



DID YOU KNOW #3

WHAT IS ON/OFF CONTROL ?

Stand-alone electronic temperature controllers are devices used to control the temperature of processes such as baking ovens, furnaces, in the plastic industry etc. They come in varying sizes and housings, but in the main can be broken into two groups:

Simple ON/OFF or proportional controllers and

More advanced PID controllers.

Both of these two groups of controllers have the same main components from a control loop point of view:

The input We measure the process temperature using a probe, typically a thermocouple (type J or K etc) or PT100 (RTD) and then connect that signal back to the controller. This signal is referred to as the input to the controller.

The controller This is the device that monitors the input signal and decides by comparing it with the “set-point” or desired temperature setting, whether to increase or decrease the temperature by applying heat (or not).

The output This is the part of the controller that is used in turning the heating elements on or off to make the temperature hotter or cooler. This is typically a relay out-put or a solid state relay output. (We can also have an analog such as a 4~20 milliamp or 1~5 Vdc signal. Generally used with some sort of thyristor controller to regulate the heat.)

So these controllers can be one of two main control function types:

1. Simple **ON/OFF** or **proportional** controllers and
2. More advanced **PID** controllers.

SO WE GET TO “WHAT IS ON/OFF CONTROL”

On/off control is the simplest (Most elementary) type of control.

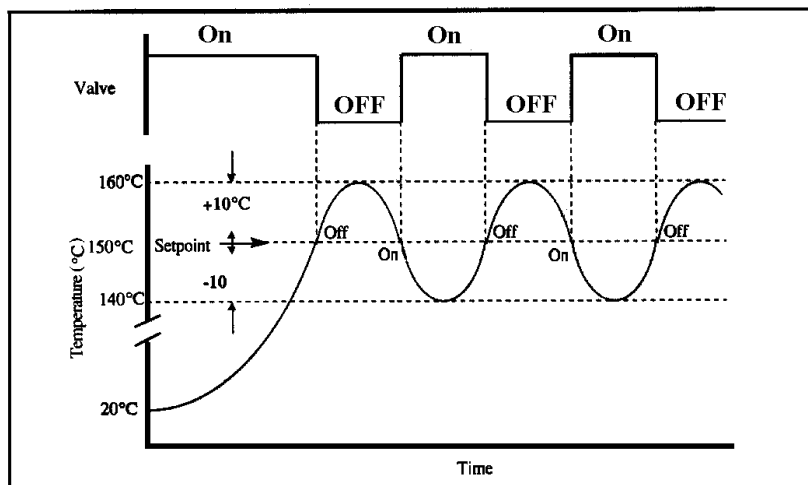
Whenever the temperature you are measuring (Controller input) is below the set point, the output relay (or analog signal in some controllers) will be switched on.

Whenever it is above the setpoint the output will be switched off.

It is as simple as that.

So with reference to the drawing below:

You can easily see that when the measured temperature shown in the graph, oscillating around the setpoint (Setpoint is set at 150 deg C in our example) is below the 150 deg C mark the output (valve) is on, applying heat to the system. When it is above the setpoint, the relay output (valve) is off.



Relay Chatter:

You can easily imagine though that once a temperature has reached the setpoint, it is possible that as the measured temperature changes by as little as 0.1 of a °C around the setpoint, causing the output to switch “on and off” a lot, each time it crosses the setpoint by only 0.1 °C

We do not want the contactor switching unnecessarily, wearing out our contactor or relay, so we have built in a *deadband*, into the controller, which prevents this relay/contactor chatter. This *deadband* means that the temperature must reach the setpoint, and the output relay will switch off, and then must drop below the setpoint by an amount equal to the *deadband*, before the output will switch on again. In most simple on/off controllers, this is factory set and could be a degree or two around the setpoint

APPLICATIONS:

This type of controller (on/off), although widely used in most applications is best-suited in applications where precise control is not the criteria, and the process is such that the energy inflow into the system is small relative to the energy already in the system.

**SO SIMPLY PUT, ON/OFF CONTROL IS THE MOST
ELEMENTARY TYPE OF CONTROL, TO BE USED IN
APPLICATIONS WHERE ACCURACY IS NOT CRITICAL.**

FOR MORE DEMANDING APPLICATIONS WE WILL LOOK AT “PROPORTIONAL” OR PID CONTROL IN THE NEXT ISSUE OF DID YOU KNOW.

QIS WILL BE HAPPY TO ANSWER ANY QUESTIONS YOU MAY HAVE. JUST CONTACT US WITH YOUR QUERIES.

**REMEMBER WE SUPPLY A FINE RANGE OF TEMPERATURE CONTROLLERS
AND SOLID STATE RELAYS AT VERY INEXPENSIVE PRICES
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