



Dutch  
Metrology  
Institute

## Calibration of Liquid Flow Meters

### Calibration "*beyond all doubt*"

Defining the measurement error or k-factor of a liquid flow meter with low measurement uncertainty is always a challenge. Mass and volume flow or batch meters need different calibration methods to achieve this goal. VSL can determine any output signal utilizing three different calibration methods for liquid flow meters. The calibration facility is the National Standard for the Netherlands and has the lowest measurement uncertainty (CMC) in the world. Many different calibrations can be performed using different written standards like, ISO, API, OIML etc.. to achieve your calibration needs. All flow meter calibrations of VSL are accepted around the world by other NMI's as on VSL certificates you can find the CIPM MRA logo next to the logo of the ISO/IEC17025 accreditation.

### Reliability and accuracy

Every year millions of cubic meters pass through modern large scale systems for production, transport and distribution of all kinds of liquids. Measurements are the basis for revenues, costs and process yield. An incorrect measurement of just one-tenth of a percent can cause a significant difference in profit. Calibration with traceable measurement standards is vital for accurate measurements. Therefore companies that sell expensive liquids have their flow meters that are used for custody transfer calibrated/proved regularly. For this they invest in calibration/proving systems that are directly connected to the measurement systems or they send their flow meters to calibration facilities. Calibrations of the flow meters at VSL give the lowest measurement uncertainty for that part of the custody transfer system.

### Determining the Measurement Error, Meter Factor or other

To be sure of correct measurements in your application liquid flow meters at VSL are directly calibrated against the National Standards. Depending on your liquid flow meter indication(s) or output signal the Measurement Error, Meter Factor, k-factor, mA vs flow rate or other performance indicator can be determined. If needed the flow meter can be adjusted and corrected for optimal measurements in your applications!



### Why choose VSL?

VSL is the National Metrology Institute (NMI) of the Netherlands. VSL is appointed as the National standards institute. VSL is the start of the traceability chain for physical standards from which other calibrations and many other measurements are derived. The traceability chain for liquid flow and volume measurements starts with primary standards like the meter and the kilogram and ends via a series of carefully executed steps at the liquid flow metering system. The standards for liquid flow measurements are compared with those of other National Metrology Institutes throughout the world in an ongoing process. This guarantees the (inter-) national comparability of liquid flow and volume measurements.



### Calibration and Measurement Capabilities

Calibration certificates for liquid flow meters issued by VSL show two logos. The CIPM MRA logo guarantees that all NMIs around the world that are signatories of the Mutual Recognition Arrangement (CIPM MRA) have approved the Calibration & Measurement Capabilities (CMCs) of VSL and accept the calibration results of VSL. The CMCs of VSL can be found in appendix C of the CIPM MRA on the website of the BIPM ([www.bipm.org](http://www.bipm.org)). The task of the BIPM is to ensure worldwide uniformity of measurements and their traceability to the International System of Units (SI). VSL together and two other institutes can issue the lowest measurement uncertainty for liquid flow meters in the world tested with water.

The RvA logo relates to the ISO/IEC17025 accreditation of VSL. All calibration activities for liquid flow meters are assessed by the Dutch Council for Accreditation (RvA). The accreditation number for VSL is K999 and the scope of work can be found on the website of the RvA ([www.rva.nl](http://www.rva.nl)).

The CMCs of VSL for CIPM MRA and ISO/IEC 17025 are:

Base volume	Calibration method	CMC*
0.001 to 400 m <sup>3</sup> /h – t/h	Gravimetical (Weighing)	0.02%
0.8 to 400 m <sup>3</sup> /h – t/h	Pipe Prover (Compact Prover)	0.02%
0.1 to 400 m <sup>3</sup> /h – t/h	Master Meter(s) (Coriolis and Turbine)	0.04%

\* Best achievable uncertainty under normal conditions

Test liquid is water for liquid flow meters with internal diameters ranging from 3 to 250 mm (0.1 to 10 inch) can be installed depending on the connection.

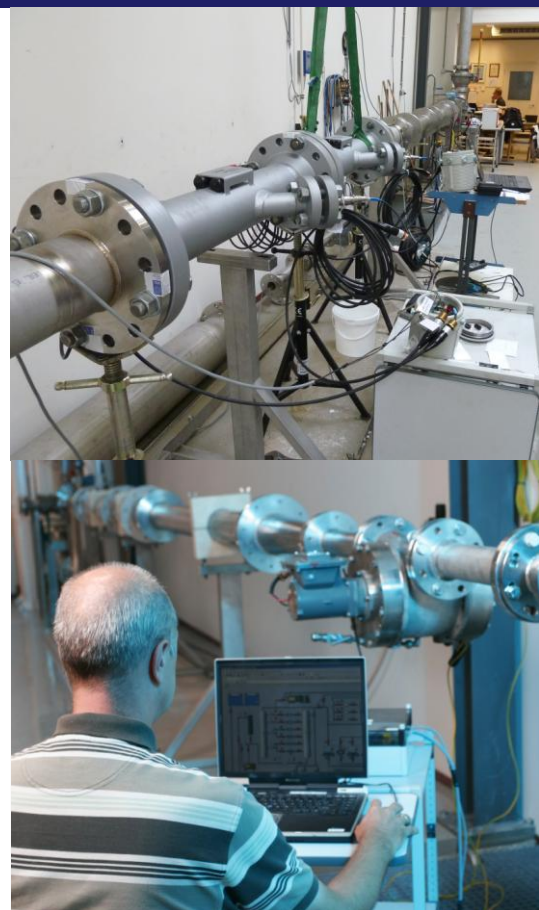
### VSL calibration certificate

For each calibration VSL issues a calibration certificate that includes the calibration results and measurement uncertainties.

### Type of flow meters that VSL calibrates are for example

Coriolis Mass Flow, Ultrasonic (single, multi paths and clamp on), Electromagnetic, Positive Displacement, Turbine, Vortex, Delta P, Variable Area, Water Meters, etc...

### VSL ensures calibration "beyond all doubt"



### Information

If you want to know more about what VSL can offer in the field of calibrations of liquid flow meters or when you have other questions please contact:

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