VERTEX-QIS

DID YOU KNOW #1

HOW ACCURATE IS THAT CONTROLLER ?

When we talk about accuracy, most are probably referring to the accuracy of control. The specification quoted by manufacturers, some of which are listed below, only refers to the accuracy of the display calibration showing the temperature we are measuring!

Eurotherm 2216e	0.25% of reading ± 1°C on a reading of 200deg C = 0.5 °C ± 1°C =	**1.5 °C**
CAL 940	0.25% of sensor maximum ± 1°C (type J 0.25% x 800) = 2 °C ± 1°C =	**2.5 °C**
VERTEX VT4820	± 1°C for Thermocouples =	**1.0 °C**
Vertex F4C	Thermocouples =	**1.0 °C**
	PT100 =	**0.2 °C**

(Specifications as claimed by manufacturers)

Controller measurement aside, the claimed accuracies of both thermocouples and PT100 in themselves are not very high. A general guide:

Tpes J, K and N (±2.2C or 0.75%)
PT100 (standard) is much better but depending on the class and construction can vary a lot.

But what does the controller manufacturers "accuracy" actually mean? It means that the reading of a measured temperature you see in the controller display (the temperature you are trying to control) will be accurate to within those specifications.

What does it **NOT** mean? It does not mean that when you install any of these controllers that your process will necessarily be held within those tolerances.

People often ask about "accuracy" as if it's important. It is not, what is far more important is consistency and repeatability of the whole control system, which in the real world (outside lab environments) always depends almost totally on the design of the system and tuning of the PID parameters in the controller.

WHAT THEN EFFECTS THE RESULTS YOU WILL GET FROM THE CONTROLLER

1. The DYNAMICS of the system will.
   For example, if you were trying to control the kettle in your kitchen and instead of having a 2000-watt heating element you had a 6000-watt element. It is fairly clear

that each time you turn the heating element on you will supply far too much heat to the kettle, causing the temperature to overshoot a lot. If you reduce the element size to say 1000 watts, you will be able to get much better control.

2. The probe accuracy you are using to measure the temperature

   For example you cannot get better than the expected accuracy of the thermocouple you are using. Typically specifications gay that on a type J you are looking at between 1.5 °C and 2.5 °C tolerance.

3. The type of control you are using

   You will experience vastly differing degrees of REPEATABILITY from the control system depending on the type of control mode used. These could be on/off or Proportional or PID (proportional, integral and derivative) All these will be explained in future DID YOU KNOW.

4. The method of switching the heaters on and off

   If you are using a contactor you will be able to get certain results, if you use a Solid State Relay you will get better and if you use analog thyristor control you will get the best possible results.

FINALLY, IT BECOMES QUIET CLEAR THAT THE QUESTION "HOW ACCURATE IS THAT CONTROLLER" IS NOT ACTUALLY VERY IMPORTANT. IT IS FAR MORE IMPORTANT TO DESIGN A SYSTEM THAT CAN DELIVER GOOD REPEATABILITY, THAT WAY YOU CAN ALWAYS KNOW THAT WHEN IT SAYS IT'S A CERTAIN TEMPERATURE, IT IS ALWAYS THE SAME TEMPERATURE, NOT SCIENTIFICALLY EXACTLY THAT TEMPERATURE, BUT ALWAYS THE SAME REAL WORLD TEMPERATURE!