

Special Edition



Controlling Hot Air Mixtures

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Gossen Metrawatt supplies module for controlling moderate temperatures of an H_2O_2 – hot air mixture.



Steam Tunnel, Part of a Bottling Line

Controlling moderate temperatures of H_2O_2 – hot air mixtures is required for cleaning (disinfecting) PET bottles.

Hydrogen peroxide (H_2O_2) can be used in three different ways to disinfect packaging materials:

- As a liquid
- In the vaporous state with subsequent condensation
- In a gaseous state

Very high temperatures are required when liquid H_2O_2 is used. Furthermore, the liquid H_2O_2 has to be removed from the containers. This step is quite time consuming, rendering the process impracticable except under certain circumstances.

An application which is taken advantage of very frequently is based upon the use of vaporous H_2O_2 which condenses onto the surfaces of the container or the cap, and is activated during drying at higher temperatures. This step results in a considerable disadvantage for the process: PET is a thermally sensitive packaging material and may shrink at high temperatures. Lower temperatures or shortened activation times are not necessarily the answer, because the risk of inadequate disinfection or contamination of the product with residual H_2O_2 would thus increase.

The third possibility is based on the use of gaseous H_2O_2 . In this case, bottles which have been preheated to a temperature of 50 to 60° C are exposed to gaseous H_2O_2 . Condensation of the H_2O_2 is avoided during disinfection.

The prerequisite for successful container disinfection within a short period of time is a sufficiently high concentration of H_2O_2 in the gaseous phase. In order to assure this without any condensation of the H_2O_2 , the temperature of the PET bottles and caps must always be higher than the dew point of the gaseous H_2O_2 .

The PET bottles are disinfected using moderate temperatures in several consecutive steps. These temperatures make it possible to extend the duration of exposure to the gaseous H_2O_2 almost indefinitely, without damaging the PET containers.

Problems Involving Temperature Control in Connection with H₂O₂



The gaseous mixture is produced by precisely dosing H₂O₂ in a vaporizer. In order to assure, on the one hand, that the H₂O₂ is fully vaporized, and, on the other hand, that no undesired chemical reactions occur, the vaporizing surface must be kept at a constant temperature. The temperature sensor must be mounted in close proximity to the vaporizing surface to this end. Due to the fact that vaporization does not take place continuously, the measured temperature fluctuates in a cyclical fashion, thus impairing

controllability. This makes it impossible to assure quick correction of interference by means of the usual methods, because interference-optimized settings for the controller result in a greatly fluctuating manipulated variable, which may intensify interference under certain circumstances (see figure 1).

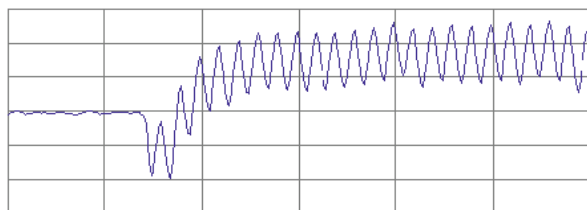


Figure 1: Control Without Oscillation Suppression

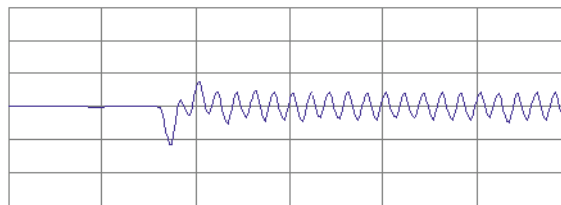


Figure 2: Control With Oscillation Suppression

Solution Using the R355 Controller Module with Specially Developed Oscillation Suppression



R355 Controller Module

If the cyclical vaporizing period is constant, oscillation can be filtered out by activating the oscillation suppression function. This is accomplished by means of narrow-band filtering in order to remove the signal component with the selected period, which is then disregarded for measuring signal control. The temperature values for the displays are not influenced (see figure 2). Periods can be selected within a range of 0.3 to 25 seconds, and the filter remains inactive for other setting values.

In addition to the R355 controller module, this special function has also been integrated into the R6000 multi-channel controller, the new range of R2500 and R2700 compact controllers, and the SOFTcontroller.

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