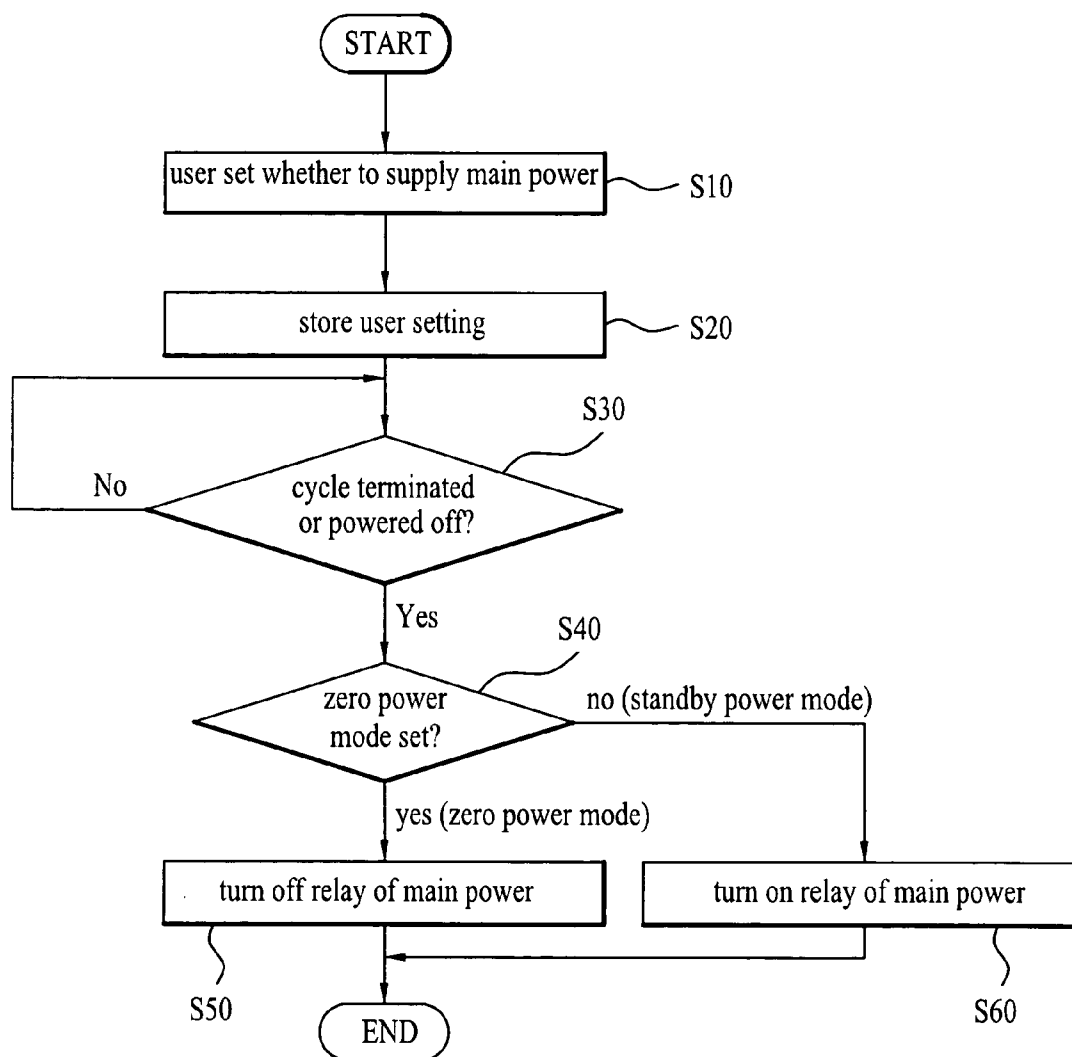


FIG. 4



METHOD AND APPARATUS FOR CONTROLLING STANDBY POWER OF WASHING MACHINE

[0001] This application claims the benefit of Korean Patent Application No. 10-2005-0059194, filed on Jul. 01, 2005, which is hereby incorporated by reference as if fully set forth herein.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a washing machine, and more particularly, to a method and apparatus for controlling standby power of a washing machine that is located at a remote location and can be remotely controlled by the user.

[0004] 2. Discussion of the Related Art

[0005] The washing machine is a home appliance which is most commonly used to clean stains from clothes using emulsion of detergent in water, friction by the flow of rotating water, its collision with the clothes, and the like.

[0006] Along with increasing demand for large living spaces of residences, washing machines or driers are increasingly installed in remote places separated from their living spaces such as their basements or outdoor places. In the following, the term "washing machine" rather than "washing machine or drier" is used for ease of explanation.

[0007] When a washing machine has been installed in a remote place, the user has to go to that place as needed to control the washing machine or monitor its operating status, which causes inconvenience to the user.

[0008] Recently, to overcome this problem, researchers have conducted studies of a remote control technology that allows users to control washing machines installed in places distant from their living spaces or to check operating states of the washing machines.

[0009] One example is a system for remotely controlling a washing machine using power line communication (PLC), which is described in Korean Patent Application No. 2004-0047737.

[0010] Another example is a home networking system using radio frequency (RF) communication, which is described in Korean Patent Application No. 2002-0073502.

[0011] In one example shown in FIG. 1, a washing machine 100 is connected to a monitoring device 200 used to control the washing machine 100 in such a manner that they can communicate with each other through power line communication.

[0012] In another example shown in FIG. 2, a washing machine 100 and a monitoring device 200 each have a wireless communication module for RF communication with each other.

[0013] In the examples of FIGS. 1 and 2, the washing machine 100 is located in a place separated from the living place of a residence such as its basement or an outdoor place and periodically transmits status information of its wash cycle currently in process to the monitoring device 200 through power line communication or RF communication.

[0014] The monitoring device 200 is installed in the living place in the residence where it is easy for the user to use the monitoring device 200. According to a request from the user, the monitoring device 200 remotely controls the washing machine 100 through data communication with the washing machine 100. In addition, the monitoring device 200 analyzes status information from the washing machine 100 and outputs its current wash cycle states such as wash cycle conditions, a remaining cycle time, cycle errors, and cycle starting/finishing in a variety of output forms (for example, via video or audio).

[0015] However, the main power of a washing machine is generally turned off when the washing machine terminates a wash cycle or when a power-off command is input to the washing machine. When the main power of the washing machine is off, the washing machine cannot be powered on through remote control using the monitoring device.

[0016] To remotely control the washing machine using the monitoring device, it is necessary to always keep the main power of the washing machine on. This leads to high power consumption of the washing machine in standby mode, thereby wasting energy.

SUMMARY OF THE INVENTION

[0017] Accordingly, the present invention is directed to a method and apparatus for controlling standby power of a washing machine that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0018] An object of the present invention is to provide a method and apparatus for controlling standby power of a washing machine, which allows the user to selectively set one of a zero power mode and a standby power mode of the washing machine.

[0019] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objectives and other advantages of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0020] To achieve these objects and other advantages and in accordance with the purpose of the invention, as embodied and broadly described herein, an apparatus for controlling standby power of a washing machine comprises a power supply unit that supplies needed power to the washing machine; and a controller that determines whether or not to supply main power to the washing machine according to a user setting when a wash cycle is terminated or when a power-off command is input and controls the power supply unit according to the determination.

[0021] In another aspect of the present invention, an apparatus for controlling standby power of a washing machine comprises a communication unit that performs data communication with a monitoring device that performs remote control and monitoring of the washing machine; a power supply unit that supplies needed power to the washing machine; and a controller that determines whether or not to supply main power to the washing machine according to a

user setting when a wash cycle is terminated or when a power-off command is input during data communication with the monitoring device through the communication unit and controls the power supply unit according to the determination.

[0022] Preferably, the apparatus further comprises a switching unit that switches on or off output power of the power supply unit according to a control signal from the controller.

[0023] Preferably, the switching unit is a relay including a coil connected to a control signal output of the controller, the coil being driven by a control signal of the controller; and a switch connected to a power supply line of the power supply unit, the switch being turned on or off according to driving of the coil.

[0024] Preferably, the apparatus further comprises a key input unit that allows a user to set a user setting as to whether or not to supply the main power when a wash cycle has been terminated or when a power-off command has been input.

[0025] Preferably, the key input unit includes at least one key that allows the user to select one of a zero power mode in which the main power is turned off to terminate communication with the monitoring device and a standby power mode in which the main power is kept on to enable communication with the monitoring device.

[0026] Preferably, the apparatus further comprises a memory that stores the user setting as to whether or not to supply the main power, which the user has set through the key input unit, wherein the controller keeps the main power on to maintain the data communication with the monitoring device or turns off the main power to terminate the data communication with the monitoring device.

[0027] Preferably, the communication unit includes one of a power line communication (PLC) module and a wireless communication module according to a communication scheme used for communication with the monitoring device.

[0028] In another aspect of the present invention, a method for controlling standby power of a washing machine that can perform data communication with a monitoring device that performs remote control and monitoring of the washing machine comprises setting, by a user, a user setting as to whether or not to supply main power to the washing machine when a wash cycle has been terminated or when a power-off command has been input; and turning on or off the main power according to the user setting set by the user when a wash cycle has been terminated or when a power-off command has been input.

[0029] Preferably, setting the user setting as to whether or not to supply the main power includes selectively setting one of a zero power mode in which the main power is turned off and a standby power mode in which the main power is kept on.

[0030] Preferably, turning on or off the main power according to the user setting includes turning off the main power and terminating communication with the monitoring device when the user has set the zero power mode; and switching the washing machine to the standby power mode in which the main power is kept on to allow communication with the monitoring device when the user has set the standby power mode.

[0031] It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0033] FIG. 1 illustrates one conventional remote-controllable washing machine using PLC communication;

[0034] FIG. 2 illustrates another conventional remote-controllable washing machine using RF communication;

[0035] FIG. 3 is a block diagram of an apparatus for controlling standby power of a washing machine according to the present invention; and

[0036] FIG. 4 is a flow chart of a method for controlling standby power of a washing machine according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0037] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

[0038] A method and apparatus for controlling standby power of a washing machine according to the present invention will now be described with reference to FIGS. 3 and 4.

[0039] The washing machine, which is applied to the present invention, is connected to a monitoring device located at a certain distance in such a manner that they can perform data communication with each other. The washing machine is located in a space separated from the living space of a residence such as an outdoor space or its basement, and receives a variety of control commands from the monitoring device and periodically transmits its current wash cycle status information to the monitoring device.

[0040] The monitoring device is provided in an indoor space where the user resides. The monitoring device remotely controls the distant washing machine from the indoor place through data communication with the washing machine. In addition, the monitoring device analyzes status information received from the washing machine and outputs its current wash cycle states such as wash cycle conditions, a remaining cycle time, cycle errors, and cycle starting/finishing in a variety of output forms (for example, via video or audio).

[0041] The washing machine, which can be remotely controlled and monitored using the monitoring device, includes a communication unit 110, a key input unit, a controller 130, a memory 140, a power supply unit 150, and a relay 160 as shown in FIG. 3. The communication unit 110

receives a control command from the monitoring device and transmits wash information thereto. The power supply unit **150** supplies needed power to the washing machine. The key input unit **120** allows the user to set a user setting as to whether or not to supply main power when a power-off command has been input or when a wash cycle has been terminated. The memory **140** stores the user setting as to whether or not to supply main power which the user has set through the key input unit **120**. When a wash cycle is terminated or when a power-off command is input, then the controller **130** turns on or off the output power of the power supply unit **150** according to the user setting stored in the memory **140**. The relay **160** switches on or off the power supply unit **150** according to a control signal of the controller **130**.

[0042] The communication unit **110** may include a wireless communication module such as a radio frequency (RF) module, a power line communication (PLC) module, or the like.

[0043] The key input unit **120** includes at least one key button to allow the user to set a user setting as to whether or not to supply the main power, i.e., to selectively set one of a zero power mode in which the main power is turned off and a standby power mode in which the main power is kept on.

[0044] The relay **160** includes a coil connected to an output of the controller **130** and a switch that is connected to a power supply line of the power supply unit **150** to switch on or off the power supply unit **150** according to a current flowing through the coil.

[0045] The power supply unit **150** supplies needed power to the washing machine. When a wash cycle is terminated or when a power-off command is input, the controller **130** turns on or off the relay **160** according to the user setting to allow or disallow the power supply unit **160** to supply power.

[0046] A method for controlling standby power of a washing machine according to the present invention will now be described in detail.

[0047] As shown in FIG. 4, first, the user sets a user setting as to whether or not to supply main power when a power-off command has been input or when a wash cycle has been terminated, specifically sets one of a zero power mode or a standby power mode (S10).

[0048] The controller **130** then stores the user setting as to whether or not to supply the main power in the memory **140** (S20).

[0049] When a cycle is terminated or when a power-off command is input while the washing machine is in use after the user has set the user setting as to whether or not to supply the main power (S30), the controller **130** confirms the user setting, as to whether or not to supply the main power, stored in the memory **140**.

[0050] Specifically, the controller **130** determines whether the standby mode set by the user is the zero power mode or the standby power mode (S40). If the determination is that the zero power mode has been set, the controller **130** outputs a control signal for turning off the relay **160** of the power supply unit **150** (S50).

[0051] That is, if the zero power mode has been set, the controller **130** switches off the relay **160** to turn off the main power output from the power supply unit **150**.

[0052] In the zero power mode, when a wash cycle is terminated or when a power-off command is input, the main power is completely turned off so as not to supply even the minimum power required for data communication with the monitoring device. This reduces power consumption when the washing machine is not in use, thereby saving energy.

[0053] If the determination of step S40 is that the standby power mode has been set, the controller **130** keeps the relay **160** on to maintain the main power output from the power supply unit **150** (S60).

[0054] In the standby power mode, even if a wash cycle is terminated or a power-off command is input, the main power is kept on to supply the minimum power required for data communication with the monitoring device, thereby allowing the user to remotely control the washing machine using the monitoring device.

[0055] Accordingly, through the user setting, it is possible to determine whether or not to supply the main power to the washing machine in standby mode.

[0056] As is apparent from the above description, the present invention provides a method and apparatus for controlling standby power of a washing machine, which allows the user to selectively set whether or not to supply the main power to the washing machine when a wash cycle has been terminated or when a power-off command has been input, thereby achieving convenient, user-friendly power control of the washing machine in standby mode.

[0057] It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. An apparatus for controlling standby power of a washing machine, the apparatus comprising:

a power supply unit that supplies needed power to the washing machine; and

a controller that determines whether or not to supply main power to the washing machine according to a user setting when a wash cycle is terminated or when a power-off command is input and controls the power supply unit according to the determination.

2. The apparatus according to claim 1, further comprising a switching unit that switches on or off output power of the power supply unit according to a control signal from the controller.

3. The apparatus according to claim 2, wherein the switching unit is a relay including:

a coil connected to a control signal output of the controller, the coil being driven by a control signal of the controller; and

a switch connected to a power supply line of the power supply unit, the switch being turned on or off according to driving of the coil.

4. The apparatus according to claim 1, further comprising a key input unit that allows a user to set a user setting as to

whether or not to supply the main power when a wash cycle has been terminated or when a power-off command has been input.

5. The apparatus according to claim 4, wherein the key input unit includes at least one key that allows the user to select one of a zero power mode in which the main power is turned off and a standby power mode in which the main power is kept on.

6. The apparatus according to claim 4, further comprising a memory that stores the user setting as to whether or not to supply the main power, which the user has set through the key input unit,

wherein the controller turns off the main power or switches the washing machine to the standby power mode in which the main power is kept on, according to the user setting stored in the memory.

7. An apparatus for controlling standby power of a washing machine, the apparatus comprising:

a communication unit that performs data communication with a monitoring device that performs remote control and monitoring of the washing machine;

a power supply unit that supplies needed power to the washing machine; and

a controller that determines whether or not to supply main power to the washing machine according to a user setting when a wash cycle is terminated or when a power-off command is input during data communication with the monitoring device through the communication unit and controls the power supply unit according to the determination.

8. The apparatus according to claim 7, further comprising a switching unit that switches on or off output power of the power supply unit according to a control signal from the controller.

9. The apparatus according to claim 8, wherein the switching unit is a relay including:

a coil connected to a control signal output of the controller, the coil being driven by a control signal of the controller; and

a switch connected to a power supply line of the power supply unit, the switch being turned on or off according to driving of the coil.

10. The apparatus according to claim 7, further comprising a key input unit that allows a user to set a user setting as to whether or not to supply the main power when a wash cycle has been terminated or when a power-off command has been input.

11. The apparatus according to claim 10, wherein the key input unit includes at least one key that allows the user to select one of a zero power mode in which the main power is turned off to terminate communication with the monitoring device and a standby power mode in which the main power is kept on to enable communication with the monitoring device.

12. The apparatus according to claim 10, further comprising a memory that stores the user setting as to whether or not to supply the main power, which the user has set through the key input unit,

wherein the controller keeps the main power on to maintain the data communication with the monitoring device or turns off the main power to terminate the data communication with the monitoring device.

13. The apparatus according to claim 7, wherein the communication unit includes one of a power line communication (PLC) module and a wireless communication module according to a communication scheme used for communication with the monitoring device.

14. A method for controlling standby power of a washing machine that can perform data communication with a monitoring device that performs remote control and monitoring of the washing machine, the method comprising:

setting, by a user, a user setting as to whether or not to supply main power to the washing machine when a wash cycle has been terminated or when a power-off command has been input; and

turning on or off the main power according to the user setting set by the user when a wash cycle has been terminated or when a power-off command has been input.

15. The method according to claim 14, wherein setting the user setting as to whether or not to supply the main power includes selectively setting one of a zero power mode in which the main power is turned off and a standby power mode in which the main power is kept on.

16. The method according to claim 15, wherein turning on or off the main power according to the user setting includes:

turning off the main power and terminating communication with the monitoring device when the user has set the zero power mode; and

switching the washing machine to the standby power mode in which the main power is kept on to allow communication with the monitoring device when the user has set the standby power mode.

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