ecos 5 climate package

Manual

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SAUTER

Creating Sustainable Environments.

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List of changes

Date	Rev./Ver. issue	Change	Chapter	Page
11/04/2014	A	New document		

1 Introduction

In the past, climate or temperature control often only meant the immediate actuation of a heating or cooling valve to regulate room temperature, or doing the same via a thermostat. Constantly increasing energy prices, however, have drastically changed our requirements for dealing with heating and cooling energy. Energy efficiency plays an ever more important role; modern buildings need to attain the best possible energy efficiency or energy efficiency class.

To this end, in addition to precise temperature control, information regarding whether windows in the room are opened, the room occupancy and the outside temperature/season must also be taken into account. The SAUTER climate package fulfils these requirements.

2 Explanation of basic terms

2.1 Occupancy management

Occupancy management is used to evaluate information from connected room control units, occupancy detectors and the occupancy schedule and the occupancy status for the room – “present” or “absent” – is determined.

During the typical occupancy period of the room as mapped by the occupancy schedule, the room user can switch between “present” and “absent” by manual operation of the room control unit.

Outside of the occupancy period, the room user can also switch to “absent” or “present” using the room control unit. After a fixed time delay, however, it is automatically switched back to “absent”.

When an occupancy detector is used and occupancy is detected, it is immediately switched to “occupied” or “present”. After a fixed time delay and if the occupancy signal ceases, the system switches back to “unoccupied”. This happens independently of the occupancy period profile.

For occupancy detection, i.e. whether people are currently in the room, either the occupancy detector or the occupancy period profile is used in conjunction with the room control unit.

2.2 Energy level selection

The energy level selection allows an optimum temperature setpoint to be set for each room depending on usage, occupancy and window state. Occupancy, which is usually detected by a motion detector, and the time program for a room (occupancy period profile), which maps the typical usage period, play an important role.

This means that the energy level selection has a significant effect on energy efficiency. Instead of, for example, keeping the room at a comfortable temperature constantly and regardless of usage, the setpoints of the setpoint calculationfunction vary according to usage type, room type and room occupancy planning (see VDI 3813, sheet 1, section 7).

The occupancy period profile ensures that the system switches to the energy level with the appropriate setpoints for the heating and cooling modes. Outside of the occupancy period, the energy level is set to ECONOMY; within the occupancy period, it is set to PRE COMFORT. After occupancy detection and within the occupancy period, the system switches immediately from PRE COMFORT to COMFORT. In ECONOMY mode, i.e. outside the occupancy period, there must be occupancy detection during a definable period to ensure that the system switches to COMFORT mode. If the system is not to be permitted to activate COMFORT mode outside the occupancy period, this definable period must be set to a very large value, e.g. 24 hours.

This function is particularly important when the operating times of the heating and cooling are well above the average occupancy period of the room in question, e.g. due to flexitime or several separately leased areas. In this manner, up to 10% of heating and cooling energy for the building can be saved. In modern buildings with a lighter construction, the low storage ability of the building material makes this effect much more pronounced.

The following energy levels are possible in the SAUTER climate package:

- COMFORT (comfort level)
- PRE COMFORT (standby level)
- ECONOMY (reduced level)
- PROTECTION (building protection level)

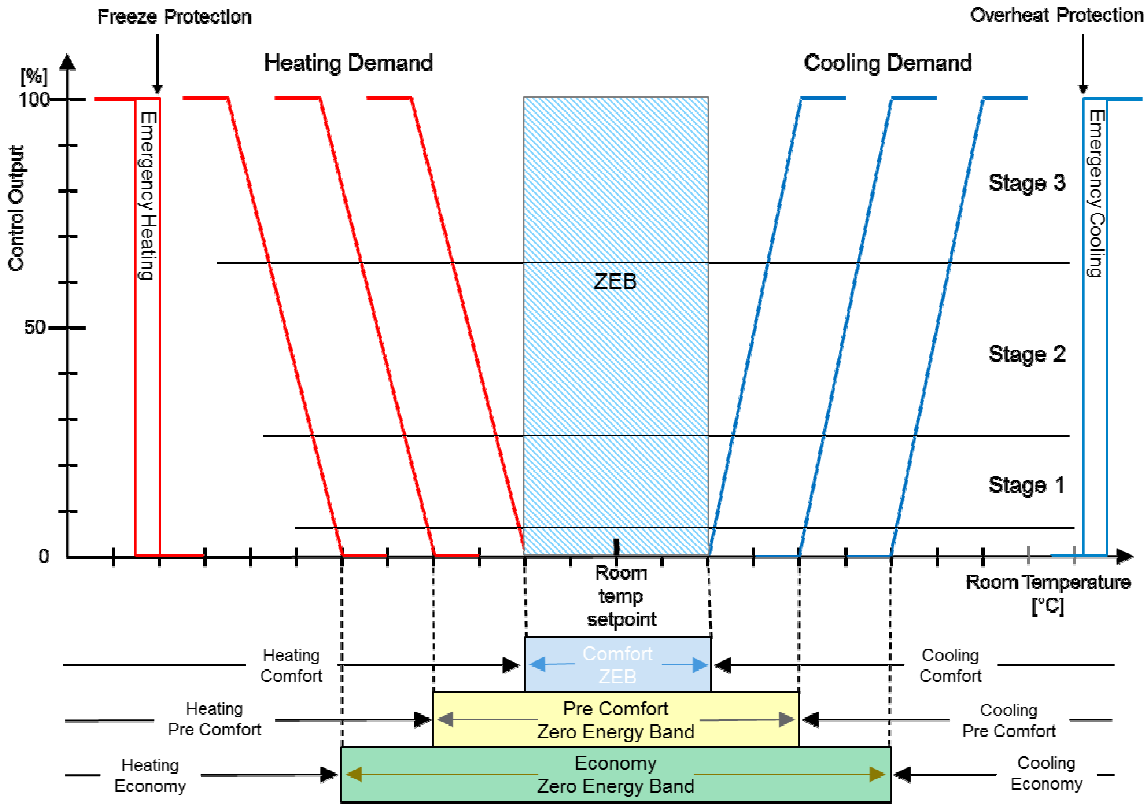

Fig. 1: Setpoint pairs for different energy levels

The difference between the comfort setpoints for heating and cooling is determined by the zero energy band (ZEB). It prevents a smooth transmission between heating and cooling modes. The temperature specified by the operator according to VDI 3813 corresponds to the centre of the zero energy band between the comfort setpoints for heating and cooling.

2.3 COMFORT

Comfort mode is set when rooms are occupied and windows are closed and is intended to attain a feel-good temperature for the room user(s). The temperature setpoint is comprised of a basic setpoint and a temperature offset. The setpoint correction can usually be set directly by the room user by means of the room control unit and is intended to satisfy individual users' heat requirements. The setpoint is also adapted to the season; this is referred to as summer compensation.

Switching to Comfort mode is – in addition to the option of a time program – always attained by logging on in the room or by occupancy detection.

2.4 Summer compensation

Summer compensation increases the setpoint for temperature control at high outside temperatures in a gradual manner to ensure that there is no large difference between inside and outside temperatures. This ensures that the room users do not get a "cold shock" when they enter. On hot summer days, for example, we would consider a room temperature of 20 ℃ to be very cool, in part becau se we are not dressed very warmly.

In general, this gradual increase starts at an outside temperature of 25 ℃ and ends at an outside temperature of 32 ℃. Within this temperatu re range, the room-temperature setpoint is increased in a linear manner by 5 K.

Summer compensation increases the comfort in the room while also reducing the energy requirement to cool the building.

2.5 PRE COMFORT

In Pre Comfort mode, less energy is used than with the Comfort mode, but still somewhat more than in Economy mode. This mode is maintained during the usage time of a room (via the time program) as long as the room is not occupied. This ensures that once the room is occupied, Comfort mode can be attained again quite quickly. During heating mode, this means a slight reduction in room temperature; during cooling mode, it means a slight increase.

The setpoint correction set on the room control unit affects – as in Comfort mode – the temperature setpoint in accordance with the requirements of the room's user(s).

2.6 ECONOMY

Economy mode is an energy-saving mode for the room when it is not used for a longer period, e.g. over night. This phase prevents the rooms from becoming too cold in winter or too hot in summer, however.

The setpoint correction set on the room control unit does not affect the temperature setpoint in Economy mode.

2.7 PROTECTION

Protection mode ensures that the room only receives enough energy to prevent damage to the structure of the building. For heating mode, this means that frost protection is guaranteed in order to prevent heating pipes from freezing in winter. In cooling mode, it guarantees that the room does not overheat.

This energy level is set when the window is open.

2.8 Night cooling

With night cooling, cooler outside air is conducted into the room in summer months and stored in the peripheries in order to provide a pleasant room climate the following day – where possible without the additional of active cooling energy. The aim is to compensate for daytime heat input during the night. A distinction is made between passive or free night cooling using cross ventilation via open windows or façade louvres, and active night cooling with mechanical support.

The function is ended automatically as soon as the room air has reached either the outside air temperature or the comfort setpoint for the heating mode.

Activation is controlled by a time program and usually takes place outside the occupancy period.

3 Customer benefits

The SAUTER climate package guarantees very efficient usage of heating/cooling energy by means of optimum climate management. Energy is only conducted into rooms when it is required. While rooms are empty, the energy level is reduced to a minimum. By taking user behaviour into account, the system ensures that optimum room comfort is attained as soon as possible after users enter a room.

Furthermore, the SAUTER climate package supports demand-led provision of primary energy. The SAUTER climate package allows customers to attain the maximum energy efficiency class for their buildings.

Summer compensation demonstrates impressively that comfort and energy savings do not have to be in conflict with one another.

4 Climate package solutions from SAUTER

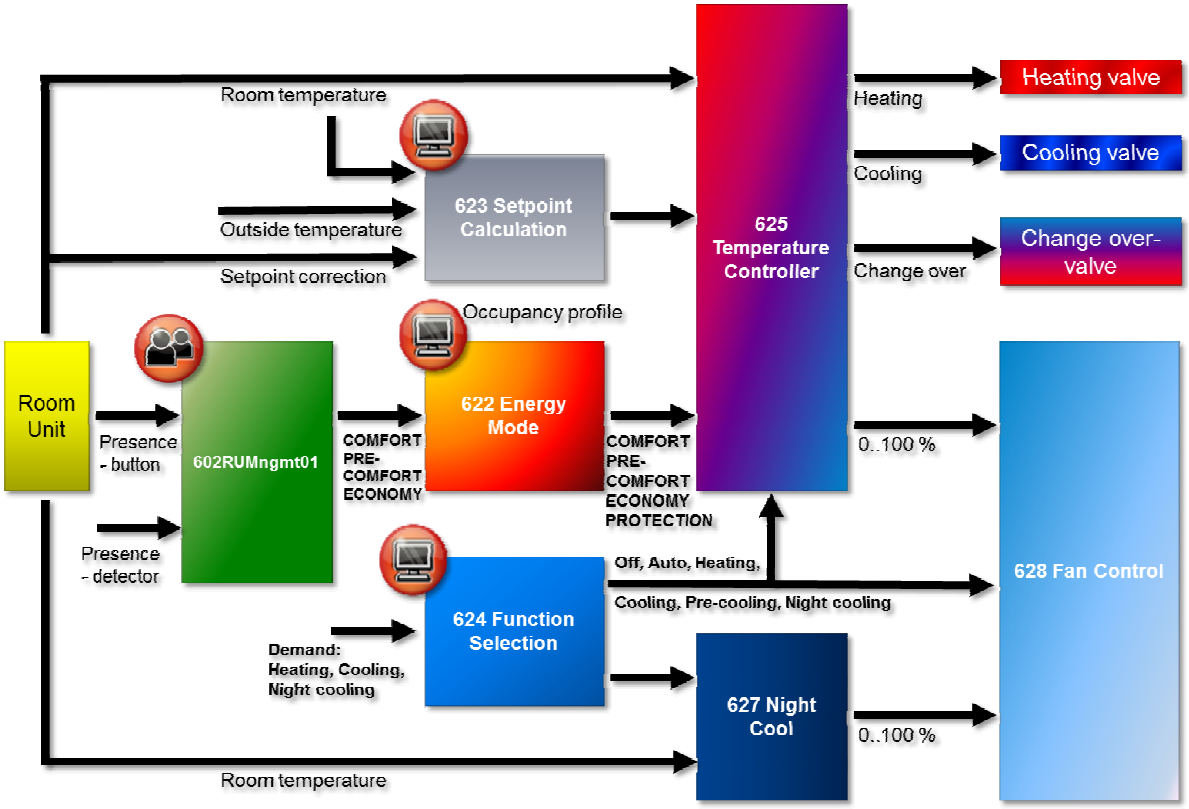

Fig. 2: Climate package block diagram from SAUTER

A central feature of the SAUTER climate package is the temperature control, which receives the room temperature as an actual control value from the room control unit or a temperature sensor. Temperature control has a direct effect on the valves that control the energy flow to heat or cool the room. Furthermore, existing ventilators are actuated according to needs.

The room user can use the control buttons or rotary knob on the room control unit to actively lower or raise the room temperature for the setpoint correction (dXs) in order to attain his or her feel-good temperature.

Setpoint calculation provides the setpoints for Comfort, Pre Comfort and Economy mode as well as building protection, taking the defined setpoint correction into account. The outside temperature should also be taken into account here. The basic setpoints stored, e.g. for the room temperature, can be adapted using the management level if, for example, a room user complains about a room being too cold.

The upstream energy level selection allows an optimum temperature setpoint to be set for each room depending on usage, occupancy and window state. Occupancy management supplies the occupancy state of the room.

The function selection determines the possible climate functions. It can be controlled actively via the management level:

Off:
Only the building protection is active, for example in order to prevent the heating from freezing or a room becoming too hot.

Auto:
Automatic selection of the climate function.

Heating:
Pure heating mode, no cooling.

Cooling:
Pure cooling mode, no heating.

Pre-cooling:
Pre-cooling only is active.

Night-cooling:
Night cooling only is active.

Note Building protection is always activated.

During warm summer nights, night cooling conducts cold outside air into the room once a fixed temperature difference is reached or exceeded, reducing the cooling energy that needs to be generated the next day.

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Im Surinam 55
CH-4016 Basel
Tel. +41 61 - 695 55 55
Fax +41 61 - 695 55 10
www.sauter-controls.com
info@sauter-controls.com

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