Calibration methodology of the piston prover for cold and hot water test equipment

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The development of meters with higher accuracy and a wide range of the testing flow rate requires development, or improvement of the primary and secondary calibration methodology and adjustment to new trends in this field of measurement.
The papers describes a piston prover with 30 liters volume, integrated into a test line with possibility to measure with cold and/or hot water, which by its innovative system of liquid delivery together with the sophisticated control system allows to reach higher accuracy and stability of measurement conditions.
The uncertainty analysis indicates that at the same requirements for calibration and measurement capability better than 0.1% the testing volumes may be reduced down to 0,2 liters without correlation to the flow rate, whereby at testing volumes over 5 liters the reached measurement uncertainty is better than 0,03%. Even other parameters as temperature and flow rate stability are monitored. Advantages of this method are described for the developed piston prover working within the range from 0.13 l/h up to 7 000 l/h.

The contribution is focused on the presentation of methodology and results of the initial calibration of the piston prover by means of geometrical assessment using 3D measuring equipment. Followed by a successful comparison with the results of a next calibration realized automatically via the integrated software by means of volumetric method with a standard capacity measure and an electronic measurement. Comparability of the traceability of the piston prover to the Czech National Standard of Length with traceability to the Czech National Standard of Mass is expressed.
Further the experimental measurements of long-term stability especially in the field of low flow rates 0.13 l/h to 6 l/h are described and determined.
Results have shown that the developed equipment and methodology may successfully be spread to both higher and also very low flow rates.