

Title: Method and system for carrying out closed-loop or open-loop control of the water pressure in a pressure zone and device for carrying out and for operating same

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The invention relates to a method and system for water pressure regulation or control in a pressure zone and a device for carrying out and operating same.

10 In tall buildings the relevant standards require the maximum water pressure at process water consumers such as fire hydrants and sprinklers, for example, to be limited for reasons of safety or economy.

15 If, for example, a supply pressure is provided for a fire hydrant on the 40th floor at a height of 120 m, for reasons of occupational safety (for fire fighters, for example) the maximum flow pressure at extraction in the underground car park must not exceed 8 bar. Due to occupational safety
20 considerations affecting the fire fighter, a pressure of 80 MPa (8 Bar) has been set as the maximum reasonable limit value. In the past pressure reducers have often been used to limit pressure at the hydrant even though they have in fact been banned in fire water systems for years under the
25 relevant standards (DIN 1988).

According to accepted engineering standards at the time of filing two different types of system are known which allow maximum pressure limitation, namely:

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- A first type is known in which the building is divided hydraulically into a plurality of pressure zones. In this arrangement separate pipe lines are laid for

every 10 floors, for example, and supplied via individual or separate pressure booster stations. Such a version according to the prior art is described, for example, in the draft of DIN EN 1988-500, 2008 edition, Appendix 1, where it is referred to as version B.

- A second type of system is known in which the building is supplied hydraulically via a riser. In this arrangement the maximum pressure is ensured by means of pressure regulators and/or pressure reducers. Such versions according to the prior art are also detailed, for example, in the aforementioned draft of DIN EN 1988-500, again in Appendix 1, where they are referred to as versions C and/or D.

However, both types have disadvantages. Due to the provision of a plurality of risers and pressure booster pumps, for example, the first type according to the prior art demands a high material and technical outlay to avoid exceeding the prescribed maximum pressures. This makes such versions very expensive. In the second type the pressure regulation and/or pressure reduction fittings are very sensitive and can so compromise the water supply. Their use in fire water systems is therefore very controversial and should be avoided (cf. also DIN 1988).

Given this situation it was desirable to develop systems which permit process and/or fire water systems in operation in tall buildings to be provided on each floor of the building both with the desired or necessary pressure and, taking into account the particular pressure limit, with a

single riser and a single pump system without using pressure regulators or pressure reducers.

According to the prior art (cf. Götsch, Enrico, Regelungs-

5 Varianten für Trinkwasser-Trennstationen von Hochhäusern,
published online on 06.05.2009 at "[http://www.gep-h2o.de/service/fachbibliothek/fachbeitrag-](http://www.gep-h2o.de/service/fachbibliothek/fachbeitrag-detail.html?beitrag_id=87)

detail.html?beitrag_id=87") such a solution is offered by a
system which in case of single section regulation when fire

10 water mode is triggered refers to a supply pressure value
stored for each floor which provides the required flow
pressure - 4.5 bar for example - at the desired extraction
point. If a fire water alarm is then triggered on the 20th
floor, for example, the pump then has to generate a supply
15 pressure of e.g. 15 bar to achieve the required 4.5 bar on
the 30th floor. If, on the other hand, a hydrant is actuated
in the underground car park, the pump need only produce a
supply pressure of e.g. 5 bar to achieve the same flow
pressure in the basement. The corresponding values are stored
20 and when an alarm is triggered on a given floor it is simply
necessary to retrieve the value for this floor. In practical
terms this is accomplished by means of speed-regulated pumps,
for example pumps with a frequency-regulated three-phase
drive.

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As is clear from the aforementioned example, however, the
disadvantage of this process lies in the fact that when
fighting a fire on the 20th floor a parallel supply pressure
of 15 bar also exists in the underground car park. If there
30 were then a fire event in the underground car park, the flow
pressure in the basement would thus significantly exceed the
maximum permissible flow pressure of 8 bar.

In systems of this kind, however, the problem is further complicated by fault detection. The detection of a fault in a water extraction station - generally a broken cable or short circuit in the water extraction station signal lines - should
5 cause the supply pressure to be set or adjusted to a level corresponding to the highest permissible flow pressure for that water extraction station since in such a case an alarm, i.e. water extraction, is likely to be triggered and the highest permissible supply pressure for this water extraction
10 therefore needs to be provided. This is logical because a fault of this type can sometimes be detected in case of fire where the fire has already been able to attack wiring, and thus the water extraction station signal lines, for example, before being detected directly - by means of smoke alarms,
15 for example. For this reason the detection of faults of this type indicates a possible fire for which the fire water supply can be prepared by adjusting the pressure accordingly such that if an alarm is subsequently triggered it is able to react immediately with the corresponding supply pressure.

20 It is particularly problematic, however, to set or adjust the water pressure such that, on one hand, the aforementioned (maximum permissible) height-dependent supply pressure available is sufficient if it is triggered, i.e. water is
25 extracted, and, on the other, anticipatory pressure adjustment is guaranteed by the detection of faults - in particular the identification of cable breaks and/or short circuits. This is difficult because the various events may be dependent on one another. Where, for example, a fire has
30 already been detected on the 8th floor and the fire water system has already been triggered, i.e. water has already been extracted on the 8th floor, such a fire can then clearly

lead to faults being detected on other floors, namely if it has attacked signal lines.

Against this background, and based on the prior art according
5 to the aforementioned publication by Götsch on 06.05.09, the
object of the invention is therefore to specify methods and
systems for water pressure regulation or control in a
pressure zone which allow the use of a cost-effective single
10 section system even in case of parallel water extraction on
different floors taking into account the maximum pressure
limits for the flow pressure and in so doing both guarantee
optimum fire fighting safety by aiming to comply with maximum
pressure limits and at the same time provide precautionary
water pressure adjustment by means of fault detection, in
15 particular the identification of cable breaks and short
circuits.

This object is achieved by means of a method for water
pressure regulation or control in a pressure zone according
20 to claim 1 in which, as in the aforementioned publication by
Götsch on 06.05.09, the flow pressure at the relevant
extraction station is adjusted following detection of water
extraction or a fault in the extraction station by setting
the highest permissible water supply pressure setpoint value
25 for this extraction station, wherein this is carried out at
least dependent on the geodetic height of the extraction
station by speed-controlling or speed-regulating a pump drive
containing the pump which supplies the extraction station
with water, which, however, is characterised in the invention
30 by the fact that

- where water extraction is detected at at least one
further extraction station

the new supply pressure is set to the highest permissible supply pressure setpoint value for this further extraction station at which water extraction has been detected;

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- where if a fault is detected at at least one further extraction station and water extraction has not already been detected,

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the new supply pressure is set to the lowest supply pressure setpoint value for all extraction stations at which a fault has been detected,

wherein any new supply pressure is also set at least

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dependent on the geodetic height (9) of the extraction stations (2, 2a) by speed-controlling or speed-regulating the pump drive containing the pump (4) which supplies the extraction stations (2, 2a) with water.

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Thus if further water extraction is detected, the new supply pressure is set to the highest permissible value for this further extraction station.

If on the other hand a fault - a broken cable or short

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circuit, for example - is detected subsequently and water extraction has not already been established (detected), the new supply pressure is set to the lowest pressure setpoint value for all extraction stations at which a fault has been detected.

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In this case the new supply pressure is set, for example, to the highest permissible supply pressure setpoint value for the lowest extraction station at which a fault has been

detected. Thus, if a fault is detected on the 50th floor, then on the 4th floor and then on the 3rd floor - in each case water extraction not having been already detected on any floor - and if the target flow pressure on each floor is 4.5 bar, according to the invention the supply pressure is adjusted such that it produces a flow pressure of 4.5 bar on the 3rd floor and a correspondingly lower flow pressure on the floors above it. Thus in the aforementioned example the fire water system can be operated such that when the fire event occurs in the underground car park the speed setpoint value for the pump drive can be pre-set such that the pump then only generates a pressure (supply pressure) at which the flow pressure in the underground car park is 8 bar instead of 15 bar. This knowingly takes into account the fact that the flow pressure for fire fighting falls on higher floors. Here the location of the subsequent water extraction takes priority over that of the earlier water extraction since it can be assumed in practice that in the meantime the fire fighting will have moved from the earlier to the subsequent water extraction location and that it is here that it is now necessary to guarantee fire fighting safety by readjusting the water pressure.

The method according to the invention also guarantees precautionary water pressure adjustment as a result of fault detection by setting a water pressure for the water extraction location which corresponds to the first fault discovered since it can be assumed that it is at - or at least close to - the source of a fire and that this is where subsequent fire fighting, i.e. water extraction, is likely to occur.

Nevertheless, the triggering of an alarm itself, i.e. water extraction, always takes priority over fault detection-based water pressure adjustment since it is at the water extraction location that the highest permissible flow pressure has to be provided to ensure the most effective fighting of any fire possible.

The speed of the pump drive can be pre-set by storing the characteristic curve of the pump - in the memory of a computer system used to carry out the method according to the invention, for example - and determining the relevant speed for each supply pressure setpoint value. In this case there is no need for a separate sensor for the pump pressure, i.e. the supply pressure (= operating pressure in the pressure zone). Alternatively, however, the supply pressure (i.e. the pressure generated by the pump in the pressure zone) can be measured by means of a pressure sensor and the speed setpoint value of the pump drive, for example, can be used as a control variable for the water pressure to be set.

The supply pressure is preferably set not only using the geodetic height but also dependent on pipe friction losses. This can be done by calibrating the water distribution system appropriately and by taking into account the values thus obtained in the supply pressure values stored for each floor.

Water extraction at one of the water extraction stations can be detected in various manners including, for example, by means of a measuring element which is triggered when a water extraction point is actuated by hand or alternatively by a measuring element which is triggered when a given water volume flow is reached and/or exceeded. A fault such as a short circuit or broken cable at a water extraction station

can also be detected by the measuring element associated with the water extraction station by the use of openers rather than closers.

- 5 If DIN 14462 is complied with, all measuring elements must be individually monitored for broken cables, short circuits and triggering, i.e. any manual actuation of a water extraction point or where a given water volume flow is reached and/or exceeded.

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As is conventionally usual, the pump (or more exactly the pump drive) can be speed controlled or speed regulated with a controlled - preferably brushless - DC drive as the pump drive. Today, however, a frequency-regulated three-phase
15 drive is generally preferred as the pump drive.

With the method for water pressure regulation or control in a pressure zone according to this invention where it is intended to reduce the pressure the supply pressure can be
20 set (at least in part) by opening a controlling element or regulating element, preferably a water release valve, or by operating a pressure reduction pump until the pressure reaches or falls below the new supply pressure.

- 25 As regards the deactivation of the method according to the invention for water pressure regulation or control in a pressure zone, it should be noted that once all water extraction and fault detection at the extraction stations has ceased the supply pressure is set to the setpoint value
30 corresponding to the highest permissible supply pressure of all extraction stations in the pressure zone (i.e. generally to the highest permissible supply pressure for the highest located extraction station). Thus if a building has, for

example, 20 floors and if the highest permissible pressure is, say, 20.5 bar for the 20th floor, the supply pressure in the pressure zone after all detection - both fault and water extraction detection - has ceased on all floors is adjusted to a 20.5 bar standby pressure so that in the most unfavourable case, say a fire on the 20th floor, sufficient flow pressure will be available at the extraction point there immediately.

In cases in which a particularly long riser is used - in tall high-rise blocks, for example - the method according to the invention described here can be problematic as, due to the hydrostatic head, the pressure in the riser becomes very high in the lower sections of the pipe. In such a case it is then difficult to ensure the reduction in supply pressure in the pipe required to reach the highest permissible flow pressure quickly by means of a release valve since the reduction in hydrostatic head - at least when using economically viable release valves - can take a certain time which may well be too long for the lower regions. In conventional systems which work with a plurality of pressure zones this problem does not generally occur as the building is divided up into various pressure zones with individual risers which are limited in terms of height.

In the case of this invention, therefore, the method according to the invention can be carried out by a pressure reduction device which is configured such that a water supply pipe, for example the riser, comprises at least one non-return valve that opens when the water is flowing upwards from the water pressure source to the water extraction point and almost closes in the opposite direction because it comprises an opening configured in such a way that the water

is able to pass through it in the opposite direction to the
aforementioned flow direction due to gravity in order to
release the region of the water supply pipe after the non-
return valve - seen in the upstream flow direction - from
5 pressure in excess of the pressure generated by gravity when
the non-return valve is closed. At the low compression factor
of water - $0.00021 \text{ m}^3/\text{m}^3 \text{ K}$ at 20°C - even a small, preferably
round hole in the valve with a diameter of preferably no more
than 10 mm, and particularly preferably no more than 5 mm, is
10 sufficient for the gravity-generated return flow of water to
reduce the water pressure very quickly. If the opening is
configured not as a round hole but rather as a bore, a
(roughly) corresponding surface area of the differently-
shaped opening cross-section corresponding to the round hole
15 replaces the opening size in specifying the diameter
dimensions.

If the water pipe, the riser for example, is longer, a
plurality of non-return valves spaced apart from one another
20 according to the invention can be provided which limit the
pressure generated by the hydrostatic head present in the
pipe in the their respective sections as they have only a
small opening facing the gravity-generated (return) flow.

25 For the sake of completeness it should also be mentioned that
the pressure reduction device according to the invention
described here can be realised not only using the method
according to the invention and the devices for carrying it
out described here but that it also represents, independently
30 of them, a separate invention for pressure reduction in
liquid-bearing pipes, in particular risers, since either
alone or spaced in sequence one behind the other in the pipe
the valves permit quick pressure reduction even without a

high outflow volume flow of the liquid, preferably the water, in the pipe.

All the embodiments of the method for water pressure
5 regulation or control in a pressure zone according to the
invention as described above can be operated on an
appropriately configured computer system, wherein the
computer preferably comprises interfaces for triggering the
actuators - here for pre-determining the speed setpoint value
10 for the pump drive - and/or for inputting measurement values
or sensor statuses - here measuring elements such as pressure
sensors, water flow meters or even extracting fitting
sensors, for example. The method according to the invention
can also take the form of a computer program on a data medium
15 or an electronic carrier signal for downloading, for example.

Using such a computer system and the corresponding measuring
and/or controlling elements (actuators and/or sensors) it is
possible to structure a water pressure regulation or control
20 system for the water pressure regulation or control of a
pressure zone according to the invention, namely a system
comprising a computer system which is configured as described
above and which also has detectors for detecting water
extraction or a fault in an extraction station which are
25 connected to the computer system via the interface for
connecting one or more detectors. Furthermore, in a system of
this type a pump is provided which supplies the extraction
stations with water and which comprises a pump drive the
speed of which can be pre-set via the interface for
30 outputting the speed setpoint value, wherein the computer
system is connected to the pump drive via the interface for
outputting the speed setpoint value. The system according to
the invention system preferably also has a pressure sensor

which measures the supply pressure (also known as the pump pressure), i.e. the operating pressure generated in the pressure zone by the pump.

- 5 The water pressure regulation or control system according to the invention preferably serves to regulate or control the water pressure of the process and/or drinking water supply in a high-rise building, i.e. preferably in a building in which the floor of at least one habitable room is more than 22 m
10 above the level of the ground (surrounding the high-rise building). In this arrangement the high-rise building particularly preferably comprises only one single pressure zone for supply, i.e. only one single riser for the process water supply and/or one single rise for the drinking water
15 supply. It should, however, also be mentioned that (like the method according to the invention) the system according to the invention can also be used in (particularly high) buildings comprising a plurality of pressure zones, namely when the building is too big for one single pressure zone,
20 i.e. the distance between two floors which are to be supplied in parallel without the pressure at the extraction point on the lower floor becoming too high is too great. In this case this invention permits a reduction in the number of pressure zones since it allows them to be dimensioned such that two
25 different floors can be supplied in parallel to one another without the pressure at the extraction point on the lower floor becoming too high or the pressure on the higher floor falling too low.
- 30 The use of the invention as a water pressure regulation and control system for fire water supply, preferably in a high-rise building, is however particularly preferable. In this case, too, the fire water network of the high-rise building

need have only one single pressure zone. If the zone becomes too big, however, the invention can also be used in this case at least to reduce the number of pressure zones as has already been explained above in relation to the case of its
5 use for process and/or drinking water supply.

A non-limiting embodiment is discussed below with reference to the drawings.

10 Fig. 1 shows a perspectively drawn front elevation of a 50-storey high-rise building with only one fire water pressure zone in which an embodiment of the invention is used.

15 Fig. 2 shows a longitudinal section through a riser with an embodiment of a pressure reduction device according to the invention.

Fig. 3 shows a longitudinal section through a riser with a
20 further embodiment of a pressure reduction device according to this invention.

Fig. 1 shows a perspectively drawn front elevation of a 50-storey high-rise building 1 with only one fire water pressure
25 zone using an embodiment of the invention. The high-rise building 1 comprises a basement with underground car park T and 50 floors OG of which only a certain number are shown individually.

30 Located on the individual floors OG are extraction stations 2 which are connected to a single common water pipe 3, 3a - designed as a riser 3 to the upper floors OG - via which the extraction stations 2 are supplied with water by a pump 4

located in the basement. The pump 4 comprises a speed-controlled pump drive which can be actuated by a computer system 5 via an interface for outputting a speed setpoint value 6. The computer system (the computer) 5 also has an interface for connecting detectors 7 for detecting water extraction at one of the extraction stations 2, 2a. This interface 7 is connected to the detectors at the extraction points 2, 2a via a signal line 8, 8a such that it can report the triggering of the detector to the computer system 5.

These signal lines 8, 8a are connected preferably in a star shape to the computer 5 and - particularly preferably - monitored for broken cables and/or short circuits. This is possible using an appropriate line monitoring module (for example, a module with a resistor network such as the line monitoring device manufactured by Walluszek GmbH, 01591 Riesa). As far as possible, the signal lines 8, 8a running in a star shape from the computer 5 to the detector are particularly preferably laid together in a cable harness or next to one another on a common cable rack such that a fire at one location will attack all the signal lines there simultaneously. If this happens a short circuit and/or a cable break, i.e. a fault, will be detected for all these lines. According to the invention, unless water extraction has previously been detected this causes the supply pressure to be adjusted to the lowest water pressure setpoint value of the extraction stations for which a fault has been detected. So, for example, if there is a fire between the second and third floors 2.0G, 3.0G, after a short time a fault will be reported for all signal lines above the 2nd floor as the fire there will attack all these lines and result either in a short circuit or (later) even a broken cable. However, initially at least the lines 8 running to the first and second floors 1.0G, 2.0G remain undamaged. The computer 5

operating in accordance with the method according to the invention then adjusts the supply pressure so that it corresponds to the supply pressure setpoint value corresponding to the lowest water pressure setpoint value of the extraction stations for which a fault has been detected. In this case the lowest water pressure setpoint value of an extraction station for which a fault has been detected is the water pressure setpoint value of the third floor 3.0G. The supply pressure is thus adjusted to this value and is then available for fire extinguishing work at this point. As an alternative to the conventional star-shaped configuration of signal lines with standard broken cable/short circuit monitoring it is of course also possible to use a more modern bus system that has active signal detectors and/or further active measuring elements, for example, which regularly reports its standby status to a central unit, e.g. the computer 5, via the bus. If - similar to a so-called "hold-to-run" switch - there is no standby signal for longer than a certain period to be specified there is a fault at this point - e.g. a broken cable, short circuit or signal detector failure. If the signal detector is also connected to the central unit via an additional second signal bus by means of another separate line, i.e. one laid along a different path, it is also possible to distinguish with considerable reliability whether the fault is on the line (a broken line or short circuit, for example) or on the detector. For example, if the detector reports on only one of the two signal lines the other line is faulty; if it reports on neither of the two - separately laid - lines there is probably a fault on the detector itself or a failure event (such as a fire) in the immediate vicinity of the detector.

There is also an extraction station 2a in the underground car park T in the basement. With appropriate programming in accordance with the method according to the invention, the computer system 5 is thus able to control or regulate the fire water system in the high-rise building 1 according to the invention.

When fire mode is triggered, a supply pressure (the water pressure generated by the pump in the pressure zone, also referred to as the pump pressure) stored for each floor which provides the required flow pressure - approximately 4.5 bar - at the desired extraction point 2, 2a is retrieved. If the fire water alarm is then triggered on the 50th floor 50.OG, for example, the pump 4 has to generate a supply pressure of some 20.5 bar to achieve the required 4.5 bar on the 50th floor 50.OG. If on the other hand a hydrant 2a in the underground car park T is actuated, the pump 4 need only produce a supply pressure of some 5 bar to achieve the same flow pressure of 4.5 bar in the basement. The relevant values are stored and if an alarm is triggered on a given floor OG the value for the floor in question need simply be retrieved by the computer 5 - from the (working and/or mass) memory - which then actuates the pump 4 accordingly by means of a speed value or, if there is already a correspondingly higher pressure, releases a release valve 11 until the pressure reaches or falls below the required level, at which point the pump is then returned to the required speed value.

If there were a subsequent fire event in the underground car park T after the fire event on the 50th floor 50.OG, the maximum permitted flow pressure of 8 bar in the basement would be significantly exceeded.

The invention then comes into action, not only setting the flow pressure at the relevant extraction station 2, 2a to the highest permissible water pressure setpoint value for this extraction station 2 following detection of water extraction

5 - by speed-controlling the pump drive containing the pump 4 which supplies the extraction station 2 with water via the riser 3 dependent on the geodetic height 9 of the extraction station 2 on the 50th floor 50.OG - but also, if water extraction is detected at a further extraction station 2a, in

10 this case the underground car park T - adjusting the flow pressure to the highest permissible value for this extraction station 2a at which (further) water extraction has been detected, wherein this is also done (at least) dependent on the geodetic height of the extraction stations 2, 2a by

15 speed-regulating the pump 4 and/or a release valve 11 and/or a pressure reduction pump (and thus by setting the supply pressure).

Here a non-return valve 10, preferably in the form of a flap

20 valve, is provided that opens when the water is flowing upwards from the water pressure source to the water extraction point and almost closes in the opposite direction thanks to an opening configured such that the water is able to pass through it in the opposite direction to the

25 aforementioned flow direction due to gravity in order to release the region water supply pipe after the non-return valve - seen in the upstream flow direction - from pressure in excess of the pressure generated by gravity when the non-return valve is closed. This allows the supply pressure,

30 initially built up for the extraction station on the 50th floor 50.OG, to be reduced quickly to the level of the underground car park T by means of a simple release valve

without the need to use expensive industrial valves with large cross-sections.

Thus the fire water system can be operated such that when the
5 fire event in the underground car park T occurs the speed
setpoint value for the pump drive is pre-set so that the pump
4 generates a pressure which results in a pressure of
approximately 8 bar instead of 15 bar in the underground car
park T. This knowingly takes into account a drop in the flow
10 pressure for fire fighting on the 50th floor 50. OG since it
is generally assumed that only one fire fighting location
will be active at a time.

Fig. 2 shows a longitudinal section through a riser 3 with an
15 embodiment of a pressure reduction device according to the
invention. The riser 3 (water supply pipe) comprises a non-
return valve 10 - in this case a cover 13 which can be moved
along a guide 12 axially along the water pipe 3 in a given
region - which opens when the water is flowing upwards in a
20 direction 14a from the water pressure source to the water
extraction point - the water supply pressure pressing the
cover 13 upwards against a post 12b thereby preventing the
section of the pipe 3 located in this direction - and almost
closes it in the opposite direction 14b - in which the cover
25 completely covers the section of the pipe in this direction -
by means of an opening 15 which is configured such that the
water is able to pass through it in the opposite direction
14b to the aforementioned flow direction 14a due to gravity
in order to release the region of the water supply pipe after
30 the non-return valve - seen in the upstream flow direction -
from pressure in excess of the pressure generated by gravity
when the non-return valve is closed.

Fig. 3 shows a longitudinal section through a riser 3 with a further embodiment of a pressure reduction device in accordance with the invention. It also shows a water supply pipe 3 (again a riser) which comprises a non-return valve 10 that opens when the water is flowing upwards in a direction 14a from the water pressure source to the water extraction point - namely by means of a flap valve 13a that is supported such that it is able to pivot about an axis 12c and here too is preferably pushed against a post 12b so that it opens less than 90° and its closure is always guaranteed by the water pressure - and almost closes in the opposite direction 14b - due to the water flowing downstream which pushes down the flap valve 13a which preferably does not open completely vertically - because it comprises an opening 15 configured such that the water is able to pass through it in the opposite direction 14b to the aforementioned flow direction 14a due to gravity in order to release the region of the water supply pipe 3 after the non-return valve 10 - seen in the upstream flow direction 14a - from pressure in excess of the pressure generated by gravity when the non-return valve 10 is closed.

Claims

1. Method for water pressure regulation or control in a pressure zone in which the flow pressure is adapted to the relevant extraction station (2, 2a) after detection of water extraction or a fault in the extraction station (2, 2a) by setting the highest permissible supply pressure setpoint value for this extraction station (2, 2a), wherein this is carried out at least dependent on the geodetic height (9) of the extraction station (2, 2a) by speed-controlling or speed-regulating a pump drive containing the pump (4) which supplies the extraction station (2, 2a) with water, characterised in that
- where water extraction is detected at at least one further extraction station (2, 2a) the new supply pressure is set to the highest permissible pressure setpoint value for this further extraction station (2, 2a) at which water extraction has been detected,
 - where a fault is detected at at least one further extraction station (2, 2a) and no water extraction has already been detected, the new supply pressure is set to the lowest supply pressure setpoint value for all extraction stations (2, 2a) at which a fault has been detected,
- wherein at least any new supply pressure is also set at least dependent on the geodetic height (9) of the extraction stations (2, 2a) by speed-controlling or speed regulating the pump drive containing the pump (4) which supplies the extraction stations (2, 2a) with water.

2. Method for water pressure regulation or control in a pressure zone according to claim 1, characterised in that the supply pressure is also set dependent on pipe friction losses.
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3. Method for water pressure regulation or control in a pressure zone according to claim 1 or 2, characterised in that water extraction at the extraction station (2, 2a) is detected by means of a measuring element that is triggered when an extraction point (2, 2a) is actuated manually.
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4. Method for water pressure regulation or control in a pressure zone according to claim 1, 2 or 3, characterized in that water extraction at the extraction station (2, 2a) is detected by means of a measuring element that is triggered when a given water volume flow is reached and/or exceeded.
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5. Method for water pressure regulation or control in a pressure zone according to one of claims 1 to 4, characterised in that the fault at the extraction station (2, 2a) is detected by identifying a broken cable.
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6. Method for water pressure regulation or control in a pressure zone according to one of claims 1 to 5, characterised in that the fault at the extraction station (2, 2a) is detected by identifying a short circuit.
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7. Method for water pressure regulation or control in a pressure zone according to one of claims 1 to 6,

characterised in that the speed control or speed regulation is carried out with a preferably brushless DC drive as the pump drive.

- 5 8. Method for water pressure regulation or control in a pressure zone according to one of claims 1 to 7, characterised in that speed control or speed regulation is carried out with a frequency-regulated drive as the pump drive.
- 10 9. Method for water pressure regulation or control in a pressure zone according to one of claims 1 to 8, characterised in that where it is intended to cause a pressure reduction the supply pressure is set in part at least by opening a controlling element or regulating
15 element, preferably a water release valve, or running a pressure reduction pump to reduce the pressure until the pressure reaches or falls below the new supply pressure.
- 20 10. Method for water pressure regulation or control in a pressure zone according to one of claims 1 to 9, characterised in that when all water extraction detection and all fault detection at the extraction stations (2, 2a) ceases, the supply pressure is set to the setpoint value corresponding to the highest permissible supply
25 pressure of all extraction stations in the pressure zone.
- 30 11. Computer system (5) comprising at least one data processing unit and at least one storage device and at least one interface for the connection of one or more detectors to detect water extraction or a fault at an extraction station (7) and an interface for outputting a speed setpoint value at a pump drive (6), characterized in that the program configuration of the data processing

unit is such that it operates in accordance with a method according to one of claims 1 to 10.

- 5 12. Computer system (5) according to claim 11, characterized in that the computer system also comprises an interface for connecting to a pressure sensor and that the program configuration of the data processing unit is such that it operates in accordance with a method according to one of claims 1 to 10.
- 10 13. Computer system (1) according to claim 11 or 12, characterised in that the computer system also comprises an interface for actuating a control element, preferably a release valve, and that the program configuration of the data processing unit is such that it operates in accordance with a method according to one of claims 1 to 10.
- 15 14. Water pressure regulation or control system for water pressure regulation or control of a pressure zone comprising a computer system (5) according to one of claims 11, 12 or 13 and detectors for detecting water extraction or a fault in an extraction station which are connected to the computer system (5) via the interface for connecting one or more detectors (7) and a pump (4) which supplies the extraction stations (2, 2a) with water with a pump drive the speed of which can be preset via the interface for outputting the speed setpoint value (6), whereby the computer system (5) is connected to the pump drive via the interface for outputting the speed setpoint value (6).
- 20 25 30 15. Water pressure regulation or control system for water pressure regulation or control of a pressure zone

according to claim 14, characterised in that the system also comprises a pressure sensor which measures the supply pressure.

- 5 16. Use of a water pressure regulation or control system according to claim 14 or 15 for the water pressure regulation or control of the process and/or drinking water supply a high-rise building (1).
- 10 17. Use of a water pressure regulation or control system according to claim 16, characterised in that the process water network of the high-rise building (1) has only one single pressure zone.
- 15 18. Use of a water pressure regulation or control system according to claim 16 or 17, characterised in that the drinking water network of the high-rise building (1) has only one single pressure zone.
- 20 19. Use of a water pressure regulation or control system according to claim 14 or 15 for the water pressure regulation or control of the fire water supply in a highrise building (1).
- 25 20. Use of a water pressure regulation or control system according to claim 19, characterised in that the fire water network of the high-rise building (1) has only one single pressure zone.

Abstract

Title: Method and system for carrying out closed-loop or open-loop control of the water pressure in a pressure zone
5 and device for carrying out and for operating same

Method for carrying out closed-loop or open-loop control of the water pressure in a pressure zone, in which method the flowing pressure is adaptive at the respective extraction
10 station (2, 2a) after detection of extraction of water or of a fault at the extraction station (2, 2a) by setting the maximum permissible supply pressure setpoint value for this extraction station (2, 2a), wherein this is done at least as a function of the geodetic height (9) of the extraction
15 station (2, 2a) by means of open-loop or closed-loop of the rotational speed of a pump drive, the pump (4) of which supplies the extraction station (2, 2a) with water, wherein, if it is detected that water is being extracted at at least one further extraction station (2, 2a), the new supply
20 pressure is set to the maximum permissible supply pressure setpoint value for this further extraction station (2, 2a) at which water extraction is detected, and if a fault is detected at at least one further extraction station (2, 2a) when previously no extraction of water was detected, the new
25 supply pressure is set to the lowest supply pressure setpoint value for all the extraction stations (2, 2a) at which a fault is detected, wherein any new supply pressure is also respectively set at least as a function of the geodetic height (9) of the respective extraction stations (2, 2a) by
30 means of the open-loop or closed-loop control of the rotational speed of the pump drive, the pump (4) of which drives supplies the extraction stations (2, 2a) with water, and a system based thereon together with a correspondingly

configured computer system and correspondingly operating computer program, if appropriate on a data carrier or carrier signal.

5 [Fig. 1]