Experimental investigations on the influence of temperature sensor installation conditions on the temperature measurements

Andreas N. Bryde, Simon Graner, John Domino, and Christian Bombis*; Kamstrup A/S, Industrivej 28, 8660 Skanderborg, Denmark

*Corresponding author

According to EN 1434:2022 and technical guidelines CEN TR 13582:2025 and PTB TR-K 8 (2025), the installation of temperature sensors in inlet and outlet is recommended to be identical (symmetric installation). According to PTB TR-K 8 (2025), any deviation from symmetrical installation must be investigated and assessed during type approval. However, except from EN 1434-4:2022, Clause 7.4.4.4 Testing of the influence of pockets, a standardized type test including accept criteria for the investigation of (deviating) installation sites are still lacking.

With an experimental test set-up inspired by the one used by JUMO [see e.g. Bott_EMATEM_2024 and Bott_EMATEM_2025[1]],the influence of different installation types (ball valve, flow sensor, insulation) has been investigated at flow rates varying from 6 l/h to 300 l/h and temperatures between 20 °C and 90 °C. It was observed that, even the recommended symmetric installation of non-insulated temperature sensors in 2 identical ball valves causes an error (slightly) exceeding the maximum permissible error for a temperature sensor pair at low flow. Insulation of installation sites reduces in general the errors in most cases significantly. Consequences for the measurement of temperature difference in thermal energy meters and the possibility of new type test within EN 1434-4 are discussed.

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