An instantaneously heating water dispenser, electrically connected with an external power, includes a voltage detection module, a voltage compensation module, a water tank, a heating module, and a control module. The voltage detection module detects a voltage level of the external power. The voltage compensation module operates in coordination with the voltage detection module and stabilizes the voltage level of the external power. The heating module electrically connected with the voltage compensation module is connected with the water tank, and converts the external power compensated into a thermal energy. The control module is electrically connected with the heating module and the voltage compensation module and configured for controlling the amount of water flow injected into the heating module and the thermal power generated by the heating module according to the amount of water to be dispensed from the instantaneously heating water dispenser and the associated water temperature.
FIG. 2

- External power
- Voltage detection module
- Voltage compensation module
- Frequency detection module
- Control module
- Tilt sensing module
- Heating module
- Pump
- Water tank
- Liquid and gas mixing module
- Water outlet
- Input module
- A'
- B

Line connections indicate the flow or connection between the modules.
configuring an amount of water to be dispensed and the associated water temperature

detecting the voltage level of the external power

compensating the voltage level of the external power supplied to the instantaneously heating water dispenser according to the detection result

converting the compensated external power into a thermal energy

controlling an amount of water flow injected into the heating module and the thermal power generated by the heating module according to the amount of water to be dispensed from the instantaneously heating water dispenser and the associated water temperature

START

S30

S32

S34

S36

S38

END

FIG. 3
BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

The present disclosure relates to a water dispenser; in particular, to an instantaneously heating water dispenser and a control method thereof which are capable of precisely controlling the amount of water flow to be dispensed and the water flow temperature thereof.

[0002] 2. Description of Related Art

Due to the continuously improvement of life quality, nowadays people pay more and more attentions to the quality of drinking water. The conventional method for acquiring hot water through heating the water with the gas stove or the electromagnetic plate have been replaced by water dispensers or thermos bottle that is capable of providing both hot and cold water.

[0003] However, a water dispenser or a thermos bottle requires the use of a heater to boil the tap water pumped into a hot water tank and continuously heat the water inside the hot water tank to a predetermined temperature (such as 80 degrees Celsius or 100 degrees Celsius) so as to satisfy the requirement of providing hot water on-demand.

[0004] Although water dispensers and thermos bottles provide great convenience to the user in acquiring hot water, however at the same time constantly maintaining the temperature of the hot water inside the hot water tank to the predetermined temperature might cause power waste and does not comply with the power saving policy promoted by the government.

[0005] In addition, the amount of hot water required by user may change along with different times or seasons in the year. For example, the amount of hot water demanded in winter time is larger than the amount of hot water demanded in summer time. Hence, when the hot water in the tank is kept at full water level at all times, much power would be consumed for maintaining the temperature of the hot water to the predetermined temperature, which is inefficient.

SUMMARY OF THE INVENTION

[0006] The present disclosure is for providing an instantaneously heating water dispenser and a control method thereof. The present disclosure may prevent the instantaneously heating water dispenser from being influence by the voltage fluctuation in the external power through detecting and compensating the voltage level of the external power supplied to the instantaneously heating water dispenser, such that the amount of water actually dispensed from the instantaneously heating water dispenser and the associated water temperature are more or less identical to the expected parameters pre-configured.

[0007] An embodiment of the present disclosure provides an instantaneously heating water dispenser, which is electrically connected with an external power. The instantaneously heating water dispenser includes a voltage detection module, a voltage compensation module, a water tank, a heating module, and a control module. The voltage detection module is electrically connected with the external power. The voltage detection module is configured for detecting a voltage level of the external power. The voltage compensation module is electrically connected with the voltage detection module. The voltage compensation module operates in coordination with the voltage detection module and stabilizing the voltage level of the external power. The heating module is electrically connected with the voltage compensation module. The heating module is connected with the water tank and converts the external power compensated into a thermal energy so as to heat a water flow injected from the water tank. The control module is electrically connected with the heating module and the voltage compensation module. The control module is configured for controlling the amount of the water flow injected into the heating module and the thermal power generated by the heating module according to the amount of water to be dispensed from the instantaneously heating water dispenser and the associated water temperature configured for the instantaneously heating water dispenser.

[0008] An embodiment of the present disclosure provides a control method of an instantaneously heating water dispenser, wherein the instantaneously heating water dispenser is electrically connected with an external power and the instantaneously heating water dispenser includes a heating module for converting an external power into a thermal energy. The control method comprising of configuring an amount of water to be dispensed from the instantaneously heating water dispenser and the associated water temperature for the instantaneously heating water dispenser, compensating the voltage level of the external power supplied to the instantaneously heating water dispenser according to the detection result of a voltage level of the external power, converting the external power compensated correspondingly into a thermal energy; controlling the amount of water flow injected into the heating module and the thermal power generated by the heating module according to the amount of water to be dispensed from the instantaneously heating water dispenser and the associated water temperature configured.

[0009] To sum, embodiments of the present disclosure provide an instantaneously heating water dispenser and a control method thereof. The present disclosure can facilitate the heating module of the instantaneously heating water dispenser in acquiring a stable voltage level through detecting and compensating the voltage level of the external power supplied to the instantaneously heating water dispenser so that the instantaneously heating water dispenser can precisely control the amount of the water being injected into the heating module and the thermal power generated by the heating module according to the amount of water to be dispensed from the instantaneously heating water dispenser and the associated water temperature. Accordingly, the objective of controlling the instantaneously heating water dispenser to precisely supplying the amount of water and the associated water temperature as configured can be achieved.

[0012] For further understanding of the present disclosure, reference is made to the following detailed description illustrating the embodiments and examples of the present disclosure. The description is only for illustrating the present disclosure, not for limiting the scope of the claim.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The drawings included herein provide further understanding of the present disclosure. A brief introduction of the drawings is as follows:

[0014] FIG. 1 is a function block diagram of an instantaneously heating water dispenser provided according to an exemplary embodiment of the present disclosure.
FIG. 2 is a function block diagram of an instantaneously heating water dispenser provided according to
another exemplary embodiment of the present disclosure.

FIG. 3 is a flowchart illustrating a control method for an instantaneously heating water dispenser provided
according to an exemplary embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An Embodiment of an Instantaneously Heating Water Dispenser

Please refer to FIG. 1, which shows a function block

The instaneously heating water dispenser includes a voltage detection module 1, a voltage compensation

The control module 7 is electrically connected with the water outlet 9. One terminal of the voltage
detection module 1 is electrically connected with the external power B, while the other terminal of the voltage
detection module 1 is electrically connected with the control module 7 through the voltage compensation module 2. The control

The voltage detection module 1 is configured for detecting the voltage level of the external power B. Practically,

The water tank 4 is detachably installed on the instaneously heating water dispenser A, and is configured

The water tank 4 is detachably installed on the instaneously heating water dispenser A, and is configured

The pump 5 is configured for pumping a water flow stored in the water tank 4 to the heating module 6, wherein

The heating module 6 is configured for converting the external power B compensated into a thermal energy to

The control module 7 is configured for controlling the amount of water to be injected into the heating module 6

water temperature configured. Specifically, the control module 7 is configured for respectively generating the first control signal and a second control signal responsive to the parameters inputted from the input module 3 by the user, such as the amount of water to be dispensed and the water temperature desired. The first control signal and the second control signal are transmitted to the pump 5 and the heating module 6, respectively. The first control signal indicates the amount of water to be dispensed from the instantaneously heating water dispenser A, i.e., configured for controlling the amount of water flow to be pumped from the water tank 4 by the pump 5. The second control signal indicates the water temperature configured, i.e., configured for controlling the amount of the thermal power generated by the heating module 6 (or controls the amount of power of the compensated external power B supplied to the heating module 6).

[0026] The duty cycle of the heating module 6 in practice can be controlled to cause the thermal power generated by the heating module 6 to be evenly distributed to the water flow flowing inside the heating module 6. Specifically, because the voltage compensation module 2 of the instantaneously heating water dispenser A is capable of stabilizing the voltage level of the external power B, the compensated voltage level inputted into the heating module 6 is a constant value. Particularly, under the conditions that "the thermal power is equal to the current inputted to the instantaneously heating water dispenser A" the voltage level of the external power B compensated* the duty cycle of the heating module 6", and "the current inputted into the instantaneously heating water dispenser A is equal to the voltage level of the external power B compensated* the resistance of the heating module 6", the thermal power generated by the heating module 6 can be evenly distributed among the water flow flowing inside the heating module 6 by just controlling the duty cycle of the heating module 6.

[0027] It is worth noting that a first temperature sensor (not shown in figures) and a second temperature sensor (not shown in figures) are respectively disposed on the water input terminal and the water output terminal of the heating module 6. The first temperature sensor and the second temperature sensor are both electrically connected with the control module 7, and are configured for respectively sensing an unheated water flow and a heated water flow so as to enable the control module 7 instantly adjusting the thermal power generated by the heating module 6 using the first temperature sensor and the second temperature sensor. Thus, the temperature of the water flow outputted from the water outlet 9 can be more or less identical to the water temperature configured by the input module 3.

[0028] The liquid and gas mixing module 8 is configured for transforming the fluids (including hot water flows and vapors) being outputted from the water output terminal of the heating module 6 into a liquefied hot water to prevent the vapors from spreading thereby achieving the objective of improving the efficiency of thermal conversion. Practically, the liquid and gas mixing module 8 may be implemented by a narrow and long pipeline, and the outlet can be, for example, a kind of water valve, and the present disclosure is not limited thereto.

[0029] [Another Exemplary Embodiment of the Instantaneously Heating Water Dispenser]

[0030] Please refer to FIG. 2, which shows a function block diagram of an instantaneously heating water dispenser according to another exemplary embodiment of the present disclosure. As shown in FIG. 2, the instantaneously heating water dispenser A' includes the voltage detection module 1, the voltage compensation module 2, the input module 3, the water tank 4, the pump 5, the heating module 6, the control module 7, the liquid and gas mixing module 8, the water outlet 9, a frequency detection module 10, and a tilt sensing module 11. As most of the function modules of the instantaneously heating water dispenser A' are essentially the same as their counterparts in the instantaneously heating water dispenser A, thus their related connections and operations are omitted.

[0031] The differences between the instantaneously heating water dispensers A and A' is in that the instantaneously heating water dispenser A in the instant embodiment further includes the frequency detection module 10 and the tilt sensing module 11. The frequency detection module 10 is electrically connected with the external power B and the control module 7, while the tilt sensing module 11 is electrically connected with the control module 7.

[0032] The frequency detection module 10 is configured for detecting the frequency of the external power B, and operatively drive the control module 7 to selectively switch an operating frequency mode of the instantaneously heating water dispenser A' according to the detection result of the frequency detection module 10 so as to precisely control an amount of water flow injected into the heating module 6 and the thermal power. In other words, as the instantaneously heating water dispenser A' includes the frequency detection module 10, the instantaneously heating water dispenser A' is capable of automatically selecting to the optimal frequency modes according to the frequencies of the external power B regulated in each of the countries or regions. Accordingly, the objective of precisely controlling the amount of water to be dispensed from the instantaneously heating water dispenser A' with the configured water temperature can be achieved.

[0033] Take the AC power standard in Taiwan for example, the frequency of the external power B is 60 Hz. Supposed the operating frequency mode of the instantaneously heating water dispenser A' is initially configured to operate in an operation environment of 50 Hz or less. When the frequency detection module 10 of the instantaneously heating water dispenser A' detects that the frequency of the external power B is 60 Hz, the instantaneously heating water dispenser A' automatically switches to the operating frequency mode to suit the 60 Hz operation environment. On the other hand, if the present operating frequency mode of the instantaneously heating water dispenser A' is already adjusted to suit the 60 Hz operation environment, the switching operations would not be performed.

[0034] The tilt sensing module 11 is configured for detecting the tilt angle of the instantaneously heating water dispenser A', and generating a set of warning signals driving the control module 7 to turn off the operation of the instantaneously heating water dispenser A' when the tilt angle detected exceeds a predetermined angle in order to prevent the instantaneously heating water dispenser A' from being damaged or for safety concerns caused by external factors. The tilt sensing module 11 can be, for example, a tilt sensor. The predetermined angle can be configured by the user through the input module 3. The user can configured the predetermined angle such as 15 degrees or 45 degrees, however the present disclosure is not limited thereto.

[0035] In actual operations, since the instantaneously heating water dispenser A' has voltage compensation (by using the
voltage detection module 1 and the voltage compensation module 2) and frequency switching (by using frequency detection module 10) functionalities, the instantaneously heating water dispenser A is capable of precisely operating in the mode of constant amount of water flow or constant water temperature. In the mode of constant amount of water flow, the amount of the water outputted from the water outlet 9 is constant, while the corresponding water temperature changes according to the water temperature configured by the users. In the mode of constant water temperature, the temperature of the water outputted from the water outlet 9 is constant, while the amount of the water flow outputted from the water outlet 9 changes according to the amount of water to be dispensed configured by the users.

[0036] [An Example Embodiment of a Control Method of an Instantaneously Heating Water Dispenser]

[0037] Please refer to FIG. 1 in conjunction with FIG. 3. FIG. 3 shows a flowchart illustrating a control method of an instantaneously heating water dispenser provided according to an exemplary embodiment of the present disclosure. As shown in FIG. 3, in Step S30, the amount of water to be dispensed from the instantaneously heating water dispenser A and the water temperature desired to be manually configured by a user. In Step S32, the instantaneously heating water dispenser A detects the voltage level of the external power B before heating the water flow.

[0038] In Step S34, the instantaneously heating water dispenser A may compensate the voltage level of the external power B supplied to the instantaneously heating water dispenser A according to the detection result of the voltage level of the external power B. After that, in Step S36, the instantaneously heating water dispenser A converts the compensated external power B into thermal energy.

[0039] At last, in Step S38, the instantaneously heating water dispenser A further controls the amount of water flow injected into the heating module 6 and the thermal power generated by the heating module 6 according to the amount of water to be dispensed from the instantaneously heating water dispenser A and the associated water temperature configured by the user.

[0040] Preferably, the water input terminal and the water output terminal of the heating module 6 respectively can be installed with a first temperature sensor and a second temperature sensor. The first temperature sensor and a second temperature sensor enable the instantaneously heating water dispenser A to instantly adjust the thermal power generated by the heating module 6.

[0041] Preferably, the control method of the instantaneously heating water dispenser A may further include a step of controlling the duty cycle of the heating module 6 to cause the thermal power to be evenly distributed among the water flow flowing inside the heating module 6.

[0042] Preferably, the control method of the instantaneously heating water dispenser A may further include detecting the frequency of the external power B and having the instantaneously heating water dispenser A to selectively switch an operating frequency mode thereof according to the detection result. Such that the amount of the water flow injected into the heating module 6 and the thermal power generated by the heating module 6 can be precisely controlled.

[0043] Preferably, the control method of the instantaneously heating water dispenser A may further include transforming a fluid outputted from the water output terminal of the heating module 6 a liquefied hot water flow.

[0044] Preferably, the control method of the instantaneously heating water dispenser A may further include detecting a tilt angle of the instantaneously heating water dispenser A, and stop the operation of the instantaneously heating water dispenser A when the tilt angle exceeds a predetermined angle.

[0045] [Possible Efficacies of the Embodiments]

[0046] In summary, the present disclosure provides an instantaneously heating water dispenser and a control method thereof. The present disclosure can facilitate the heating module of the instantaneously heating water dispenser in acquiring stable voltage level through detecting and compensating the voltage level of the external power supplied to the instantaneously heating water dispenser. The instantaneously heating water dispenser can further automatically switch to the optimal frequency mode to achieve the objectives of precisely controlling the amount of water to be dispensed from the instantaneously heating water dispenser and the water temperature configured. Accordingly, the instantaneously heating water dispenser and the control method thereof are very practical as being capable of accurately and precisely control the amount of water flow being injected into the heating module and the thermal power generated by the heating module so that the amount of water to be dispensed from the instantaneously heating water dispenser and the associated water temperature are more or less identical to the user-configured parameters.

[0047] Some modifications of these examples, as well as other possibilities will, on reading or having read this description, or having comprehended these examples, will occur to those skilled in the art. Such modifications and variations are comprehended within this disclosure as described here and claimed below. The description above illustrates only a relative few specific embodiments and examples of the present disclosure. The present disclosure, indeed, does include various modifications and variations made to the structures and operations described herein, which still fall within the scope of the present disclosure as defined in the following claims.

What is claimed is:

1. An instantaneously heating water dispenser, electrically connected with an external power, comprising:
   a voltage detection module, electrically connected with the external power, for detecting a voltage level of the external power;
   a voltage compensation module, electrically connected with the voltage detection module, for operating in coordination with the voltage detection module to stabilize the voltage level of the external power;
   a water tank;
   a heating module, electrically connected with the voltage compensation module and the water tank, for operatively converting the external power compensated into a thermal energy so as to heat a water flow injected from the water tank; and
   a control module, electrically connected with the heating module and the voltage compensation module, operatively controlling an amount of water flow being injected into the heating module and a thermal power generated by the heating module according to an amount of water to be dispensed from the instantaneously heating water dispenser and a water temperature thereof.
2. The instantaneously heating water dispenser according to claim 1, further comprising a pump, which is connected among the water tank, the heating module, and the control module, wherein the pump is controlled by the control module, and pumps the water flow from the water tank to the heating module responsive a first control signal generated by the control module, wherein the first control signal indicates the amount of water to be dispensed from the instantaneously heating water dispenser.

3. The instantaneously heating water dispenser according to claim 1, wherein a first temperature sensor and a second temperature sensor are respectively disposed on a water input terminal and a water output terminal of the heating module, and the first temperature sensor and the second temperature sensor are electrically connected with the control module enabling the control module to instantly adjust the thermal power generated by the heating module using the first temperature sensor and the second temperature sensor.

4. The instantaneously heating water dispenser according to claim 1, wherein the control module further controls a duty cycle of the heating module to cause the thermal power to be evenly distributed among the water flow flowed therein.

5. The instantaneously heating water dispenser according to claim 1, further comprising a frequency detection module, electrically connected between the external power and the control module, operative to detect a frequency of the external power and drive the control module to selectively switch an operating frequency mode of the instantaneously heating water dispenser according to the detection result of the frequency detection module so as to precisely control the amount of the water flow injected into the heating module and the thermal power generated by the heating module.

6. The instantaneously heating water dispenser according to claim 1, further comprising an input module, electrically connected with the control module, enabling a user to manually configure the amount of water to be dispensed from the instantaneously heating water dispenser and the associated water temperature.

7. The instantaneously heating water dispenser according to claim 1, further comprising a liquid and gas mixing module connected with a water output terminal of the heating module, the liquid and gas mixing module is configured for transforming fluid being outputted from the water output terminal into a liquefied hot water flow.

8. The instantaneously heating water dispenser according to claim 1, further comprising a tilt sensing module, electrically connected with the control module, for detecting a tilt angle of the instantaneously heating water dispenser, and generating a warning signal when the tilt angle exceeds a predetermined angle, wherein the control module stop the operation of the instantaneously heating water dispenser upon receiving the warning signal.

9. A control method for an instantaneously heating water dispenser, wherein the instantaneously heating water dispenser is electrically connected with an external power and includes a heating module for converting the external power into a thermal energy, the control method comprising:
   - configuring an amount water to be dispensed and an associated water temperature for the instantaneously heating water dispenser;
   - detecting a voltage level of the external power;
   - compensating the voltage level of the external power supplied to the instantaneously heating water dispenser according to the detection result of the voltage level of the external power;
   - converting the external power compensated into a thermal energy; and
   - controlling the amount water flow injected into the heating module and a thermal power generated by the heating module according to the amount of water to be dispensed and the water temperature thereof configured.

10. The control method of the instantaneously heating water dispenser according to claim 9, wherein the instantaneously heating water dispenser further comprises a pump, for pumping the water flow from a water tank to the heating module.

11. The control method of the instantaneously heating water dispenser according to claim 9, wherein a first temperature sensor and a second temperature sensor are respectively disposed on a water input terminal and a water output terminal of the heating module and enables the instantaneously heating water dispenser to instantly adjust the thermal power generated by the heating module using the first temperature sensor and the second temperature sensor.

12. The control method of the instantaneously heating water dispenser according to claim 9, further comprising of controlling a duty cycle of the heating module to cause the thermal power to be evenly distributed among the water flow flowed therein.

13. The control method of the instantaneously heating water dispenser according to claim 9, further comprising of detecting a frequency of the external power and having the instantaneously heating water dispenser to selectively switch an operating frequency mode thereof according to the detection result so as to precisely control the amount of water flow being injected into the heating module and the thermal power generated by the heating module.

14. The control method of the instantaneously heating water dispenser according to claim 9, further comprising of a step of transforming a fluid outputted from a water output terminal of the heating module into a liquefied hot water flow.

15. The control method of the instantaneously heating water dispenser according to claim 9, further comprising of detecting a tilt angle of the instantaneously heating water dispenser and stopping the operation of the instantaneously heating water dispenser when the tilt angle exceeds a predetermined angle.