

Control technology

**VIESSMANN**

## **OUTDOOR RESET CONTROL**

Increase energy efficiency



with advanced boiler controls from Viessmann

# Outdoor Reset

Condensing boilers offer a huge step forward in environmentally friendly heating, with greater possible fuel savings than conventional non-condensing boilers. However, there are ways to save even more with just a simple outdoor reset function and some very clever weather compensation controls, available with Vitodens and Vitocrossal boilers.

Outdoor reset controls can improve your home's energy efficiency and help you enjoy an incredibly comfortable home with a pleasant indoor temperature whatever the weather.

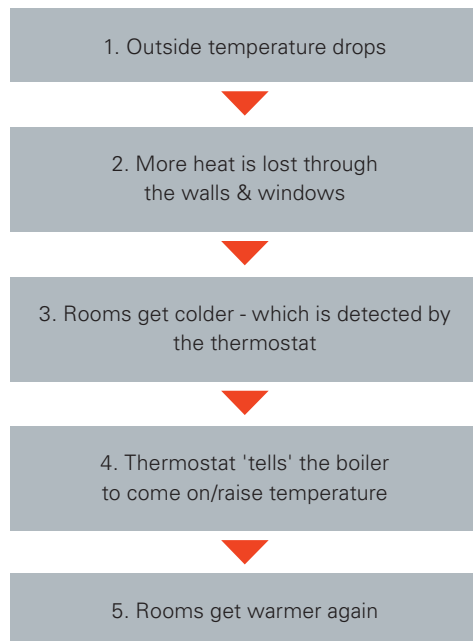
## Outdoor reset overview

Outdoor reset works by ensuring that the boiler burns the exact amount of fuel required to match the heat lost from the building in real-time. When in use, the house will always be warmed to the desired temperature, eliminating uncomfortable waves of being too hot and too cold.

Outdoor reset significantly improves efficiency under partial load conditions and is especially useful in climates with varying seasons. In these areas, the boiler will provide only a fraction of its maximum heat load during portions of the year. This means the boiler temperature is able to be reduced during part of the year, while still maintaining a consistent and comfortable room temperature.

## Conventional controls

Traditional heating systems have a room thermostat indoors and this is the sequence that follows a drop in temperature:



In the previous example, it isn't until stage 4 that the boiler gets any 'feedback' and is able to respond to changing conditions. The chances are that at this stage, the householder will be feeling cold and will turn the thermostat up manually, consuming additional energy.

If the outside temperature rises, the boiler will not respond until the rooms have become uncomfortably warm - so in addition to adjusting the thermostat, there may be temptation to open some windows, releasing more heat and wasting additional energy.

With outdoor reset controls, the boiler is able to respond at stage 1, improving energy efficiency.

## How does outdoor reset work?

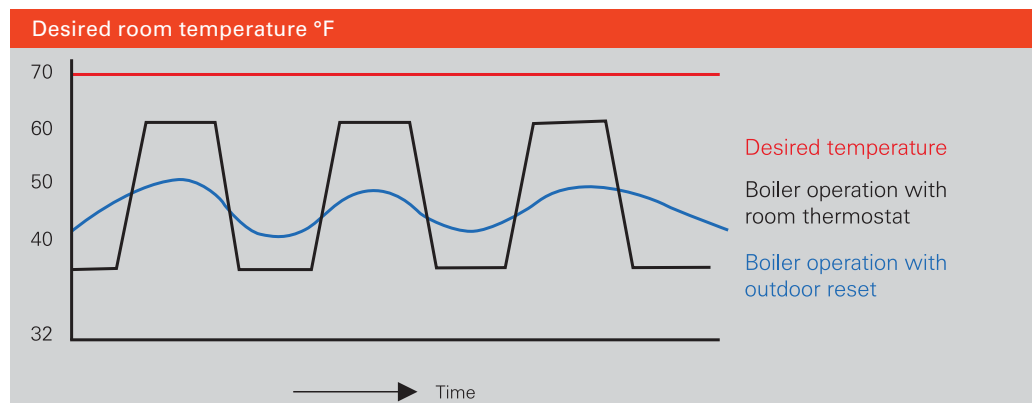
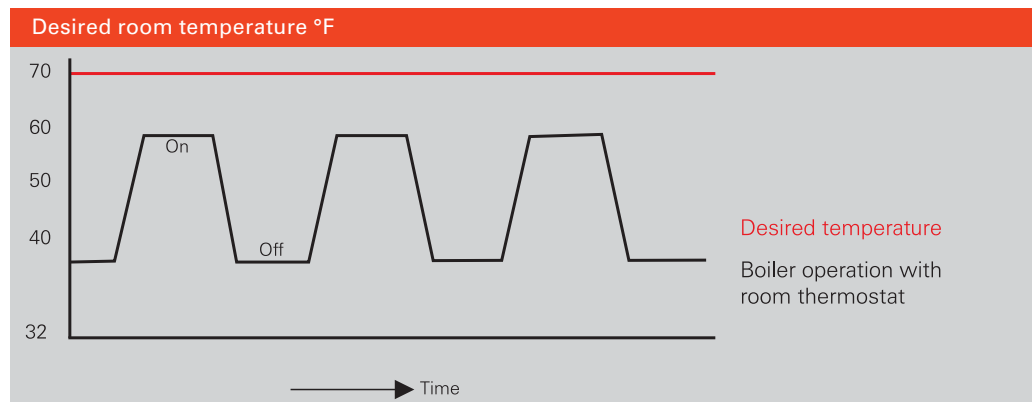
A small temperature sensor is located on the outside of the building on a North facing wall. This sensor is wired to the internal controls of the boiler allowing information about the outside temperature to be continuously transferred to the boiler.

When the outdoor temperature changes, the boiler responds automatically, increasing or decreasing its operating temperature to compensate for the weather changes taking place outside. This proactive mechanism means that people inside the building won't even notice that the temperature has changed outside as they enjoy a consistent level of comfort.

For example, when the outside temperature drops at night, more heat is lost through the walls of the building. Because the outdoor sensor detects the fall as soon as it happens, the boiler is able to raise the room temperature accordingly, maintaining a stable indoor temperature.

The boiler flow diagram shown below helps to demonstrate how this compares to a heating system without an outdoor reset function - where the boiler runs very hot then very cold as it constantly "plays catch-up" to achieve the desired room temperature.

Maximizing the condensing effect appropriate boilers has dramatically increased the efficiency of home heating systems by recovering latent heat in flue gases. For a condensing boiler to achieve the highest levels of efficiency it is capable of, it needs to condense for as long as possible. An outdoor weather sensor can help the boiler operate at lower temperatures, meaning it can condense for longer, increasing the overall efficiency of the boiler even on the coldest days of the year.



### How does it help the boiler to condense longer?

For a condensing boiler to actually get the water vapor in the flue gas to condense, the return water temperature needs to be at or below the dew point. Without weather sensitive controls, this is difficult to achieve, with most boilers operating with a flow temperature of around 180°F. This results in a return temperature of around 160°F, too high for condensation to occur.

Advanced controls with an outdoor weather reset sensor enable the boiler to make constant, small adjustments to the flow temperature, ensuring that the boiler runs as hot as it needs to - but no hotter. By achieving a flow temperature a few degrees lower, the return temperature is lower, allowing the boiler to condense for longer. This enables more efficient operation and a higher level of energy conservation and reduced fuel expenditure.

### Standard outdoor reset controls

The curve shown to the right demonstrates how the boiler temperature adjusts in response to changes in the outdoor temperature.

As the heating curve shows, if the outside temperature is close to freezing, the boiler will run at a flow temperature of around 150°F, which ensures a return temperature that will enable the boiler to condense effectively. If the outside temperature increases, the set flow temperature reduces accordingly, maintaining comfort and increasing energy efficiency. In this case, the slope and shape of the curve are fixed, but it is possible to position (or shift) the heating curve so that the boiler achieves and maintains the preferred temperature of the homeowners. Fuel savings may then be achieved.

### Advanced outdoor reset controls

(Vitocrossal 300 and Vitodens 200)

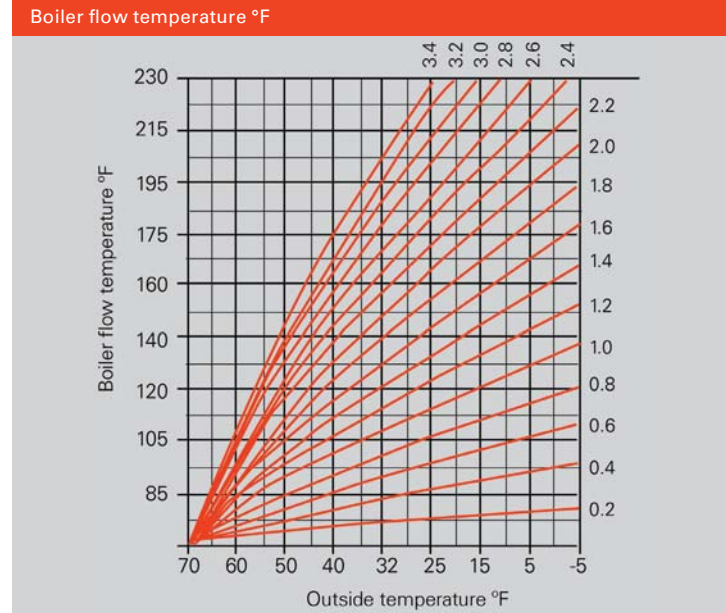
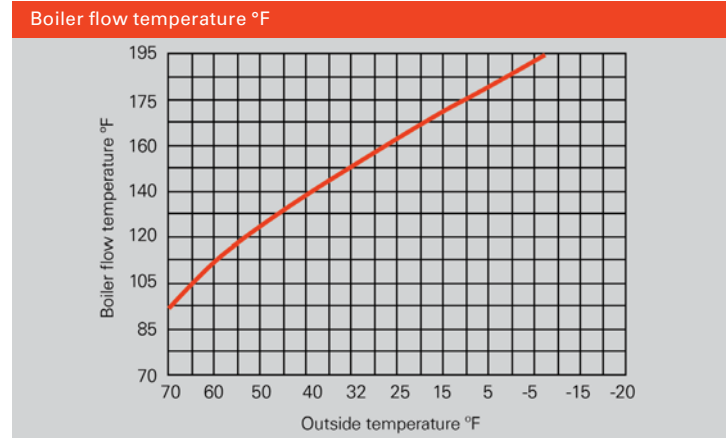
This type of boiler control is very sophisticated in that the slope of the heating curve can be adjusted or "fine tuned" to suit not only the household, but also the type of building construction.

For example, a very well insulated house will lose far less heat than an older house and will not require the boiler to work as hard when the outside temperature drops - so a flatter heating curve will achieve the desired room temperature for such a building. A less insulated house will experience high heat loss in the winter and require a steeper heating curve to compensate.

Once again the heating curve is set according to the homeowners' heat requirements in terms of personal comfort.

### Further benefits include:

- Night set-back option
- Built-in 7-day programmer
- Built-in pump logic for optimized pump over-run to reduce power consumption
- Morning booster function; it lifts the flow temperature in the morning to heat the house faster
- Energy savings may be achieved





### What does it mean to homeowners?

Greater energy efficiency - which may result in greater savings on your monthly home heating bills.

A comfortable home - a constant temperature is maintained inside, despite the changing weather.

You won't even notice the changes - because the system is proactive, rather than reactive, you won't notice the subtle temperature changes. You certainly won't be feeling the cold and don't need to worry about adjusting a room thermostat. An even quieter boiler - if you've already got a Viessmann boiler, you'll know that they operate incredibly quietly. With weather compensation, the boiler should fire so infrequently that for the first few months you'll probably keep checking if it's still on!

Cooler heaters or baseboards - a good sign that the weather compensation is working well is that the baseboards will feel warm, but won't get very hot then cool. This is because the small adjustments mean that a steady temperature is maintained, with few fluctuations.

Piping hot water - even though the radiator temperature is kept low, you have the reassurance that, at the same time, the temperature of water in the indirect water heater (if you have one) is maintained, for piping hot water when required.

### Outdoor reset function

With outdoor reset the sequence of events changes considerably:

1. Outside temperature drops/rises - which is detected by outdoor sensor



2. Boiler operates at a higher/lower temperature



3. Room temperature is maintained

The small, constant adjustments mean that the baseboards should feel warm, rather than hot and then cold. In this example, as soon as the outside temperature falls, the boiler is able to respond instantly because the sensor is continually sending information to the boiler.

If the outside temperature rises, the boiler will automatically run the radiators at a lower temperature, to maintain the correct level. The householder will be unaware of these small constant adjustments and does not have to touch any controls or thermostats to enjoy a constant, comfortable temperature.

### Weather sensitive controls from Viessmann

Weather sensitive controls are available on most Vitodens residential boilers.

### Advanced weather compensation control - the Vitotronic 200

All Vitodens models and the Vitocrossal 300 CU3A are fitted with weather sensitive controls and just need connecting to an outdoor sensor, to take advantage of significant fuel savings.

There are also a number of added features for comfort and convenience, including a party function, which extends the heating period to keep the house warmer without having to alter the settings. A vacation setting enables you to key in your vacation dates, and while you're away, the boiler will run a frost protection program instead of your comfort heating settings. It will then warm up the house before you return. The economy setting is a quick and easy way to turn the temperature down if you're leaving the house for a few hours.

### Additional features include:

- Easy installation, commissioning and maintenance, with integrated diagnostics
- Service interval display
- Digital time switch for selecting daily or weekly programs
- Automatic summer/winter change over
- Integral control unit for 3 heating circuits (2 mixed, 1 unmixed) and 1 DHW circuit
- Integral remote monitoring & operation interfaces