

Honeywell Solutions for Accurate and Reliable Sterilization at High Temperatures



One of the most effective and widely used methods of sterilization is the use of high temperature to kill microorganisms. Controlling the temperature of the autoclave, retort or oven and the time of exposure according to product lethality rates is called Fo sterilization. This is common in food and beverage, pharmaceutical and biomedical applications.

Honeywell's solution of combining innovative recorders, controllers, temperature and pressure transmitters provides:

- Capability to draw charts, scales and data simultaneously
- Ability to automatically scale a plain paper chart
- Larger 12" chart
- Full portfolio to solve problems, with a large installed base
- Wireless options for hard -to-reach or high temperature areas



Fo Sterilization

Fo Sterilization Description - The DR4500 Truline Recorder (or DPR100/180/250) can be set up to calculate the Fo Sterilization time for any specific product using steam sterilization procedures. These recorders use the following equation to compute Fo sterilization time:

$$T_s = T_s (t-1) + (dt)(10^{(t - T_b)/z})$$

T_s = Sterilization time in minutes

$T_s (t-1)$ = Previous Sterilization Time

dt = Scan time of the recorder (either 1/3 sec or 2/3 sec depending on # of inputs)

T_b = Standard Reference Temp. (This temperature is the minimum value required to sterilize the product)

t = Product Temperature

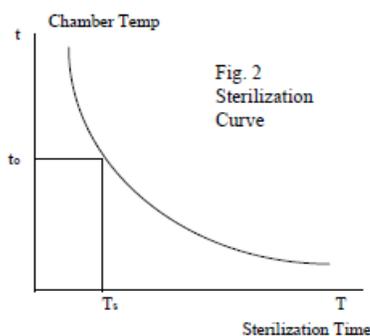
z = Thermal Resistance of the product being sterilized

The Fo calculation can be assigned to one of the pens to document the sterilization process and an alarm output can be set to indicate that the Fo value required to kill the microorganisms has been achieved. The DR4500 recorder can also be programmed to print a six character message on the chart to document this event along with the normal printing of the Fo value when the range information is printed.

The Fo sterilization time begins accumulating once the programmed sterilization temperature has been reached and will continue to accumulate as long as the process temperature remains above this value. The thermal resistance and lethality curves determine the length of time required to sterilize the product and the final Fo value needed. An alarm indicates that the Fo value has been reached and the product has been sterilized. The sterilization time is dependent on the temperature of the process. The higher the temperature, the shorter the sterilization time becomes as seen in Fig 2. The downside of higher temperature is that it can affect the product characteristics. Because of this factor, autoclaves are usually sterilized at 250 °F (121 °C) and the sterilization time is around 10 - 15 minutes.

Process Control - The process control can be accomplished in either the DR4500 Recorder or with a separate UDC Controller. The customer handout shows, a UDC controller regulating the steam to the autoclave to control temperature. The recorder is used to determine the Fo sterilization time and to monitor the pressure in the autoclave to insure that it does not exceed a safe limit. The recorder also signals the UDC, via an alarm contact, to switch to a second setpoint once the Fo value indicates that the sterilization process has been completed.

This allows the UDC to stop the sterilization process and lower the temperature in the autoclave so the product can be removed for final packaging and shipment. The recorder also allows the Fo calculation to be reset externally using a remote contact so the process can be started again once the operator signals that the new batch to be sterilized has been loaded into the autoclave. Temperature control when done in the recorder, uses the optional control output.



More Information

For more information on Truline Recorders, UDC Controller and Pressure Transmitter visit www.honeywellprocess.com, or contact your Honeywell account manager.

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