Figure: Diverter used in PTB's water flow calibration facility

Non-interacting fluid flow diverter

When diverting processes in closed conduits to change the path taken by the fluid flow, the diverting element causes disturbing interactions. PTB's new idea allows these types of disturbing effects to be significantly minimized. Pressure variations during the diverting process are compensated for by means of additional sensors. The result is a clearly more precise diverting process in flow calibration facilities.

Technical description

A non-interacting diverting device (diverter) for a fluid flow is preferably used in measuring facilities with flowing media. These facilities determine the mass or the volume of the flowing liquid with the highest possible accuracy. For a precise measurement, the diverter diverts liquid from the fluid flow at well-defined intervals and feeds it into the corresponding reference standard (weighing instrument or volumetric tank). If a free-jet diverter is used in the diverting path, the diverting process is practically non-interacting.

In closed diverter arrangements, the variations of the resistance to flow are compensated for by using special control and regulation strategies on each of the displacement paths in such a way that the diverting process is practically non-interactive. For this purpose, two regulating valves are used as diverters. These are controlled by means of pressure sensors installed in the corresponding closed-conduit arrangement. These sensors compensate for pressure changes in the fluid flow in such a way that the pressure and thus the flowrate in the actual measuring circuit remain constant under all process conditions. The required non-interaction is achieved functionally by this active control.

Application

This procedure can be used at national metrology institutes as well as in calibration laboratories. It plays a similarly important role in non-technical application fields such as, in medicine and environmental technologies.

Economic Significance

It is possible to integrate PTB's new diverter into existing facilities at relatively low cost. In addition, the diverter is multifunctional and can also be used for gaseous fluids as well as for liquids which, due to temperature and material properties, have a high evaporation rate.

Development status

A patent application has been filed in Germany for PTB's new non-interacting diverter. We are looking for licence partners for its implementation.

Advantages

- **Non-interacting diverting processes**
- **Exact determination of quantities when measuring flowing fluids**
- **Minimization of flowrate variations in measuring facilities**

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