

How to save energy and money with outdoor reset control

There is a need nowadays to achieve maximum energy savings while retaining a high level of people's comfort.

This article explains how this can be done in hot water heating systems, by installing an outdoor reset controller. The percentage savings are the same whether in a commercial building or a single family home. The savings shown assume that the exterior walls have decent insulation and the windows are of good quality.

Most heating systems are controlled by on-off thermostats activating zone valves or pumps. These thermostats are not able to provide maximum energy savings because a) they are not accurate enough and b) they are reactive. Even after they turn off, the thermal mass of the heating system will tend to overheat the space.

An outdoor reset controller, on the other hand, anticipates what is going to happen inside the building by constantly monitoring changes in the outdoor temperature. Based on this information, the controller adjusts the heating water temperature according to a reset curve. Colder outside - higher water temperature, milder outside - lower water temperature.

This results in a much more accurate indoor climate that does not overheat. By maintaining a more stable temperature the indoors can typically be kept a couple of degrees cooler without discomfort. **For each degree reduction over a season, we get 2.5% energy savings.** But that is only a start.

Existing zone thermostat remain in place but now act primarily as high limits in case there are heat gains from people or sunlight. The pumps are activated by the reset controller based on an adjustable outdoor cut-off temperature.

The evolution of the micro processor has made it possible to have advanced pre-programmed control functions in small, economical controllers. These functions were previously only available in large building automation systems.

A modern outdoor reset controller, like the Paxton TC204, have all the functions needed to achieve maximum energy savings, such as:

- Should work equally well with mixing valves or direct control of one or more burners, by easy selection of the appropriate program. Should have boiler duty rotation when the controller is used for direct control of burners.
- Factory default settings that work in most cases, to minimize setup time. "Set time and day and walk away" should be the general idea.
- Self-adjusting reset curve. With the use of an optional room reference sensor the controller will, over a number of days, learn the specifics of each building and heating system and adjust the heat output accordingly. It will ignore short term changes such as from the occasional open window.

- Clock and calendar for night setback and holiday schedules. Lowering the heating water temperature at night is one of the surest ways to save energy.
- Optimized morning start. This feature adjusts the switchover from night to day schedule depending on the outdoor temperature.
- Outdoor cut-off. This feature stops the heat output and pumps above a selected outdoor temperature.
- Exercise valve and/or pump once every 24 hr to prevent sticking.

How much can we save?

Most of the savings from an outdoor reset controller come on mild to moderately cold days which mostly happen in the fall and in the spring. This is logical as a heating system is designed to heat the structure on the coldest day and is therefore oversized for mild days. That's when the outdoor reset controller will throttle back on the heat and save energy.

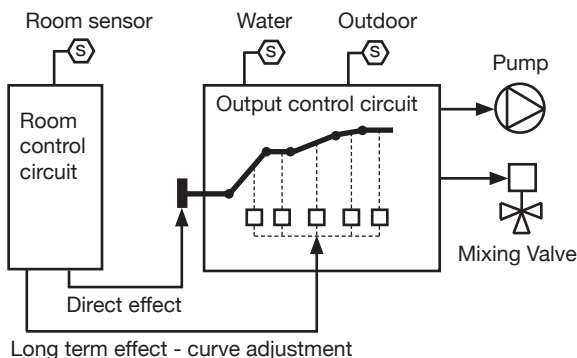
There are sometimes exaggerated claims made regarding savings but here are some guidelines:

- Lowering the average indoor temperature by 1 degree: 2.5%
- Installing a reset controller without night setback: 5-7 %
- Night setback: 5-8 %
- Automatic curve adjustment: 3-5%
- Optimized morning start: 5%
- Outdoor cut-off: 3-5%

The above percentages should be multiplied, not added. Using all the above features should save about 18 %.



TC 204
Outdoor Reset
Controller



V3R 3-Way Mixing Valve.
Use with VM62E Actuator

