

## Pumping efficiency in the supply of drinking water

**For the efficiency measurement of pumps in drinking water treatment systems, we have calibrated and paired Pt100 temperature sensors so as to ensure that temperature discrepancies of down to 1 mK can be measured securely for years.**

The most cost-effective method to optimise service intervals of pumps is to determine the heat loss between pump inlet and outlet. This is done by applying two special Pt100 temperature sensors alternately to an amplifier using high-precision switches. A high-resolution ADC digitises the signals, while a downstream microprocessor calculates the difference. If the input stage of the circuit is designed strictly symmetrically, the errors from thermoelectric

voltages can be eliminated almost entirely. This highly symmetric multiplexer is much more accurate, or more stable, than for example a Wheatstone bridge. The disadvantage of limited bandwidth is negligible for this type of application.

Our task in this project was to measure the Pt100 sensors at different temperatures and to perform the pre-aging. The sensors were calibrated in a copper block in a highly insulated heat bath. With this setup, an inhomogeneity in the temperature distribution in the copper block of less than 0.1 mK is guaranteed. For each system, two temperature sensors are paired so that they are resistant to ageing effects over a long period of use.

