

Claims

1. Urinal system comprising a urinal bowl, a fluid inlet with an inlet valve, a urinal outlet, at least one HF motion sensor for detecting fluid motion provided on the urinal bowl and/or at the urinal outlet and a urinal controller coupled with the at least one HF motion sensor and the inlet valve, wherein the urinal controller comprises a data processing system and/or is connected with a data processing system, which is arranged to at least retrieve and/or receive data captured by the at least one HF motion sensor, to evaluate the data arithmetically and, based on the evaluated data, to detect at least one of the following malfunctions and/or initiate an action, in order to prevent at least one of the following malfunctions:

- that the urinal outlet is obstructed, and/or
- that there is a pressure fluctuation in a wastewater system connected to the urinal system, and/or
- that the fluid inlet and/or the inlet valve is malfunctioning, and/or
- that there is a malfunction of at least one of the at least one HF motion sensor,

and/or to recognise a predefined urinal usage situation and/or frequency of use based on the evaluated data, and to adjust an opening time and/or an opening position and/or an opening frequency of the inlet valve based on the evaluated data during at least one subsequent urinal flushing process.

2. The urinal system of claim 1, wherein the urinal system further comprises at least one pressure sensor and/or at least one flow sensor in the fluid inlet and/or is coupled with at least one pressure sensor and/or at least one flow sensor in the fluid inlet via a meshed and/or a wireless local data transmission network.

3. Urinal system comprising a urinal bowl, a fluid inlet with an inlet valve, a urinal outlet, at least one HF motion sensor for detecting fluid motion provided on the urinal bowl and/or at the urinal outlet and a urinal controller coupled with the at least one HF motion sensor and the inlet valve, wherein the urinal system further comprises at least one pressure sensor and/or at least one flow sensor in the fluid inlet and/or is coupled with at least one pressure sensor and/or at least one flow sensor in the fluid inlet via a meshed data transmission network and the urinal controller comprises a data processing system and/or is connected to a data processing system, which is arranged to at least retrieve and/or receive data captured by the at least one HF motion sensor and/or the at least

one pressure sensor and/or the at least one flow sensor, to evaluate the data arithmetically and, based on the evaluated data, to identify at least one of the following malfunctions and/or trigger at least one action, in order to prevent at least one of the following malfunctions:

- that the urinal outlet is obstructed, and/or
- that there is a pressure fluctuation in a wastewater system connected to the urinal system, and/or
- that pressure in the fluid inlet has dropped below a minimum pressure value, or has exceeded a maximum pressure value, and/or
- that the inlet valve is malfunctioning, and/or
- that there is a malfunction of the at least one HF motion sensor,

and/or to identify a predefined urinal usage situation and/or frequency of use based on the evaluated data and adjust an opening time and/or an opening position and/or an opening frequency of the inlet valve based thereon during at least one subsequent urinal flushing process.

4. The urinal system of any one of the preceding claims, wherein the urinal system comprises an error message and/or service notification output unit coupled with the data processing system.

5. The urinal system of any one of the preceding claims, wherein the data processing system comprises at least one data processing block that is machine-learning and/or comprises an artificial neuronal net and/or includes an expert system.

6. Water consumer system comprising a urinal system according to one of the preceding claims, wherein the water consumer system comprises at least one additional water consumer in addition to the urinal system, where at least one additional sensor is provided, wherein the data processing system is coupled with the at least one additional sensor and is arranged to arithmetically evaluate the data captured by the at least one additional sensor and received by the data processing system and to include the data into the detection and/or prevention of at least one of the malfunctions.

7. The water consumer system of claim 6, wherein the water consumers and the urinal system are connected with each other via a meshed and/or a wireless local data transmission network.

8. Method for operating a urinal system comprising a urinal bowl, a fluid inlet with an inlet valve, a urinal outlet, at least one HF motion sensor for detecting fluid motion provided on the urinal bowl and/or at the urinal outlet and a urinal controller coupled with the at least one HF motion sensor and the inlet valve, by means of which the inlet valve is opened for a predefined time if draining fluid is detected by the at least one HF motion sensor, wherein the urinal controller comprises a data processing system and/or is connected to a data processing system, which at least retrieves and/or receives data captured by the at least one HF motion sensor, evaluates the data arithmetically and, based on the evaluated data, recognizes when there is one of the following malfunctions and/or triggers at least one action, in order to prevent one of the following malfunctions:

- that the urinal outlet is blocked and/or
- that there is a pressure fluctuation in a waste water system connected to the urinal system and/or
- that the fluid inlet and/or the inlet valve is faulty and/or
- that there is a malfunction of the at least one HF motion sensor

and/or to identify a predefined urinal usage situation and/or frequency of use based on the evaluated data and adjust an opening time and/or an opening position and/or an opening frequency of the inlet valve based thereon during at least one subsequent urinal flushing process.

9. The method of claim 8, wherein a fluid pressure is captured by means of at least one pressure sensor and/or a fluid flow is captured by means of at least one flow sensor in the fluid inlet, the captured fluid pressure and/or the captured fluid flow is/are transmitted to the data processing system, the data processing system arithmetically evaluates the captured fluid pressure and/or the captured fluid flow along with the data retrieved and/or received by the at least one HF motion sensor and, based on the evaluated data, recognizes when there is at least one of the following malfunctions and/or triggers at least one action in order to prevent at least one of the following malfunctions:

- that the urinal outlet is blocked and/or
- that there is a pressure fluctuation in a waste water system connected to the urinal system and/or
- that the pressure in the fluid drops below a minimum pressure value or exceeds a maximum pressure value in the fluid inlet and/or
- that the fluid inlet and/or the inlet valve is faulty and/or
- that there is a malfunction of at least one of the at least one HF motion sensor

and/or to identify a predefined urinal usage situation and/or frequency of use based on the evaluated data and adjusts an opening time and/or an opening position and/or an opening frequency of the inlet valve based thereon during at least one subsequent urinal flushing process.

10. Method for operating a urinal system with a urinal bowl, a fluid inlet with an inlet valve, a urinal outlet, at least one HF motion sensor for detecting fluid motion provided on the urinal bowl and/or the urinal outlet and a urinal controller coupled with the at least one HF motion sensor and the inlet valve, by means of which the inlet valve is opened for a predefined time if draining fluid is detected by the at least one HF motion sensor, wherein a fluid pressure is captured with at least one pressure sensor and/or a fluid flow is captured with at least one flow sensor in the fluid inlet and the urinal controller comprises a data processing system and/or is connected with a data processing system, which at least retrieves and/or receives data captured by the at least one HF motion sensor and/or the at least one pressure sensor and/or the at least one flow sensor, evaluates the data arithmetically and, based on the evaluated data, recognizes when there is at least one of the following malfunctions and/or triggers at least one action in order to prevent at least one of the following malfunctions:

- that the urinal outlet is blocked and/or
- that there is a pressure fluctuation in a waste water system connected to the urinal system and/or
- that the pressure in the fluid drops below a minimum pressure value or exceeds a maximum pressure value in the fluid inlet and/or
- that the fluid inlet and/or the inlet valve is faulty
- that there is a malfunction of at least one of the at least one HF motion sensor.

11. The method of any one of claims 8 to 10, wherein the data processing system recognizes that the urinal outlet is blocked and/or the fluid inlet is faulty, if no draining fluid is detected by the HF motion sensor even though the inlet valve is open and/or it is detected by means of the at least one HF motion sensor that at least a lower area within the urinal bowl is filled with standing fluid.

12. The method of claim 11, wherein the data processing system recognizes whether the urinal outlet is blocked or the fluid inlet is faulty, if no draining fluid is detected by the at least HF motion sensor even though the inlet valve is opened and fluid pressure has

been captured by the at least one pressure sensor and/or fluid flow has been captured by the at least one flow sensor and/or it is detected by means of the at least one HF motion sensor that at least a lower area within the urinal bowl is filled with standing fluid.

13. The method of claim 9 or 10, wherein the data processing system recognizes that the urinal outlet is partially blocked and/or the fluid inlet is faulty, if it is detected by the at least one HF motion sensor that there is a delayed drainage of fluid from the urinal bowl even though the inlet valve is opened.

14. The method of claim 13, wherein the data processing system recognizes, whether the urinal outlet is partially blocked or the fluid inlet is faulty when it is detected by the at least one HF motion sensor that fluid drains from the urinal bowl with a delay even though the inlet valve is opened and fluid pressure has been captured by the at least one pressure sensor and/or fluid flow has been captured by the at least one flow sensor.

15. The method of any one of claims 9 to 14, wherein a respective opening time of the inlet valve is adjusted to the respective fluid pressure and/or the respective fluid flow in the fluid inlet by the urinal controller.

16. The method of any one of the claims 8 to 15, wherein the data processing system recognizes that the fluid inlet is faulty, if the at least one HF motion sensor detects no fluid flow and/or a permanent fluid flow and/or a fluid flow beneath a fluid flow threshold value.

17. The method of any one of claims 8 to 16, wherein the urinal system comprises an error message and/or service notification output unit coupled with the data processing system and that the data processing system puts out a service notification to the error and/or service notification output unit when it recognizes at least one of the malfunctions.

18. The method of any one of claims 8 to 17, wherein the data processing system recognizes that there is a pressure fluctuation in the waste water system connected to the urinal bowl if a series of consecutive faulty urinal flushing processes on the urinal system results from the process of the data of the at least one HF motion sensor and/or a signal pattern of the data of the at least one HF motion sensor corresponds to a characteristic fluctuation of the fluid level in the urinal outlet.

19. The method of any one of claims 8 to 18, wherein when the data processing system recognizes that there is a pressure fluctuation in a waste water system connected to the urinal system, the urinal controller changes a sensitivity of the at least one HF motion sensor and/or when a signal pattern of the data of the at least one HF motion sensor corresponds to a characteristic fluctuation of the fluid level in the urinal outlet, does not initiate a urinal flushing process.

20. The method of any one of claims 8 to 19, wherein the data processing system comprises at least one data processing block, which is machine-learning and/or works based on an artificial neuronal net and/or is an expert system.

21. The method of any one of claims 8 to 20, wherein the urinal system is integrated into a water consumer system, which comprises at least one additional water consumer in addition to the urinal system, where at least one additional sensor is provided, wherein the data processing system is coupled with the at least one additional sensor and also arithmetically evaluates the data received by the at least one additional sensor, wherein at least one flushing time and/or blockage in an outlet and/or pressure fluctuation in a waste water system and/or defect of an inlet device of the at least one additional water consumer determined thereby, is included in the detection of at least one of the malfunctions.

22. The method of claim 21, wherein the water consumers and the urinal system communicate with each other via a meshed and/or a wireless local data transmission network.

23. The method of any one of claims 8 to 22, wherein there is a malfunction of at least one of the at least one HF motion sensor if the data processing system does not receive data from at least one of the at least one HF motion sensor or the data of at least one of the at least one HF motion sensor received by the data processing system are not processible by the data processing system and/or at least one of the at least one HF motion sensor issues at least one service signal.