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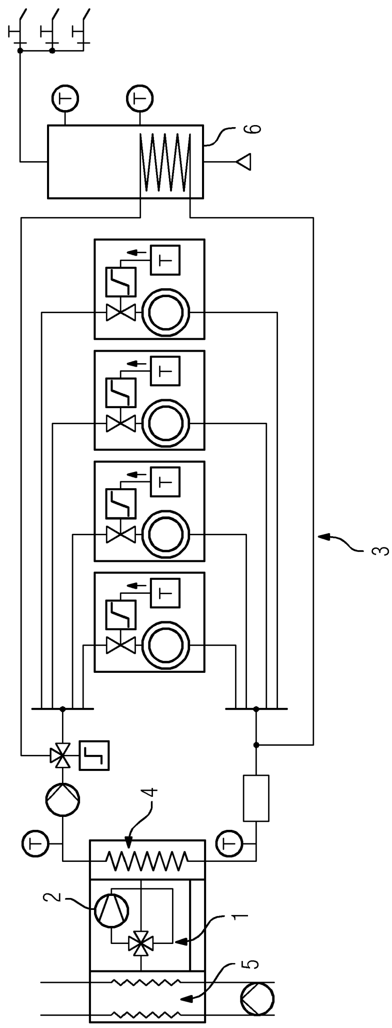
(54) Control of heating, ventilation, air conditioning

(57) Control of heating, ventilation, air conditioning. A method for control of a HVAC installation with a heat source (1, 2, 5), with a heat exchanger (4) and with a load circuit (3), the method comprising the steps of determining an extra flow of a medium through the load circuit to be added to the actual flow of a medium through the load circuit in order to maintain at least minimum flow of a medium through the load circuit, wherein either the extra flow of a medium through the load circuit is an additional flow of a medium through the load circuit of a HVAC installation due to a temperature set point of a HVAC installation being adjusted, or wherein the method comprises the step of changing a setting of the load circuit in order to allow said extra flow of a medium through the load circuit.



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Description

Backround

[0001] The present disclosure relates to a control device for heating, ventilation, air-conditioning installations. More particularly, the present disclosure focuses on a control device for an installation with no thermal buffer. The instant disclosure also relates to heating, ventilation, air-conditioning installations with such a control device.

[0002] Installations for heating, ventilation and / or air-conditioning (HVAC) frequently comprise a heat source such as a heat pump. A compressor of a heat pump compresses the refrigerant that circulates through a closed loop circuit.

[0003] A heat pump is commonly employed as a heat source in conjunction with a thermal buffer. The thermal buffer of a HVAC installation functions to ensure sufficient flow (of water) through a heat source. If the flow of the medium through the heat source drops below a minimum level, the heat source will experience frequent stop / start cycles. Those frequent stops and / or starts generally lower the overall efficiency of the HVAC installation. They may also result in (mechanical) failure of the heat source.

[0004] The flow of a medium through the load circuit of a HVAC installation is subjected to variations for reasons such as:

- A heating installation commonly comprises valves to transport heat to the various parts of a building. Typically separate valves are provided for each room of a building in order to control the amount of heat delivered to each room. These valves operate independently of the central unit of a heating installation. The flow of a medium through the load circuit thus depends on the status of each individual valve.

- If demand for heat drops, the flow on the return side of a radiator will increase. A mixing valve on the supply side of a radiator will then begin to shut off.

- In HVAC installations with multiple load circuits, each load circuit may require a different temperature on its supply side. Due to such differences in supply temperatures, the use of mixing valves proves advantageous. The load circuits run in accordance with their own schedules and in accordance with specific target temperatures and actual temperatures. Each circuit will thus generate a different flow. It follows that the flow through the heat pump of an installation changes depending on the parameters relevant to each load circuit.

- Certain installations may comprise multiple sources of heat such as heat pumps, gas-fired burners and / or oil-fired burners. Each heat source of an installation generates its own supply temperature. There are sources that deliver supply temperatures that are excessive for load circuits such as those in underfloor heating installations. Mixing valves will be required to overcome this issue. Mixing valves in installations with multiple heat sources also ensure the temperature of the boiler remains above a minimum temperature.

[0005] The above list provides, by way of non-limiting example, common causes of flow variations. A (special purpose) thermal buffer is normally added to HVAC installations to ensure continuous operation of the heat source. A thermal buffer does, however, increase

- the cost and the overall complexity of a HVAC installation,

- the size and the space requirements of a HVAC installation, and

- the losses of an installation due to thermal losses of the buffer. Especially at or near the minimum temperature of the thermal buffer, the buffer actually needs heating to maintain its temperature.

[0006] The present disclosure improves on control devices for HVAC installations. The instant disclosure aims at providing a control device that allows for HVAC installations without thermal buffers.

Summary

[0007] The present disclosure provides a control device which allows HVAC installations to operate without thermal buffers while avoiding disconnections of heat sources. A control device as per this disclosure is typically part of a heating, ventilation, air-conditioning installation. A control device in accordance with the instant disclosure may, in particular, be part of a system for central heating.

[0008] To that end, the control device as per this disclosure will avoid interruptions in the operation of a heat source by changing a setting of a load circuit of a HVAC installation. The control device may as well avoid disconnection of a heat source by changing a temperature setting of a HVAC installation. In general terms, the control device as per the present disclosure influences (the load side of) a HVAC installation so as to not interrupt the operation of a heat source.

[0009] The instant disclosure thus provides a method for control of a HVAC installation with a heat source, with a heat exchanger and with at least one load circuit in communication with the heat source through the heat exchanger, the method comprising the steps of determining a minimum amount of heat to be generated by the heat source required for continuous operation of the heat source , determining a minimum flow of a medium through the at least one load circuit, wherein said minimum flow suffices such that the heat source can generate its minimum amount of heat and such that the heat exchanger can transfer said minimum amount of heat from the heat source to the at least one load circuit, determining a critical flow of a medium through the at least one load circuit, wherein the critical flow is larger than the minimum flow of a medium through the at least one load circuit, measuring an actual flow of a medium through the at least one load circuit, determining whether said actual flow of a medium is less than the critical flow of a medium through the at least one load circuit, determining an extra flow of a medium through the at least one load circuit to be added to said actual flow of a medium through the at least one load circuit in order to maintain at least minimum flow of a medium through the at least one load circuit, wherein either the extra flow of a medium through the at least one load circuit is an additional flow of a medium through the at least one load circuit of a HVAC installation due to a temperature set point of a HVAC installation being adjusted, or wherein the method comprises the step of changing a setting of the at least one load circuit in order to allow said extra flow of a medium through the least one load circuit.

[0010] The instant disclosure also provides a device for control of a HVAC installation with a heat source, with a heat exchanger and with at least one load circuit in communication with the heat source through the heat exchanger, the device comprising means to determine a minimum amount of heat to be generated by the heat source required for continuous operation of the heat source, means to determine a minimum flow of a medium through the at least one load circuit, wherein said minimum flow suffices such that the heat source can generate its minimum amount of heat and such that the heat exchanger can transfer said minimum amount of heat from the heat source to the at least one load circuit, means to determine a critical flow of a medium through the at least one load circuit, wherein the critical flow is larger than the minimum flow of a medium through the at least one load circuit, wherein the device is configured to determine actual flow of a medium through the at least one load circuit, means to determine whether said actual flow of a medium is less than the critical flow of a medium through the at least one load circuit, means to determine an extra flow of a medium through the at least one load circuit to be added to said actual flow of a medium through the at least one load circuit in order to maintain at least minimum flow of a medium through the at least one load circuit, wherein either the control device further comprises means for adjustment of a temperature set point of a HVAC installation and the extra flow of a medium is an additional flow of a medium through the at least one load circuit of a HVAC installation due to adjustment of said temperature set point, or wherein the device is configured to change a setting of at the least one load circuit in order to generate said extra flow of a medium through the at least one load circuit.

[0011] The above problems are resolved by a control device and by a method according to the main claims of this disclosure. Preferred embodiments of the present disclosure are covered by the dependent claims.

[0012] The present disclosure further provides a control device for synchronous heat and / or cooling of the separate parts (rooms) of a commercial, residential or industrial building. The effect of synchronous heating and / or cooling is achieved by allowing all of the parts (all of the rooms) of a building to increase or decrease temperature in parallel. Due to synchronous heating and / or cooling a demand for heat will, in general, be large enough so as to avoid unnecessary starts and / or stops of a heat source.

[0013] The present disclosure further provides a heating and / or ventilation, and / or air-conditioning installation with a control device according to the instant disclosure.

[0014] The present disclosure further provides a building with a heating and / or ventilation, and / or air-conditioning installation with a control device according to the instant disclosure.

Brief description of the drawings

[0015] Various features will become apparent to those skilled in the art from the following detailed description of the disclosed non-limiting embodiments. The drawing that accompanies the detailed description can be briefly described as follows:

FIG 1 shows a heating, air-conditioning and / or ventilation installation with a heat source and with a load circuit.

Detailed description

[0016] The control device of the present disclosure is typically part of a heating, ventilation and / or air-conditioning (HVAC) installation. A HVAC installation as shown on Fig 1 comprises a closed loop heat source such as a heat pump. A suitable medium, especially a refrigerant, is circulated through the closed loop circuit 1. The medium may, by way of non-limiting example, be a R-401A, R-404A, R-406A, R-407A, R-407C, R-408A, R-409A, R-410A, R-438A, R-500, or R-502 blend.

[0017] The HVAC installation as shown on Fig 1 also provides a compressor 2. The compressor 2 may, by way of non-limiting example, be a scroll compressor or a screw compressor or a piston compressor. The compressor 2 is preferably disposed in the closed loop circuit 1. The compressor 2 compresses the medium circulated in the closed loop circuit 1.

[0018] The closed loop circuit 1 of Fig 1 also connects to a primary heat exchanger 5. The primary heat exchanger 5 commonly transfers heat to and / or from a reservoir such as outside air.

[0019] A HVAC installation as per Fig 1 also comprises one or several load circuits 3. These load circuits 3 may, by way of non-limiting example, be underfloor heating installations, central heating installations, (central) air-conditioning installations or combinations thereof. It is envisaged that the load circuits 3 and the closed loop circuit communicate through a heat exchanger 4. The heat exchanger 4 is preferably arranged in between the load circuits 3 and the closed loop circuit 1.

[0020] The elements 1, 2, and 5 as shown on Fig 1 make up a (positive or negative) heat source. Positive sources of heat feed heat into a HVAC installation. Negative sources of heat drain heat from a HVAC installation. It seems worth stressing that a heat source in accordance with the present disclosure needs not be a heat pump. According to alternate embodiments, a heat sources may, by way of non-limiting example, be a gas-fired burner, an oil-fired burner, a (nuclear) pressure vessel, a solid oxide fuel cell acting as a heat source, a cogeneration plant acting as a heat source, a (polymer electrolyte membrane) fuel cell acting as a heat source or similar. It seems worth stressing that solid oxide fuel cells and polymer electrolyte fuel cells in operation generate an amount of waste heat. It is envisaged to utilize the waste heat of a fuel cell for heating purposes.

[0021] It is also envisaged to combine several of the above heat sources into a heat source feeding an installation.

[0022] The load circuit 3 may, by way of another non-limiting example, be a radiator or a group of radiators. These radiators are typically disposed inside residential, commercial and / or industrial buildings. There may, in particular, be one load circuit 3 for each room of a building. In an alternate embodiment, one load circuit 3 provides heat and / or chilled air for several rooms of a building. In yet another embodiment, several load circuits 3 are arranged in accordance with the floors of a commercial, residential and / or industrial building.

[0023] A control device may start and / or stop (the operation of) the compressor 2. In doing so, the control device (provides means to) start(s) and / or stop(s) (the operation of) the heat source of a HVAC installation. Heat sources 1, 2, 5 in operation typically require the generation and delivery of a minimum amount of heat. This minimum amount of heat is then transferred via a heat exchanger 4 to a load circuit 3. The load circuit 3 finally absorbs the minimum amount of heat generated by the heat source 1, 2, 5. Should a heat source be unable to deliver a minimum amount of heat, the operation of the heat source 1, 2, 5 must discontinue.

[0024] The requirement of absorption of a minimum amount of heat by the load circuit 3 commonly translates into a minimum flow of a medium such as water through the load circuit 3. If the flow of the medium through load circuit 3 is less than a threshold value, the heat source 1, 2, 5 (the compressor 2) must stop. Likewise, the heat source 1, 2, 5 (the compressor 2) will start as soon as the flow of a medium exceeds a threshold value.

[0025] It seems worth stressing that the threshold values for starting and for stopping the heat source 1, 2, 5 (the compressor 2) need not be the same. The threshold value for stopping may actually be lower (in terms of medium flow) than the threshold value for starting. The difference between the threshold values introduces a hysteresis. That is, it will take an extra flow higher than the stop threshold to restart the heat source 1, 2, 5.

[0026] In a particular embodiment, the control device of the present disclosure is configured to delay the start and / or the stop of the heat source 1, 2, 5 of a HVAC installation. The delay preferably is a function of the magnitude of the extra flow of a medium through the load circuit 3. That is, the control device may actually delay the start of a compressor 2 and wait until the extra flow exceeds a given magnitude. The extra flow preferably exceeds a given threshold when the extra flow exceeds a start threshold. Even more particularly, the control device may be configured to dynamically alter the start threshold and / or the stop threshold of the heat source 1, 2, 5. The control device may, for instance, dynamically alter these thresholds in accordance with the magnitudes of the flow(s) through the load circuit(s) 3.

[0027] The control device of this disclosure is configured to check whether the flow of a medium through the load circuit 3 is higher or lower than a critical (threshold) value. The control device of the present disclosure may also be configured to determine whether the speed of any pump in the load circuit 3 is below a particular threshold value. This particular threshold value is a critical value that is higher than the stop threshold (i.e. minimum flow through the load circuit 3 due to the heat source 1, 2, 5 generating a minimum amount of heat). In other words, the control device of the present disclosure is configured to and / or provides means for determining whether the flow of a medium (through the load circuit 3) is less than a critical flow. That critical value may, for instance, be higher by 5 %, or by 10 %, or by 15 %, or by 20 %, or by 25 % than the stop threshold (than the minimum flow through the load circuit 3). The margin between the critical value and the stop threshold of the compressor is chosen such as to ensure reliable and / or continuous operation of the heat source 1, 2 5. The margin is, in particular, chosen such that the control device may commence corrective action prior to the speeds of any pumps in the load circuit 3 dropping below the stop threshold. In other words, the control device according to the present disclosure is configured to and / or provides means to determine and / or to measure whether the flow of a medium through the load circuit 3 is less than a critical flow. The critical flow preferably is larger than the minimum flow of a medium through the load circuit 3 of a HVAC installation.

[0028] The control device as per this disclosure may either provide a suitable data storage to store critical values and / or threshold values. Suitable data storage units include, but are not limited to, random access memory (RAM), magnetic RAM, read only memory (ROM), flash memory, EPROM memory, EEPROM memory, registers, a hard disk, a removable disk, other optical disks, a millipede® device. In alternate embodiment, the control device is configured to read critical values and / or threshold values from a driver module of a pump. The yet another embodiment, the control device is configured to write critical values and / or threshold values to a driver module of a pump. It is envisaged that the driver module comprises suitable data storage units as mentioned above.

[0029] In a preferred embodiment, the control device comprises a suitable analog and / or a digital processor configured to compare threshold values and / or critical flow values to actual values of medium flow through the load circuit 3.

[0030] In a particular embodiment, the heat source 1, 2 5 may start and / or stop its own operation. To that end, the heat source 1, 2 5, provides a driver module suitable to control its operation. It is also envisaged that the heat source 1, 2, 5 starts and / or stops as commanded by an external driver module. According to another embodiment, separate driver circuits start and / or stop the heat source 1, 2, 5. The driver module may actually be part of the control device of this disclosure.

[0031] Load circuits 3 frequently come with some sort of (local or remote) control. A valve may, for instance, control the amount of heat delivered by a radiator in a room. The valve may be set manually (by an operator). The valve may also be set by a thermostat, in particular by a smart thermostat. The valve may be set by a control device according to the present disclosure. The valve may further comprise a valve actuator. The valve actuator may, by way of non-limiting example, be a magnetic, a hydraulic and / or a pneumatic actuator.

[0032] In other words, it is envisaged that the control device of the present disclosure is configured to change a setting of at least one load circuit 3 of a HVAC installation. The at least one load circuit 3 of a HVAC installation and the heat source 1, 2, 5, may communicate with one another through a heat exchanger 4. A change in a setting of at least one load circuit 3 of a HVAC installation will thus result in a (positive or negative) demand for heat from the heat source 1, 2, 5. In accordance with a particular embodiment, a change of a setting of at least one load circuit 3 generates an extra flow of a medium through the load circuit 3.

[0033] It is also envisaged that one of the load circuits 3 of the HVAC installation connects to a thermal buffer 6 for drinking water. The buffer 6 may actually supply hot or chilled water. The thermal buffer preferably connects to a load circuit 3 through an additional heat exchanger. In an alternate embodiment, no heat exchanger is arranged in between the thermal buffer 6 and the load circuit 3. According to a particular embodiment, the thermal buffer 6 and the load circuit 3 are part of the same circuit.

[0034] It is further envisaged that the control device is configured to change a (temperature) setting of at least one thermal buffer 6, in particular a setting of at least one thermal buffer 6 for drinking water. The control device may, in particular, change a setting of the at least one thermal buffer 6, such that drinking water inside the thermal buffer 6 is heated. By heating (drinking) water inside the thermal buffer 6, an extra demand for heat from the heat source 1, 2, 5 is generated.

[0035] According to a special embodiment, the control device provides means and is configured to determine and / or to measure a flow of a medium through the load circuit 3. The flow of a medium may, by way of non-limiting example, be determined by measurement. To that end, a flow meter may be disposed in the load circuit 3. Further, a flow of a medium may, by way of another non-limiting example, be derived from the speed (number of revolutions per second) of any pump in the load circuit 3. A driver module of any pump(s) inside the load circuit 3 may, for instance, output its revolutions per second and send this information to the control device. The skilled person also understands that the flow of a medium may, by way of yet another non-limiting example, be calculated from temperature measurement(s). The temperature drop between different parts of the load circuit 3 may be a measure of medium flow. It is envisaged that the control device provides suitable analog to digital converters for conversion of measurement signals.

[0036] It is envisaged that the control device as per this disclosure comprises a suitable (analog or digital) processor to perform calculations as necessary. More particularly, a preferred embodiment provides a processor suitable for calculating differences such as differences between temperatures, for calculating rations such as ratios of medium flow, and / or for multiplying values. The above list of operations is nonexhaustive.

[0037] According to a particular embodiment, the control device is also configured to determine an extra flow of a medium to be added to the flow of a medium through the load circuit 3 in order to maintain at least minimum flow through the load circuit 3. This determination is preferably carried out by calculation. The determination of extra flow is preferably triggered by a drop in the flow of a medium below the aforementioned critical value. The control device preferably provides a timer to regularly compare the flow of a medium through the load circuit 3 to its critical value. To that end, the control device may, by way of non-limiting example, provide a watchdog timer or an interrupt timer.

[0038] Suppose the flow of a medium through the load circuit of a HVAC installation needs to rise from a (minimum) value X1 to another value X2. The increase in flow thus equals the difference between these values X2 - X1. In this example, the flow through the load circuit 3 needs to rise by a factor X2/X1. This factor is the same as the ratio between the two values X2/X1. In other words, the control device is configured to relate X2 to X1 and / or vice versa.

[0039] The control device of the instant disclosure thus comprises means and / or is configured to relate the flow X2 of a medium through the load circuit 3 to the minimum flow X1 required to transfer heat away from the heat source 1, 2, 5. In a particular embodiment, the control device of the instant disclosure thus comprises means and / or is configured to determine (calculate) the ratio X1/X2 between the minimum flow X1 of a medium through the load circuit 3 of a HVAC installation and the actual flow X2 of a medium through the load circuit 3 of a HVAC installation.

[0040] According to an aforementioned embodiment, the increase in flow is achieved by changing a setting (setting a valve) of a load circuit 3. In an alternate embodiment, an increase in flow is achieved by changing a temperature set point of a HVAC installation. The required change in temperature set point is calculated as follows:

Let T1 be the current temperature set point and let T2 be the current target temperature of a HVAC installation. The difference between these temperatures is (T1 - T2). The new temperature set point T3 then reads:

$$T3 = T2 + (T1 - T2) * (X1/X2).$$

[0041] The set point of the HVAC installation is thus adjusted (lowered) to T3 in order to maintain a flow X2 through the load circuit 3. In other words, there will be a (positive or negative) extra flow of a medium that is an additional flow (X2 - X1) through the load circuit 3 of a HVAC installation due to adjustment of a temperature set point from T1 to T3.

[0042] In other words, an embodiment of the control device of the present disclosure is configured to and / or provides means for adjustment of a temperature set point T1 by adding in a target temperature T2 of a HVAC installation. In a particular embodiment, the target temperature T2 is a room temperature. That is, the target temperature T2 relates to one of the load circuits 3. Even more particularly, the target temperature T2 is a room temperature of a room of a commercial, residential and / or industrial building. In yet another embodiment, the room temperature is a temperature of a group of rooms (on the same floor) of a commercial, residential and / or industrial building.

[0043] Further, an embodiment of the control device of the present disclosure is configured to and / or provides means for adjustment of a temperature set point T1 by factoring in the difference T1 - T2 between a target temperature T1, preferably a target supply temperature T1, of a HVAC installation and a target room temperature T2 of a HVAC installation.

[0044] Also, an embodiment of the control device of the present disclosure is configured to and / or provides means for adjustment of a temperature set point T1 by factoring in the difference T1 - T2 between a target temperature T1, preferably a target supply temperature T1, of a HVAC installation and a target room temperature T2 of a HVAC installation. The same embodiment of the control device of the present disclosure is configured and / or provides means for adjustment of a temperature set point T1 by multiplying said difference T1 - T2 with the ratio X1/X2 between the minimum flow X1 of a medium through the load circuit 3 and the flow X2 of a medium through the load circuit 3.

[0045] In yet another embodiment, the control device further comprises output means for sending a temperature set point to a HVAC installation. The temperature set point may, in particular, be sent to a valve of a radiator. The control device may, for instance, send a temperature set point to a HVAC installation by means of a suitable protocol such as KNX®, Modbus, LON (local operating network), and / or BACnet®. The control device may communicate through a suitable bus such as WLAN, KNX® RF, Enocean®, KNX® cables, and / or Ethernet® cables. None of the above lists is exhaustive.

[0046] According to yet another embodiment, the control device maintains minimum flow of a medium through the load circuit 3 by directly opening a valve (of a radiator). The control device may also maintain minimum flow of a medium through the load circuit by opening a valve of a buffer for drinking water.

[0047] It is also envisaged that the control device provides means to monitor temperatures in various parts of a building. In this particular situation, the control device is programmed to tolerate deviations of target temperatures of various rooms of a building. The control device may, by way of non-limiting examples, allow temperatures in the building to deviate by -/+ 0.1°C or by -/+ 0.2°C or by -/+ 0.5°C or by -/+ 1.0°C. In order to maintain minimum flow through the load circuit 3, the control device will thus allow temperatures to rise above target temperatures. This also means that the temperature targets and / or the flow targets of the load circuits that correspond to particular rooms will be set and / or controlled accordingly. In other words, the control device avoids frequent start / stop cycles by allowing room temperatures to vary by a certain degree.

[0048] It is envisaged that the control device runs an operating system. The operating system may, for instance, be an Android® operating system, a Windows® operating system, or a Linux® operating system such as Meego®. The operating system may be a system specifically tailored for embedded systems and / or for controllers for HVAC installations. The operating system may also be general-purpose.

[0049] Parts of the control device or parts of a method according to the present disclosure may be embodied in hardware, in a software module executed by a processor, or by a cloud computer, or by a combination thereof. The software may include a firmware, a hardware driver run in the operating system, or an application program. Thus, the disclosure also relates to a computer program product for performing the operations presented herein. If implemented in software, the functions described may be stored as one or more instructions on a computer-readable medium. Some examples of storage media that may be used include random access memory (RAM), magnetic RAM, read only memory (ROM), flash memory, EPROM memory, EEPROM memory, registers, a hard disk, a removable disk, other optical disks, a millipede® device, or any available media that can be accessed by a computer or any other IT equipment and appliance.

[0050] It should be understood that the foregoing relates only to certain embodiments of the invention and that numerous changes may be made therein without departing the scope of the invention as defined by the following claims. It should also be understood that the invention is not restricted to the illustrated embodiments and that various modifications can be made within the scope of the following claims.

Reference numerals

[0051]

1 closed loop circuit (refrigerant circuit)
2 compressor
3 load circuit
4 heat exchanger
5 primary heat exchanger.
6 thermal buffer for drinking water.

Claims

1. A method for control of a HVAC installation with a heat source (1, 2, 5), with a heat exchanger (4) and with at least one load circuit (3) in communication with the heat source (1, 2, 5) through the heat exchanger (4), the method comprising the steps of
determining a minimum amount of heat to be generated by the heat source (1, 2, 5) required for continuous operation of the heat source (1, 2, 5),
determining a minimum flow of a medium through the at least one load circuit (3), wherein said minimum flow suffices such that the heat source (1, 2, 5) can generate its minimum amount of heat and such that the heat exchanger (4) can transfer said minimum amount of heat from the heat source (1, 2, 5) to the at least one load circuit (3),
determining a critical flow of a medium through the at least one load circuit (3), wherein the critical flow is larger than the minimum flow of a medium through the at least one load circuit (3),
measuring an actual flow of a medium through the at least one load circuit (3),
determining whether said actual flow of a medium is less than the critical flow of a medium through the at least one load circuit (3),
determining an extra flow of a medium through the at least one load circuit (3) to be added to said actual flow of a medium through the at least one load circuit (3) in order to maintain at least minimum flow of a medium through the at least one load circuit (3),
wherein either the extra flow of a medium through the at least one load circuit (3) is an additional flow of a medium through the at least one load circuit (3) of a HVAC installation due to a temperature set point of a HVAC installation being adjusted,
or wherein the method comprises the step of changing a setting of the at least one load circuit (3) in order to allow said extra flow of a medium through the least one load circuit (3).

2. A device for control of a HVAC installation with a heat source (1, 2, 5), with a heat exchanger (4) and with at least one load circuit (3) in communication with the heat source (1, 2, 5) through the heat exchanger (4), the device comprising
means to determine a minimum amount of heat to be generated by the heat source (1, 2, 5) required for continuous operation of the heat source (1, 2, 5),
means to determine a minimum flow of a medium through the at least one load circuit (3), wherein said minimum flow suffices such that the heat source (1, 2, 5) can generate its minimum amount of heat and such that the heat exchanger (4) can transfer said minimum amount of heat from the heat source (1, 2, 5) to the at least one load circuit

(3),
means to determine a critical flow of a medium through the at least one load circuit (3), wherein the critical flow is larger than the minimum flow of a medium through the at least one load circuit (3),
wherein the device is configured to determine actual flow of a medium through the at least one load circuit (3),
means to determine whether said actual flow of a medium is less than the critical flow of a medium through the at least one load circuit (3),
means to determine an extra flow of a medium through the at least one load circuit (3) to be added to said actual flow of a medium through the at least one load circuit (3) in order to maintain at least minimum flow of a medium through the at least one load circuit (3),
wherein either the control device further comprises means for adjustment of a temperature set point of a HVAC installation and the extra flow of a medium is an additional flow of a medium through the at least one load circuit (3) of a HVAC installation due to adjustment of said temperature set point,
or wherein the device is configured to change a setting of at the least one load circuit (3) in order to generate said extra flow of a medium through the at least one load circuit (3).

3. The device according to claim 2, wherein the device comprises means for adjustment of a temperature set point by lowering the temperature set point.

4. The device according to any of the claims 2 or 3, wherein the device comprises means for adjustment of a temperature set point by relating the minimum flow of a medium through the at least one load circuit (3) to the actual flow of a medium through the at least one load circuit (3).

5. The device according to claim 4, wherein the device comprises means for adjustment of a temperature set point by determination of the ratio between the minimum flow of a medium through the at least one load circuit (3) and the actual flow of a medium through the at least one load circuit (3).

6. The device according to any of the claims 3 to 5, wherein the device comprises means for adjustment of a temperature set point by addition of a target temperature of a HVAC installation.

7. The device according to claim 6, wherein the device comprises means for adjustment of a temperature set point by addition of a target temperature of a HVAC installation and wherein said target temperature is a target room temperature.

8. The device according to any of the claims 3 to 7, wherein the device comprises means for adjustment of a temperature set point by factoring in the difference between a target temperature of a HVAC installation and a target room temperature of a HVAC installation.

9. The device according to any of the claims 3 to 8, wherein the device comprises means for adjustment of a temperature set point by factoring in the difference between a target temperature of a HVAC installation and a target room temperature of a HVAC installation and by multiplication of said difference with the ratio between the minimum flow of a medium through the at least one load circuit (3) and the actual flow of a medium through the at least one load circuit (3).

10. The device according to any of the claims 2 to 9, wherein the control device further comprises output means for sending a temperature set point to a HVAC installation.

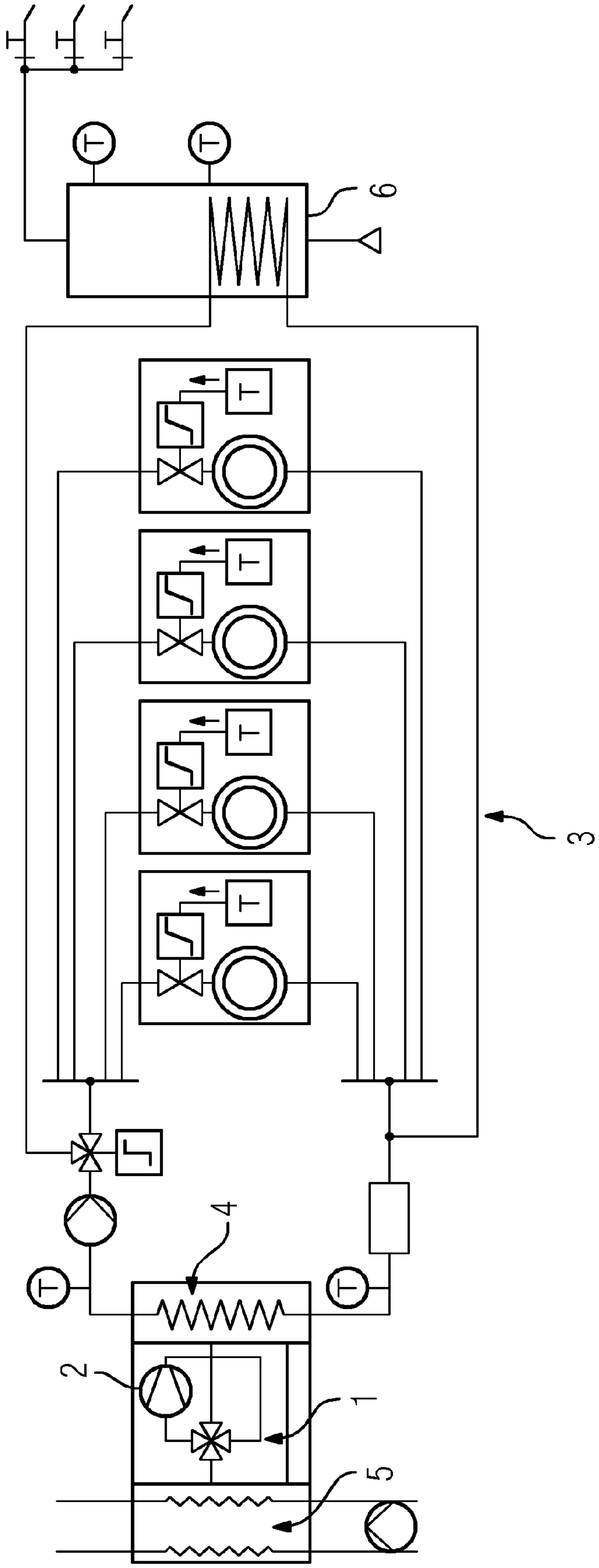
11. The device according to any of the claims 2 to 10, wherein the control device further comprises a driver module configured to start and / or to stop the operation of the heat source (1, 2, 5).

12. The device according to claim 11, wherein the means are configured to delay the start and / or the stop of the heat source (1, 2, 5) of a HVAC installation in accordance with the magnitude of the extra flow of a medium.

13. The device according to claim 2, wherein the at least one load circuit (3) is a buffer for chilled or hot water, in particular drinking water.

14. A HVAC installation with a control device according to any of the claims 2 to 13.

15. A HVAC installation according to claim 14 providing at least one fuel cell and / or at least one cogeneration plant as a heat source.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EUROPEAN SEARCH REPORT

Application Number
EP 15 16 1676

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The present search report has been drawn up for all claims

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Place of search	Date of completion of the search	Examiner
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CATEGORY OF CITED DOCUMENTS

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