Excerpt from the report of the University of Technology Ilmenau on control stability of a SIKA TP Premium Temperature Calibrator

We have had our patented control technology tested by an independent body with regard to control stability. Below you will find some excerpts from the extensive report of the University of Technology Ilmenau.

Abridged version

In order to achieve control stability for the fast portable temperature calibrators which could previously only be achieved with stationary calibration baths, SIKA Dr. Siebert & Kühn GmbH & Co. KG developed a model-based predictive temperature control. The control was implemented both for operation as a micro bath and as a dry block for the temperature calibrators of the TP Premium series. A temperature calibrator of this series was tested at the Institute of Process Measurement and Sensor Technology at the University of Technology Ilmenau with regard to its control stability. The temperature calibrator was exposed to monitored variations in ambient temperature during operation. The data obtained show that the temperature calibrator has a control stability of better than 0.010 °C (micro bath) or better than 0.002 °C (dry block) at ambient temperature variations of ± 2 °C.

For operation as a dry block, control stability of up to 0.0005 °C can even be achieved for certain target temperatures.

What is model-based temperature control?

For controlling the temperature of the calibration volume of portable temperature calibrators, conventional PID controllers are usually used. Using optimized PID parameter sets, control stability of about 0.020 °C to 0.005 °C can be achieved for micro bath and metal block temperature calibrators. So far, better control stability could only be achieved with stationary calibration baths. In order to achieve better control stability for the lighter and faster portable temperature calibrators, SIKA Dr. Siebert & Kühn GmbH & Co. KG developed a model-based predictive control.

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Measurement results

The measurement results show that the model-based controller achieves a control stability better than 0.0025 °C for ambient temperature variations of ± 5 °C over the entire temperature range for the configuration as a dry block and significantly better than 0.002 °C for ambient temperature variations of ± 2 °C.

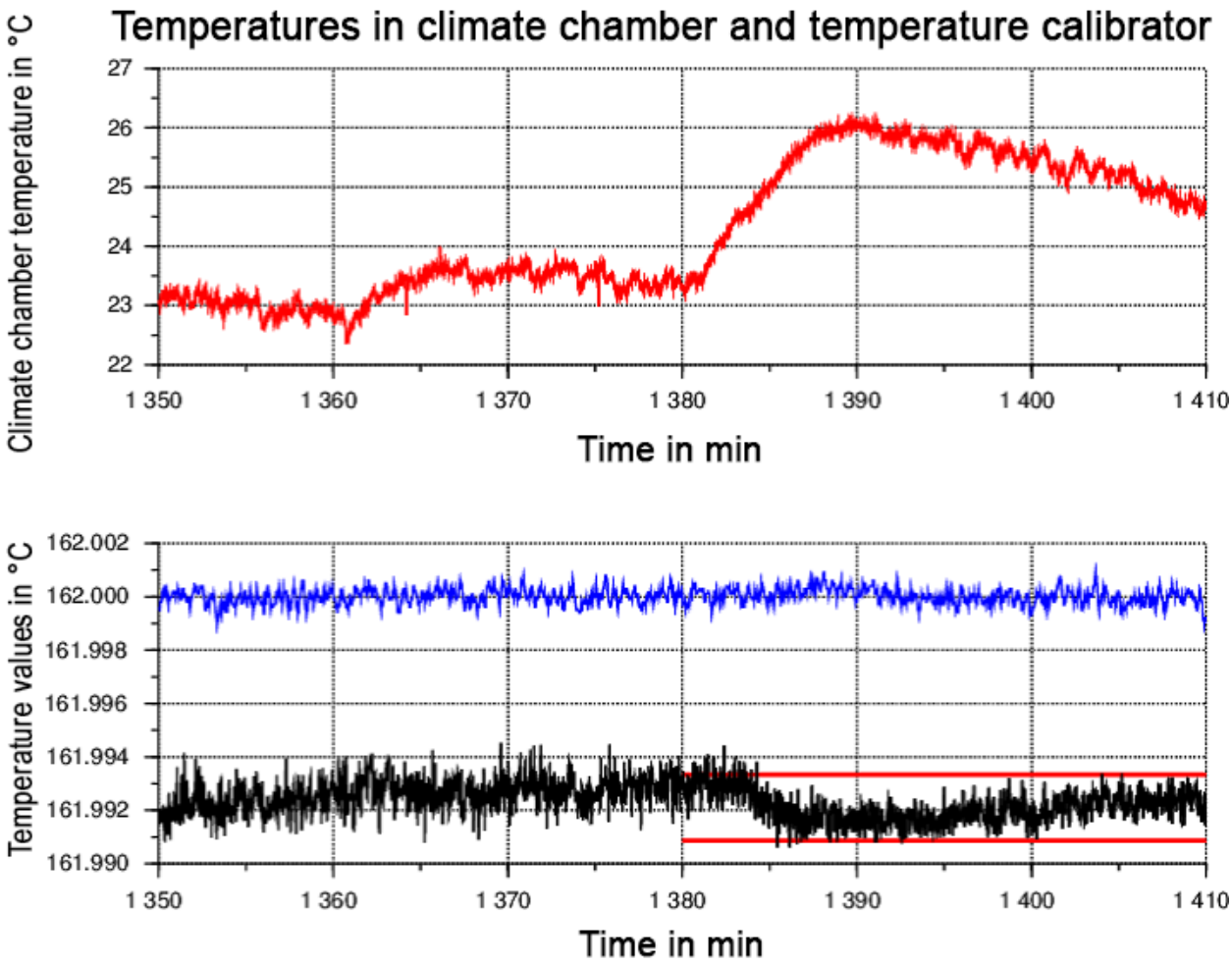

Fig.: Air temperature curve in climate chamber (above) and the control stability of the temperature in the temperature calibrator (below) achieved in the process. The temperature of the external reference of the calibrator Ref *T* (blue) is controlled to 162 °C. Around the temperature indication of the Pt10 *T* (black), which serves to determine the control stability for 30 minutes, the ±2 σ-band (red) is additionally drawn around the mean value.

Source: Technische Universität Ilmenau (R. Friedrichs, M. Hohmann, H. Mammen und T. Fröhlich, "Mikrobad- und Trockenblock-Temperaturkalibrator mit modellbasierter Regelung", Tagung Temperatur 2017, Berlin, 05/2017).

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