

Sanitary fitting having an electrical valve arrangement, a control unit and an operating device, and method for controlling a water output in a sanitary fitting

The present invention relates to a sanitary fitting according to the preamble of claim 1. The
5 invention further relates to a method for controlling a water output in a sanitary fitting according to the preamble of claim 9.

Such a sanitary fitting is disclosed in the publication DE 20 2016 004 151 U1 in which an electronic valve controller is constructed from at least two solenoid valves or a solenoid valve
10 block with two valve outlets and various control elements, whereby three or more precise flows can be controlled. The valve controller is equipped with a keypad which is provided with a plurality of buttons. The valve controller can be equipped with an additional sensor which triggers a water flow when approached.

15 The object of the invention is to improve the aforementioned prior art.

This object is achieved by a sanitary fitting having the features of claim 1. The object is further achieved by a method which has the features of claim 9. Advantageous embodiments can be found individually or in combination in the dependent claims.

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The positions and orientations provided when the sanitary fitting is used as intended and when an observer is standing, in particular, in front of the sanitary fitting and looking in the direction of the sanitary fitting are specified by the terms "above", "below", "front", "rear", "horizontal", "vertical", "left", "right", "depth direction", "width direction", "height direction",
25 etc.

The sanitary fitting can also be, for example, a constituent part of a household appliance or a beverage dispensing appliance which is designed to dispense process water or drinking water to a user.

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According to the characterizing part of claim 1, a further operating element is provided on the operating panel and, when actuated, stops at any time a water output triggered by the sensor operating element. This enables both a convenient triggering of the water flow and a rapid

ending thereof. The further operating element can be configured, for example, as an independent touch button which operates on a capacitive, inductive or optical basis. The further operating element, however, can also be designed as a virtual button which is displayed on a touch screen. Preferably, the water flow can be stopped at any time both by the sensor operating element and by the further operating element on the operating panel. This possibility for parallel operation, and in particular equal operation, of two operating elements which are independent of one another provides additional safety and enhances the ease of use. The additional safety is relevant, in particular, regarding a possible hot water output or boiling water output which covers a temperature range of greater than or equal to 60°C. In spite of an equal operation, it can be provided that during an operating procedure on one of the two operating elements, the respective other operating element is blocked from operation. The operating elements assigned to the operating device are preferably configured purely electrically, i.e. free of mechanically movable components. However, the mode of operation thereof can be based on piezo or ultrasonic technology.

The sensor operating element is preferably configured as a touch sensor and in an advantageous embodiment is arranged in front of an outlet of the sanitary fitting. In particular, the sensor operating element is arranged on a front face of the fitting body facing the user. The fitting body is designed for supplying water by means of internal water channels or water lines and also has a further outlet for the water output to the user. The sensor operating element can respond by being touched by a finger of a user, for example. However, the sensor operating element can also function contactlessly, in the sense of a proximity sensor, when approached by an operator's hand or a finger thereof. The sensor operating element can operate, for example, capacitively, inductively, by means of ultrasound or on the basis of infrared radiation. Particularly preferably, at least one lighting element which displays to the user, for example, a recognized actuation is assigned to the sensor operating element. This lighting element is preferably located on the sensor operating element or in the immediate vicinity thereof. The lighting element can be configured, for example, as an illuminated ring encompassing the sensor operating element. The operating panel is preferably positioned in the vicinity of the fitting body such that it is arranged within a range of movement of the operator's hand of a user standing in front of the sanitary fitting. This can be, for example, on the right-hand side adjacent to or in front of the sanitary fitting and, in particular, adjacent to a

water basin or sink assigned to the sanitary fitting. The sanitary fitting, in particular, is a kitchen fitting with a correspondingly assigned sink.

In a preferred embodiment, the operating panel has a visual display for visualizing a water
5 output activated by the sensor operating element. For the visualization, the parameters of a
current water flow rate and a current water temperature are preferably visually displayed to
the user. The visualization can be implemented via graphical elements such as for example
bars, curve segments or circular segments. The specific numerical values of the parameters of
the flow rate and water temperature can also be displayed to the user. It is particularly
10 advantageous if the output parameters, such as flow rate and water temperature for example,
are visualized to the user in a manner in which the user obtains a rapid overview relative to
the nature of the water which is output on the sanitary fitting. In particular, relative to a hot
water output at a temperature of greater than or equal to 60°C, this also represents a safety
aspect for the user, in addition to simple information, in particular when the hot water output
15 is shown visually highlighted relative to other water outputs. This can be implemented, for
example, by displaying the water output temperature in a color which is noticeable to the
human eye, a flashing display or an enlarged display.

In a further embodiment, it is proposed that the operating panel is designed to change the
20 parameters of a water output activated by the sensor operating element at any time and, in
particular, immediately with a corresponding touch gesture by an operator's hand. The
parameters of the water output relative to an operation by the sensor operating element are
stored in the control unit of the operating device. When a water output is activated by means
of the sensor operating element, the corresponding output parameters are visually displayed to
25 the user on the operating panel. The user then has the option of changing or adapting the
parameters of the running water output immediately, i.e. during the output itself, on the basis
of a corresponding touch gesture by the hand or a finger thereof. The touch gesture can be, for
example, a swipe, a tap or a displacement movement by means of a finger of the operator's
hand on the operating panel. The operating panel is preferably configured as a touch screen.
30 The change of parameters takes place during the water output and, for example, without the
need to call up a submenu first. The change of parameters takes place, therefore, on a main
level or in a main menu of the operating panel. The changed parameters are continuously
displayed to the user. The display of the parameters on the main level preferably refers to the

current parameters of the water output. The current parameters can be the currently set or the currently measured parameters.

If the operating panel is also designed to permit the activation of a water output and if this
5 water output is then able to be interrupted at any time by an actuation of the sensor operating
element, this provides a possibility for an extended and particularly convenient operation. The
functionality of the activation of a water output on the operating panel also advantageously
comprises the selection of different types of water for the output. In contrast to the sensor
operating element which, when actuated, permits only the possibility of a single water output
10 predetermined by the control unit, the output of different types of water is made possible by
an operation on the operating panel which is configured, for example, as a touch screen. Thus,
for example, an output of chilled water, filtered water, boiling water, or water with the
addition of flavorings can be selected in each case with a variable flow rate and temperature.
The particular advantage of the possibility of being able to interrupt or end this water output,
15 which has already been started on the operating panel, at any time by the sensor operating
element, is that the user has a very short distance to cover and thus a rapid reaction time for
ending a water output. This is because the hand of the user or operator is generally in the
vicinity of the outlet during a water output and, in particular with a sensor operating element
arranged in front of the outlet, this results in a correspondingly short distance which has to be
20 covered by the operator's hand for operating the sensor operating element.

A preferred development is that the operating panel is configured at least in some regions as a
touch screen and is designed to display visually the current or currently set parameters of a
flow rate and a water temperature by a symbol in a two-dimensional coordinate system. Thus
25 the two parameters of water temperature and flow rate are visualized or made visible to the
user in a particularly noticeable manner. The rapid detection of the current state of the output
water and a corresponding reaction thereto is thus made easier for the user. A possibly
required interaction on the part of the user is correspondingly accelerated. This possibility for
rapid interaction for the user, in addition to the increase in the ease of use, also represents a
30 further safety aspect, in particular with the output of water at a temperature of greater than or
equal to 60°C.

The two parameters can refer to the currently set parameter values or to the currently measured parameter values regarding the water output. An axis of the two-dimensional coordinate system indicates a rate of flow, or flow rate, of the output water and the other axis indicates the temperature of the output water. Thus with an operating panel arranged in front of a user in a horizontal plane, for example, a flow rate is displayed in an axis facing away from the user and a temperature is displayed in an axis perpendicular thereto and running parallel to the user. The symbol is always displayed at that point of the coordinate system which corresponds to the current flow rate and the current temperature. The axes of the coordinate system can be visibly displayed on the touch screen but they can also be printed on a corresponding operating panel frame adjacent to the touch screen in order to save display surface. In addition to the symbol, the parameter values can also be displayed numerically on the touch screen. The operating panel, which is configured at least in some regions as a touch screen, preferably has a plurality of menu levels which permit a comprehensive and detailed operation or setting of the sanitary fitting. The operating panel or the touch screen is arranged in the vicinity and in front of, or adjacent to, the fitting body, in particular on the right-hand side of a water basin or sink assigned to the sanitary fitting, so that a user standing in front of the fitting body can in turn easily implement a corresponding operation of the operating panel or the touch screen without changing position.

It is preferred if the displayed symbol for changing the parameters can be displaced by an operator's hand, whereby the control unit controls the electrical valves of the valve arrangement of the sanitary fitting according to a change in position of the symbol. This enables the user to change two parameters simultaneously by displacing the symbol within the coordinate system and thereby brings about a particularly rapid and efficient interaction with the sanitary fitting. The user thus has the option, for example, of touching this symbol with a finger of the operator's hand and of displacing it in the desired direction. This finger movement or displacement of the symbol is detected via the control unit and output as a corresponding control command to the valve arrangement which adapts the flow rate and temperature immediately to the current position of the symbol in the coordinate system or the output parameters linked thereto.

It is advantageous if the symbol, when changed in position, also changes in terms of its geometry and/or color, so that the user obtains the effect of the change in position in a more

clearly visualized manner and thus the setting of the desired parameters is facilitated. Thus the symbol, for example, can become larger with an increasing flow rate and its color adapted to the set temperature. Preferably, the operating device can also provide an additional setting mode in which by means of the symbol the user can adapt to their own requirements the
5 parameters for the flow rate and temperature stored in the control unit and assigned to the sensor operating element. These requirements are stored in the control unit and taken into consideration with the next actuation of the sensor operating element. The most recently stored parameters are displayed by the position of the symbol within the two-dimensional coordinate system. As a result, a user-specific adaptation of the water output parameters
10 assigned to the sensor operating element is made possible, whereby the ease of use and user-friendliness of the sanitary fitting is significantly improved.

Since the control unit is designed to stop immediately an already running water output when the symbol is touched, an intuitive and rapid end of the water output is made possible. The
15 symbol thus corresponds to the operating element on the operating panel which is provided for stopping the water output. For stopping the water output, for example, a brief tap on the symbol is sufficient. In order to counteract an inadvertent stoppage, a double tap on the symbol can be provided for interrupting or stopping the water output on the sanitary fitting. If touching the symbol is coupled with a displacement movement, the water flow is preferably
20 not stopped but the correspondingly assigned parameters are adapted immediately during the running water output according to the displacement movement.

A particularly convenient and user-specific operation is made possible by customized output parameters being stored in a memory unit of the control unit, said output parameters being
25 able to be assigned to the sensor operating element on the fitting body after the identification of the user. The identification of the user can be made via biometric features, such as for example voice input, a fingerprint or correspondingly assigned preset buttons or memory buttons on the operating device. After the identification of the user, the name thereof or identifier is preferably displayed in a display of the operating device.

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The invention further relates to a method for controlling a water output in a sanitary fitting, in which the water output is immediately stopped with the actuation of an operating element which is arranged on an operating panel remotely from the fitting body. By the actuation of

the operating element, a corresponding signal is forwarded to the control unit which immediately controls the valve arrangement such that the currently running water output is immediately ended.

- 5 It is preferred if the water output is immediately stopped with a brief actuating period of the operating element on the operating panel, and the parameters of the output water can be changed with a longer actuating period. A brief actuating period can also be defined as a double brief tap on the operating element. A brief actuating period, in particular, is half a second or less. The parameters can be changed, for example, by a longer actuating period and
 10 a subsequent swiping movement or displacement movement of a finger of an operator's hand of the user.

Advantages and features which have been described, and will be described, relative to the sanitary fitting, correspondingly apply - if applicable - to the method according to the
 15 invention and vice versa.

Further features and advantages of the invention are found in the following description of an exemplary embodiment with reference to the accompanying schematic figures. In the figures:

- 20 **Fig. 1** shows a schematic view of the sanitary fitting;
Fig. 2 shows a detailed view of an operating panel in a first output situation and
Fig. 3 shows a detailed view of the operating panel in a second output situation.

Elements which are the same or functionally the same are provided with the same reference
 25 signs in the figures.

Fig. 1 shows a schematic view of a sanitary fitting, configured as a kitchen fitting, with a fitting body 2, an outlet 4 and a mounting base 6. The fitting body 2 is configured as a hollow body and consists of brass with an external protective layer of chrome. Two water lines (not
 30 shown) and an electrical cable 7 are arranged in the cavity. The two water lines feed into the outlet 4 which is substantially configured as an aerator or flow regulator. The electrical cable 7 is connected to a sensor operating element 8 which is located on a front face of the fitting body 2 facing a user. The fitting body is fastened by means of the mounting base 6 to a

kitchen countertop or to a flange of a sink integrated in the kitchen countertop (not shown in each case). The sensor operating element 8 is configured to be actuated by an operator's hand 10 of a user standing in front of the fitting body 2, by the touch or approach of a finger 11 of the operator's hand 10.

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The sensor operating element 8 is part of an operating device 12 which also has an operating panel 14 with an operating element 16. The operating panel 14 is configured here as a touch screen 14. The operating element 16 is displayed as a virtual operating element on the touch screen 14. A control unit 18 which is part of the operating device 12 is electrically connected to the operating panel 14 and to the electrical cable 7 assigned to the sensor operating element 8. The control unit 18 has a microprocessor (not shown) which evaluates the electrical signals of the operating panel 14 and the sensor operating element 8 and forwards corresponding control instructions or control signals to a valve arrangement 20. These control instructions serve for controlling a plurality of electrical valves (not shown) arranged in the valve arrangement 20.

A mixed water line 22 leads from the valve arrangement 20 to the fitting body 2 and therefrom inside the fitting body 2 (not shown) to the outlet 4. The water flowing in the mixed water line 22 is formed by a mixture of the water from a warm water feed line 28 and a cold water feed line 26 which in each case feed into the valve arrangement 20. A special water line 24 also leads from the valve arrangement 20 to the fitting body and therein (not shown) to the outlet 4. The special water line 24 contains either hot water from a boiler 30, cold water from a chiller 34 or simply filtered water from a filter 38. The boiler 30 is supplied with water by a branching in the cold water feed line 26 via the filter 38. This also applies to the chiller 34. The boiler 30, the chiller 34 and the filter 38 are connected in each case on the output side to the valve arrangement 20. Accordingly, a boiling water line 32 leads from the output of the boiler 30 to the valve arrangement 20. The output of the chiller 34 is connected by a chilled water line 36 to the valve arrangement 20. The output of the filter 38 feeds into a filtered water line 40 which is also connected to the valve arrangement 20 in addition to the feed lines for the boiler 30 and the chiller 34. The boiler water line 32, the chilled water line 36 and the filtered water line 40 are connected together in terms of fluid technology by means of different electrically controllable valves (not shown) inside the valve arrangement 20. Controlled by the control unit 18, the special water line 24, if required, is connected in each

case in terms of fluid technology to the output of the boiler 30, the chiller 34, the filter 38 or optionally also a mixture thereof. The valve arrangement 20 comprises a plurality of electrically controllable valves which can be of variable construction, such as for example solenoid valves or servo-controlled valves.

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Fig. 2 shows the operating panel 14 of the operating device 12 which displays the operating element 16 in the form of a symbol 42 and is configured as a touch screen 14. The symbol 42 is designed in a star shape and is expanded by a crosshair 44 which is guided as far as the edges of the touch screen 14. The crosshair serves for simpler or more rapid recognition of the position of the symbol 42 on the touch screen 14, in particular when the finger 11 of the operator's hand 10 is placed thereon. The symbol 42 can be displaced by placing the finger 11, and by means of a corresponding displacement movement thereof on the touch screen 14. The symbol 42 or the position thereof on the touch screen 14 visualizes the parameters of a flow rate and a temperature of the water output in a two-dimensional coordinate system, wherein a longitudinal axis facing away from the user symbolizes the flow rate and a transverse axis arranged at right-angles thereto symbolizes the water temperature.

The operating panel or the touch screen 14 is surface-mounted in a kitchen countertop (not shown) and relative to the fitting body 2 on the right-hand side at the front adjacent to a sink (not shown) assigned to the fitting body 2. A printed display 48 on the left-hand side adjacent to the touch screen 14 displays to the user the extent of a flow rate in relation to the position of the symbol 42. The minimum flow rate is specified at a front end of the touch screen 14 and the maximum flow rate is correspondingly specified at a rear end of the touch screen 14. Preferably, the minimum position is defined as the off position in the sense of a stopped water flow. A printed display 46 at the rear end of the touch screen illustrates to the user a temperature variable, in combination with the position of the symbol 42 on the touch screen 14. Relative to an extent parallel to the user, a central position of the touch screen corresponds to a lukewarm water output. A displacement of the symbol 42 to the right by the finger 11 brings about the output of warmer water, and a corresponding displacement of the symbol 42 to the left accordingly reduces the temperature of the water output. The position of the symbol 42 illustrated in FIG. 2 thus indicates the output of warm water at a high flow rate.

If a user actuates the sensor operating element 8 with the finger 11, a predefined water output stored in the control unit 18 is started. The water output takes place, therefore, by the parameters for the flow rate and water temperature which are stored in the control unit 18.

When the water output is started, this is displayed immediately by the symbol 42 on the touch screen 14 which is arranged in the two-dimensional coordinate system corresponding to the temperature and flow rate. The user can now displace the symbol 42 immediately by means of the finger 11 and thus bring about a corresponding change in the parameters of the water output. Moreover, the user can immediately stop the water output started by the sensor operating element 8 at any time, however, by a brief tap of the symbol 42. The user can also start a water output by touching the touch screen 14 at any point, wherein the corresponding symbol 42 is displayed below the finger of the operator's hand 10. The parameters corresponding to the position of the symbol 42 are used for the water output. The water output, which has already been started on the touch screen 14, can be interrupted at any time by actuating the sensor operating element 8. The operating priority between the touch screen 14 and the sensor operating element 8 is thus of equal importance. Preferably, however, during the operation of one of the two operating elements 8 or 16, the respective other operating element is blocked.

Fig. 3 shows the operating panel 14 or the touch screen 14 of the operating device 12 with the symbol 42 which, due to its position on the touch screen 14 relative to the two-dimensional coordinate system, displays to the user a low flow rate of cold water. The water flow would be stopped by displacing the symbol 42 by means of the finger 11 in the direction of the front end of the touch screen or in the direction of the user. The corresponding activation can then be carried out again by the finger 11 touching the sensor operating element 8 or alternatively by the finger correspondingly touching the touch screen at the desired coordinate position.

List of reference signs:

	2	Fitting body
	4	Outlet
5	6	Mounting base
	7	Electrical cable
	8	Sensor operating element
	10	Operator's hand
	11	Finger
10	12	Operating device
	14	Operating panel; touch screen
	16	Operating element
	18	Control unit
	20	Valve arrangement
15	22	Mixed water line
	24	Special water line
	26	Cold water feed line
	28	Warm water feed line
	30	Boiler
20	32	Boiling water line
	34	Chiller
	36	Chilled water line
	38	Filter
	40	Filtered water line
25	42	Symbol
	44	Crosshair
	46	Printed display - temperature range
	48	Printed display - flow rate range

Claims

- 1) A sanitary fitting having an electrical valve arrangement (20), a control unit (18) and an operating device (12), wherein the operating device (12) has an operating panel (14) arranged remotely from a fitting body (2) and a sensor operating element (8) which is arranged on the fitting body (2) and which can activate a water output of the sanitary fitting, **characterized in that** a further operating element (16) is provided on the operating panel (14) and, when actuated, stops at any time a water output triggered by the sensor operating element (8).
- 2) The sanitary fitting as claimed in claim 1, **characterized in that** the operating panel (14) has a visual display for visualizing a water output activated by the sensor operating element (8).
- 3) The sanitary fitting as claimed in one of the preceding claims, **characterized in that** the operating panel (14) is designed to change the parameters of a water output activated by the sensor operating element (8) at any time and, in particular, immediately with a corresponding touch gesture by an operator's hand (10).
- 4) The sanitary fitting as claimed in one of the preceding claims, **characterized in that** the operating panel (14) is also designed to activate a water output and this water output is then able to be interrupted at any time by an actuation of the sensor operating element (8).
- 5) The sanitary fitting as claimed in one of the preceding claims, **characterized in that** the operating panel (14) is configured at least in some regions as a touch screen and is designed to display visually the current or currently set parameters of a flow rate and a water temperature by a symbol (42) in a two-dimensional coordinate system.
- 6) The sanitary fitting as claimed in claim 5, **characterized in that** the displayed symbol (42) for changing the parameters can be displaced by the finger (11) of an operator's hand (10), whereby the control unit (18) controls the electrical valves of the valve

arrangement (20) of the sanitary fitting according to a change in position of the symbol (42).

- 7) The sanitary fitting as claimed in claim 5 or 6, **characterized in that** the control unit (18) is designed to stop immediately an already running water output when the symbol (42) is touched.
- 8) The sanitary fitting as claimed in one of the preceding claims, **characterized in that** customized output parameters are stored in a memory unit of the control unit (18), said output parameters being able to be assigned to the sensor operating element (8) on the fitting body (2) after the identification of the user.
- 9) A method for controlling a water output in a sanitary fitting, in which a water output is activated with predefined parameters for flow rate and temperature by the actuation of a sensor operating element (8) arranged on a fitting body (2) by means of a control unit (18) and electrical valves of a valve arrangement (20) connected thereto, **characterized in that** the water output is immediately stopped with the actuation of an operating element (16) which is arranged on an operating panel (14) remotely from the fitting body (2).
- 10) The method as claimed in claim 9, **characterized in that** the water output is immediately stopped with a brief actuating period of the operating element (16) on the operating panel, and the parameters of the output water can be changed with a longer actuating period.