Title: DEVICE FOR THE CONTROL OF A CLIMATE EQUIPMENT

Abstract: The present invention concerns a device for the control of heating/cooling system and/or another climate equipment, wherein, for the increase or decrease of the heat or the cold provided by means of the equipment, the temperature sensors of the equipment are coupled to the climate equipment via a number of heat-actuatable NTC resistances with adjacent heater elements for the supply of heat via an electrically insulating and heat conducting barrier for galvanically separated connection and control.
Device for the control of a climate equipment

The present invention concerns a device according to the preamble of claim 1.

Many heating/cooling systems, or another climate equipment according to drawing figure 1, lack the possibility of external control of temperature or are limited to a great extent.

The object of the present invention is to enable the desired control.

This is achieved by the device mentioned by way of introduction being given the features of claim 1.

The present invention will in the following be described in more detail, reference being made to the appended drawings. Fig. 1 shows a diagram of a climate equipment for heating or cooling. Fig. 2 shows a diagram of an embodiment of the present invention. Fig. 3 shows a diagram of a further embodiment of the present invention. Fig. 4 shows a diagram of yet an embodiment of the present invention.

The climate equipment may comprise a boiler or heat pump for the heating of a number of spaces, to which the heat is transported by air or water

The control may be based on hourly energy prices, control from external decision systems, set threshold values, or on fixed instants of time.

The equipment is connected so that its control equipment actuates the temperature sensors of the heating or cooling system in the desired direction depending on whether the heat/cold should be increased or decreased.
The equipment actuates the temperature sensors by parallelly or serially connecting NTC resistors, which are heated to the desired resistance by means of some type of heater element, e.g. a resistance. This allows galvanic isolated connection to the heating or cooling system.

Many existing heating/cooling systems according to drawing figure 1 have no or limited abilities to control the temperature via external signals or based on instant of time. Such a control may be desired to get a comfortable climate depending on whether it, for instance, is night or day or based on activity in the affected areas.

In hourly energy pricing, for the economy to become as favourable as possible, it is desirable to be able to actuate the heating/cooling system by letting the system work when the energy is the most inexpensive and hold back when it is more expensive. Since a climate system is inert, it is possible to accumulate, for instance, heat.

The problem is to be able to actuate a heating/cooling system without replacing its control system or reconstructing the same. In certain cases, this is not possible, and in others, this would generate large costs. Also, warranty on equipment could be affected.

Most heating/cooling systems 1 have an external temperature sensor 2, which co-operates with the control curve of the system to deliver the correct amount of heat or cold. See drawing figure 1. By actuating the external temperature sensor 2, the control curve of the heating/cooling system 1 can be affected by letting the system believe that it is warmer or colder than what it really is.

In order for the control system of the heating/cooling system 1 not to be electrically affected, one has to actuate the temperature sensor 2 in a galvanically isolated way. Then, no
detrimental potential differences or earth currents can arise, which could damage the control system.

Galvanic connection to the temperature sensor 2 may either be
effected thermally by creating an affected climatic zone around
the temperature sensor 2 or by resistive connection to the
sensor 2.

An affected climatic zone around the sensor 2 may be created by
containing the sensor 2 in an enclosure where the air either is
heated or cooled in relation to the surroundings outside the
enclosure.

A resistive connection to the sensor 2 can be made either by
serial or parallel connection of resistors 3 and 4, as is
illustrated in the drawing figures 2-4. Then the system can be
actuated with both increased and decreased temperature as a
consequence.

The resistors 3 and 4 may be of fixed values selected to fit the
temperature sensor 2 of the system in question as well as
selected actuation of the same.

The resistors 3 and 4 may also be adjustable to fit a plurality
of types of heating/cooling systems 2 as well as to actuate the
same to different extents.

The adjustable resistors 3 and 4 may either be light-actuated,
which are set to the desired resistance by illuminating the same
with an adapted amount of light, or heat-actuated by means of
elements 5 and 6, which are set to the desired resistance by
heating the resistors 3 and 4 with an adapted power by means of
a control system 7. See drawing figure 2.

The resistors 3 and 4 are NTC resistors, which are heated to the
desired resistance by means of some type of heater element 5 and
6, e.g. a resistance. This allows galvanic isolated connection
to the heating or cooling system 1. The resistors 3 and 4 may
also be PCT resistors or resistances. The NTC resistors have a negative gradient while the PTC resistors have a positive gradient.

5 For the connection and disconnection of the regulating resistances 3 and 4, relays 8 and 9 may be used. See drawing figure 4. Relays may also be used for the selection of different resistor values.

10 The regulating function can be operated via an external decision system 10.

The external system 10 may be a database including, for instance, hourly energy prices in combination with customer-set threshold values and desires of the regulating function. See drawing figure 3.

The communication with the external system 10 may, for instance, be effected via Ethernet or 3G/GSM/GPRS.
5 CLAIMS

1. Device for the control of heating/cooling system and/or another climate equipment, characterized in that, for the increase or decrease of the heat or the cold provided by means of the equipment, the temperature sensors of the equipment are coupled to the climate equipment via a number of heat-actuatable NTC resistances with adjacent heater elements for the supply of heat via an electrically insulating and heat conducting barrier for galvanically separated connection and control.

2. Device according to claim 1, characterized in that the resistances are connectable and disconnectable by means of relays for serial connection and parallel connection of one or more resistances.
Fig 1

Fig 2
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: F24D, F24F, F24H, G01 K, G05D, H05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data, COMPENDEX, EMBASE, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>EP 192781 2 A2 (TECHEM ENERGY SERVICES GMBH), 4 June 2008 (2008-06-04); abstract; paragraphs [0005]-[0008], [0012], [0014]-[0019], [0060]; figures</td>
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<td>A</td>
<td>EP 2093644 A2 (TECHEM ENERGY SERVICES GMBH), 26 August 2009 (2009-08-26); abstract; figure 1</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

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G05D 23/32 (2006.01)
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