

LDA system for investigation and calibration of flowmeters

The investigation of the accuracy of flowmeters is of particular significance in district heating and drinking water supply, which involve the metering of large volume quantities. The deployment of an LDA system enables at the same time a detailed investigation of the flow profile as well as a direct measurement of the volume flow for in-situ calibration of the flowmeters.

In terms of optical and mechanical design, ILA LDA systems are optimally set up for calibration applications. For example, one essential feature of the system is the direct integration of the laser head with the LDA probe, with the following advantages:

- No coupling losses in optical fibers
- More Laser output energy in the measurement volume
- No need for adjustment of the optical fibers
- High long-term stability
- Reduced non-uniformity of the interference fringes in the measurement volume
- High measurement accuracy 0,1 – 0,2%
- Good price / performance ratio

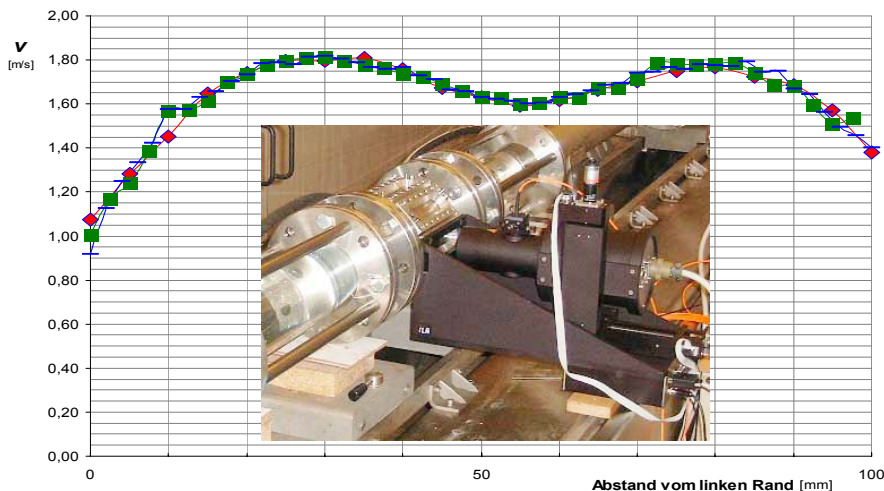


Image 1: repeatability of the measurement of velocity profiles on calibration test bench at BEV Vienna



Figure 1 shows the installation of an LDA system at BEV Vienna. On this site LDA was used for the investigation of velocity profiles, to determine their influence on the measurement bias of volume flowmeters. In addition, the effectiveness of flow straighteners and inlet sections was investigated. To make measurements, the LDA system can be mounted directly at the window port. Using a built-in 2D traversing system, it is possible to acquire automatically the flow velocities over the measurement cross-section. The LDA software is specially adapted to the demands of volume flow measurement. So for instance measurements along traverses determined by the constant area method, as per VDI2640, can be carried out in a fully automated fashion. The variations in refractive index due to pressure and temperature is also taken into account by ray-tracing computations at each fixed position. In addition, the system can record analogue signals from the local volume flowmeters. Hence it is possible to investigate online the measurement discrepancy of the volume flowmeters, without interrupting plant operations (figure 2).

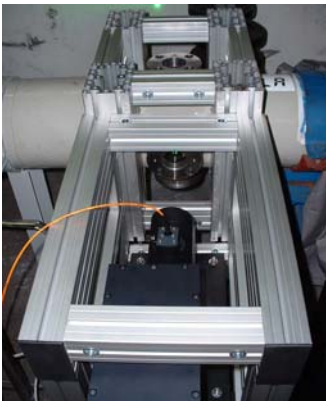


Figure 2: LDA-measurement in district heating supply plant



Figure 3: Special LDA realisation for PTB Berlin (measurement volume length 100 μ m, measurement error < 0,1%)

Accuracy Certification: We offer on request a calibration certificate for the accuracy (deviation of the fringe distance inside the measuring volume) from the Physikalisch Technische Bundesanstalt (PTB).

