



Pressure transmitters with wear-free ceramic CERTEC® measuring cells can compensate for temperature shocks

What Grandma already knows

The cooking and canning of food is an old, but very reliable method of preservation. A short period of heating is enough to kill off bacteria and prolong shelf life. Our grandparents mastered this simple principle a long time ago. So what problems could it pose for a state-of-the-art production line with precise filling technology and extremely accurate weighing and portioning of vegetable soups?

A systematic error

It was a pressure transmitters' measured values that didn't always make sense to one particular canned food manufacturer. At one stage in the production of clear vegetable soups, the level measurement dropped again and again to an abnormally low value within seconds. A quick diagnosis led them to believe that the problem was simply random deviations in the sensor, but it turned out that there was a systematic error. The same error always occurred whenever large quantities of frozen vegetables were dosed into the boiling water.

The “clicking toy frog” effect

This was triggered by a temperature shock. [Food manufacturers](#) have long preferred to use pressure transmitters with ceramic measuring cells because of their high mechanical robustness. However in its standard construction, this wear-free technology based on a virtually fatigue-proof material, is also sensitive to extreme, spontaneous temperature fluctuations. The impact of boiling water on deep-frozen vegetables triggers a reaction that can be likened to the quenching of a boiled egg. The ceramic membrane in the sensor was subjected to extreme shock: it expanded slightly on contact with the heat and contorted, an effect like a “clicking toy frog”, against the ceramic layer behind it. After such extreme temperature jumps, it can take several minutes for conventional ceramic measuring cells to reliably in-contort and output sensible values again.

A strong duo for hygienic applications

With the [VEGABAR 82](#) pressure transmitter VEGA is offering the first ceramic measuring cell capable of handling temperatures of 150° C with 200 times overload resistance. Especially when it comes to hygienic applications, this innovative pressure transmitter offers the best of both worlds: the chemically resistant CERTEC® high-performance ceramic material withstands extreme temperatures and is so robust that even abrasive particles in liquids cannot damage it. This also includes frozen vegetables in clear soup. But [VEGABAR 82](#) can do much more: it easily compensates for the extreme temperature changes that occur during pasteurisation or during CIP and SIP cleaning cycles. This is made possible by a second temperature sensor built into the measuring cell. It complements the standard temperature sensor on cell body, by measuring and outputting a rapid reaction compensating value. It is located against the rear face of the diaphragm in an exposed, yet absolutely flush position within the glass seam: here, directly behind the ceramic diaphragm, it doesn't miss even the slightest change in temperature. Thanks to a special algorithm that uses the difference between the two measurements, the ceramic sensor is able to totally compensate for temperature shocks.

Clean measuring methods from the clean room



When it comes to food, we always expect the ingredients we use to be flawless and well-selected. Equally important for our confidence as consumers is the manufacturing process, where each component plays an important role. Ultimately, the entire production chain is only as strong as its weakest link. The high quality of the ceramic-capacitive CERTEC® measuring cells begins in the special clean rooms at VEGA. Here, the special air circulation and access precautions ensure that there are no more than 352 particles with a size less than 0.5 µm per cubic metre, in the room. That's ten thousand times lower than our cleanest living quarters, on average. In this completely dust-free environment, the CERTEC® measuring cells are printed and fired using thick film technology. The process ensures that the glass solder connection, connecting the base body of the measuring cell and the ceramic diaphragm, achieves a precise gap of less than a hair's breadth, with a tolerance of ± 1 µm.

Ceramic sensors that follow the food trend

The customer is king, and since more and more customers want natural foods nowadays, the [food industry](#) is challenged to find alternative processing methods that do not require artificial preservatives. Everyday processes such as pasteurisation and freezing are among those used for increasing shelf-life that are both traditional as well as innovative. Do they sound familiar? Not the way they're employed today! Nowadays, both processes manage the difficult balancing act between shelf life and freshness - at the same time preserving vitamins. And for this reason they're being used more and more.

This type of pasteurisation usually means heating to 75° C for a few seconds, while freezing means flash or shock freezing: down to -30° C in within seconds. [VEGARBAR 82](#) pressure transmitters with CERTEC® ceramic cells perfectly meet the increasing requirements on temperature robustness and provide the basis for reliable, highly accurate measurement. This, in conjunction with the extreme durability of their high-performance ceramics, makes them practically unrivaled in the world of instrumentation. [VEGABAR 82](#)

Application examples with CIP and SIP cleaning.

Storage tanks for alcohol



Level measurement and point level detection in the storage tank

[To the application](#)

Raw milk tank



Level, pressure measurement and point level detection in the raw milk tank

[To the application](#)

Ultrapure water storage tank



Level and pressure measurement in storage tanks for ultrapure water (Water for Injections)

[To the application](#)