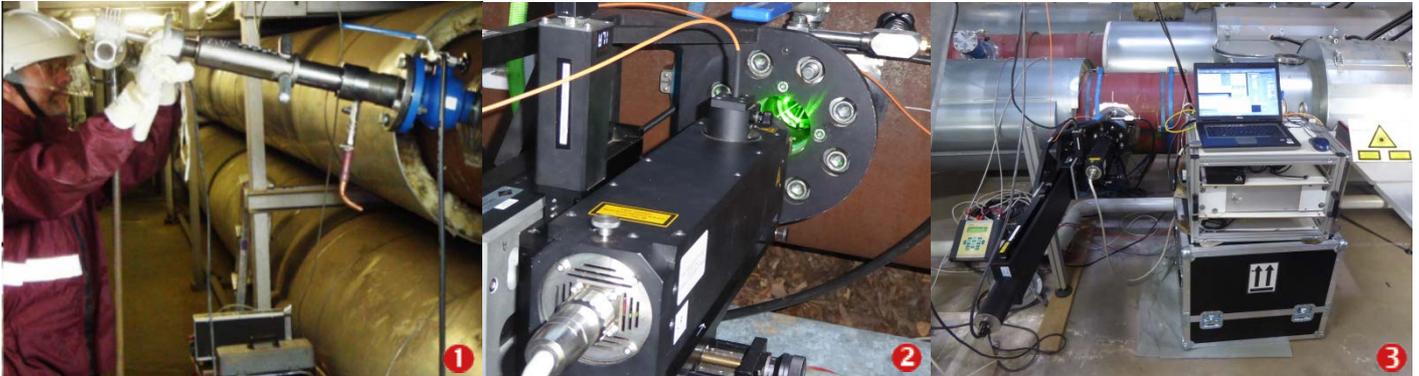


In-situ calibration application report



- 1 Hot-tapping at pipe for district heating for realization of the optical access without interruption of the heat supply
- 2 LDV Probe during a measurement
- 3 Measuring site with equipment for on-site calibration

VATTENFALL Heat Berlin pushes on-site calibration of flow sensors in district heating systems

Measurement errors of flow meters under operational conditions are often unknown and can diverge greatly from the information given by manufacturer.

Flow sensors (FS) of large heat meters are often used for decades after an initial calibration and installation without any re-calibration. As on-site operation conditions of flow sensors often differ heavily compared to calibration conditions on standardized test benches of the initial first calibration, changes in flow sensor conditions can lead to unknown changes of measurement uncertainties. Additionally, measurement uncertainties of flow sensors can change greatly during its duration of use.

These two aspects strongly affect quality management goals of the district heating suppliers. A wide range of goals, namely higher accuracy of flow sensors for billing data, increased balancing certainty of energy flows and a verifiable quality of main benchmarks (e. g. primary energy factor, CO₂ balance, KWK ratio etc.), will be enhanced by calibration.

For these reasons VATTENFALL Heat Berlin uses the on-site calibration of large FS from OPTOLUTION. With this procedure, the FS are periodically calibrated under operational conditions and at most widely used operating points of the system. Calibration certificates and project documentation conclude the results of the measurements and can be used as verification documents towards third parties.

So far calibrations took place in eight of the cogeneration plants, various heating plants, transmission stations and pumping stations of VATTENFALL Heat Berlin. The operating conditions of the measurements ranged from 50°C to 130°C of fluid temperatures and pipes of sizes between DN 150 and DN 1000.

By now the on-site calibration is specified as a planning tool at Heat Berlin. Within new construction projects an optical access is implemented by default for subsequent calibration measurements during commissioning.

In accordance with Dr. Wirths – Head of network planning at Heat Berlin - an important goal for the future is to ensure the quality of the FS measurements via on-site calibrations. This enables improved planning security and demonstrates trustworthy handling with the district heat products. Furthermore a lifetime log for the FS will document measurement accuracy and stability of the FS to sustain high quality standards in flow measurements.

Heat Berlin offers decentralised power generation and operates the district heating network in Berlin.

It supplies heat from several cogeneration plants and thus provides a reliable heat source for all interconnected buildings. Furthermore, nine local heat networks and many local heat plants are operated by VATTENFALL Heat Berlin. District heating and cooling are continuously expanded.

Benefits for VATTENFALL Europe:

- Increased balancing reliability
- Determination of benchmarks, e. g. primary energy factor, CO₂ balance, etc.
- More precision for process control
- Enhanced usage of the system in operation
- Strategic considerations for new construction projects, district heating grid etc.
- Fact based decisions and
- Evaluation of performance runs and constraints.