

## 5 Reasons to use a temperature controller over a PLC

Programmable logic controllers (PLCs) and temperature controllers can offer similar functions for effective process control in manufacturing, ensuring consistent quality and minimising user error.

Process control devices have existed in various forms since at least the 17th century, as temperature regulators in furnaces, and later in to the 18th & 19th centuries as flyball governors on steam engines, boiler valves and other mechanical systems.

PLCs are a more modern tool that came about as a result of increased factory automation in the 20th century, particularly since the 1970s. Prior to this the same function was served by an array of mechanical components which were costly to install & repair and complicated to change when factory operations were modified (for example; if a product line was updated).

However, despite many similarities in their intended functions there are substantial differences in their setup, programming & application that often means a temperature controller is a more efficient and practical solution:

### 1. Cost

Since PLCs are designed to control multiple tasks and work with a wide variety of machinery they tend to be more expensive. Because they are designed to control a wide range of applications in many cases a PLC would be over-specified for temperature control, resulting in a high expense for features and capabilities that simply aren't relevant for a lot of processes.

Because temperature controllers have a more specific task to handle they often have a lower price associated with purchase and installation. Temperature controllers will also include a range of features, but these will all be specific to temperature applications and add value by more efficient control.

### 2. Setup

As with cost because PLCs are intended for such environments with multiple tasks they require specialist programming skills and a considerable time investment to develop a solution to fit the application requirements. Whereas a temperature controller can be installed, setup and optimized (in the case of PID controllers) relatively quickly with minimal experience.

Many temperature controllers are available as panel mounted, meaning that they are attached to the process machinery front panel with a visible screen through which they can be set up, often in only a few minutes by someone with basic engineering knowledge. Given the complexity of PLCs this is in



many cases not possible as they are usually mounted in a rack at the back of the panel and have no display of their own, instead requiring a separate HMI (which also requires setup).

### 3. Functionality

Temperature controllers are specifically designed for handling particular industrial processes and so include features, outputs and control options directly related to those processes out of the box. For example specific algorithms intended for applications requiring Valve Motor Drive control (VMD). PLCs can have limited temperature control features due to needing capabilities across a wide range of manufacturing and automation functions. As a result while PLCs can manage basic temperature control tasks they don't excel at it like a dedicated temperature controller. In addition, due to handling analogue signals temperature control can be very demanding on microprocessor resources. A temperature controller is designed to handle these requirements, however whether a PLC can handle the specific demands of the process can't be known until the system is tested. A PLC not up to the requirements would be slow to respond to changes in the process leading to overshoot and lag, which will negatively impact product quality.



### 4. Visibility

Temperature controllers are available in several sizes and levels of sophistication as panel mounted devices, so the status of the process can be seen at a glance along with any alerts or alarms that require the attention of an operator. PLCs will not often feature a direct interface and instead require a separate HMI to be setup alongside. The HMI can display the necessary process information, but it will often also show a far wider range of data relating to other tasks that the PLC

manages, meaning panel mounted temperature controllers offer a clear benefit in having a dedicated view of the process where

all relevant information is easily available and adjustments can be quickly made. Many temperature controllers additionally offer data logging capability which can be used to review previous process changes and flag potential issues.

### 5. Accuracy

Temperature controllers form part of a closed feedback loop that actively track the process value against the setpoint and adjust the power level as necessary. Many controllers feature PID algorithms with auto-tuning functionality that allows them to be set up quickly and means that they will maintain a process value with minimal deviation from setpoint. This includes adjusting for any unexpected process changes or interruptions, for example an oven door being opened. This is essential for maintaining consistently high product quality and reducing the chance of a bad production batch.

PLCs will sometimes have PID functionality, but



unlike temperature controllers it will often be limited or may require manual tuning by an engineer, which takes longer to program and adds a risk of human error. As explained above the processor demands of temperature control can be high and challenging for a PLC to manage alongside other tasks, which can negatively impact response time to process changes and result in an overall lower accuracy than would be achieved with a dedicated temperature controller.

Temperature controllers have several advantages over PLCs for process control. They are faster to install and setup, quicker and easier to operate, have features dedicated to temperature control that work out of the box and, since they are designed specifically for temperature control, can handle the particularly high demands of managing a process.

Where a system requires considerable automation that is beyond the scope of a temperature controller then a PLC is the logical solution, however it is sensible to include dedicated temperature controllers as part of the system to counter the PLC shortfalls in temperature control. This will allow use of the range of temperature control specific features and reduce demand on the PLC which can lead to slow response and greater deviation from setpoint, helping to guarantee product quality.

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