Ventimat (ventilation automation)

In this mode the controller applies power to a device that brings and removes heat from a room, typically a fan. Mode is suitable when the temperature outside the room fluctuates (daily or seasonally), so that the room can be heated with warmer air from outside and cooled with colder air from outside when possible.

This mode contains two differential thermostats: one for lower and another for upper threshold to maintain desired temperature of the room in-between. Threshold values are *Start T* (T_{start}) – lower threshold – and *Stop T* (T_{stop}) – upper threshold. Final end values are *Heat to* (T_{heat_to}) and *Cool to* (T_{cool_to}). These values are set in device configuration menu.

Operation

Temperature probe A measures room temperature T_A and probe B outside temperature T_B. Turn on and off values of hysteresis (Δ_{ON} and Δ_{OFF}) are derived from values $\triangle 1$ and $\triangle 2$ as minimal and maximal value (more on this in controller manual). The controller operates as follows.

Cooling

When the measured temperature inside the room T_A rises above upper threshold value T_{stop} (point C on Figure 1) it activates relay output once the difference between measured room temperature T_A and measured outside temperature, i.e. $T_A - T_B$, is above or equal to Δ_{ON} degrees (point A on Figure 2). The relay deactivates when the difference is less or is equal to Δ_{OFF} (point B on Figure 2).

Once the measured temperature inside the room is less or equal to T_{cool_to} (room is cold enough – point D on Figure 1), the relay deactivates and will not be activated until T_A rises above T_{stop} again (point E on Figure 1) regardless of the difference $T_A - T_B$.
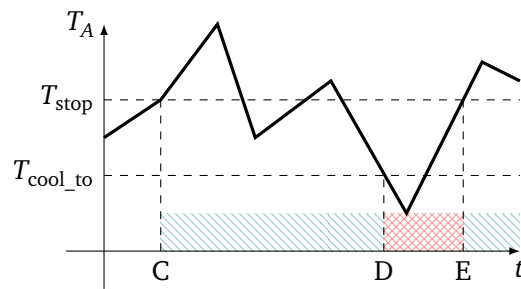

Figure 1: Output relay state (red crosshatch band) deactivates once $T_A < T_{cool\_to}$
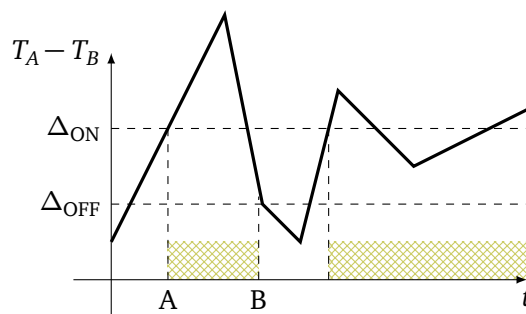

Figure 2: Output relay state (olive crosshatch band) when operating in teal band (Figure 1)

Heating

When the measured temperature inside the room T_A falls below lower threshold value T_{start} it activates relay output once the difference between measured outside temperature T_B and measured room temperature, i.e. $T_B - T_A$, is above or equal to Δ_{ON} degrees. The relay deactivates when the difference is less or is equal to Δ_{OFF}. Once the measured temperature inside the room is greater or equal to T_{heat_to}, the relay will not be activated until T_A falls above T_{start} again.

Diagrams are just mirrored copy over t-axis.

Configuration

Values (controller configuration) is properly set when the following is true:

$$T_{\text{start}} < T_{\text{cool\_to}} \leq T_{\text{heat\_to}} < T_{\text{stop}} \quad \text{or} \quad T_{\text{start}} < T_{\text{heat\_to}} \leq T_{\text{cool\_to}} < T_{\text{stop}}$$

Note: Start T (T_{start}) must be always less than Stop T (T_{stop})! But $T_{\text{cool\_to}}$ could be lower than $T_{\text{heat\_to}}$ to achieve lower temperatures in summer[1] and higher temperature in winter.

Values are set in controller configuration as given in controller manual.

Difference settings $\triangle 1$ are $\triangle 2$ could be as small as 2 and 4 °C and are usually obtained experimentally.

Installation

Temperature sensors must be protected from direct sunlight to obtain proper measurements of air temperature.

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[1]As we know it in the northern hemisphere between May and September.