

Application sheet – Potable water



- ① Hot tapping in pipe and creation of the optical access under operational conditions without interruption of supply
- ② Measurement site with calibration equipment in deep cavity
- ③ Laser probe during calibration measurements

On-site-Calibration of large bulk water meters in an Australian grid for potable water (Brisbane, Queensland)

Measurement uncertainties of flow meters in large bulk water pipes have high economic relevance. Therefore, on-site calibrations under real operation conditions are recommended.

In the scope of an international project with an Australian bulk water supplier Queensland Urban Utilities (QUU) and the engineering and consulting company GHD a number of laser optical on-site calibrations were conducted for bulk water flow meters. The goal of this project was the assessment of measurement uncertainties on a selection of important flow meters in distribution lines for potable water. In doing so, following points were addressed:

- finding of financial losses resulting from measurement errors,
- avoidance of unfair billing and cost allocations,
- reduction of inefficiencies due to miscalculations in water loss components,
- further optimization of network development and planning solutions and
- security in compliance with local and national regulations.

The on-site calibrations were performed on nine magnetic-inductive flow meters with sizes ranging from DN 600 up to DN 1050. All of those pipes are located underground in either densely populated areas or open country. Therefore, all pipes had to be exposed first. The subsequent creation of the optical accesses was performed by local specialists without the need of interruption of the bulk water supply.

Due to the concrete inner layer of the bulk water pipes, measurements of the inner pipe geometry were performed with added care and specialized measurement equipment. Limited by the bulk water network topology, volume flows for calibration purposes were only available for short periods. The on-site calibrations were conducted at two characteristic network volume flows with each calibration achieving uncertainties around ± 1 % of the measured value.

The results of the on-site calibrations showed that the flow meters under test have measurement errors ranging from -12.6 % up to +3.9 % compared to the reference flow rate. In two calibration sites the calibration measurements identified irregular flow meter data acquisition due to electrical issues or asymmetric flow conditions, deviating from the manufacturer guidelines, increasing measurement uncertainties of the meter under test and the calibration itself. According to calculations of GHD, project costs are amortized within a period of between two to five years.

“The LDV technology was selected because of its unique capability to carry out very accurate *in situ* calibrations of large flow meters with a metrological accredited traceability to a national flow reference standard. The thoroughness and meticulous emphasis on the details required for application of the method under field conditions was demonstrated by Optolution.” states Edgar Johnson of GHD.

Queensland Urban Utilities (QUU) – potable water, recycled water and sewerage services for South East Queensland.

Queensland Urban Utilities (QUU) supplies over a quarter of Queensland’s total population with potable water, recycled water and sewerage services. In total more than 1.4 million people are supplied with water by QUU.



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