



VSL

Dutch  
Metrology  
Institute



## Calibration of liquid flow meters

At first glance the calibration of a liquid flow meter may seem very easy, but when you look a little bit closer it becomes complicated.

For the determination of e.g. the measurement error, k-factor or mA output of a flow meter as a function of the flow rate, different calibration methods can be used depending on the measurement principle of the flow meter, the liquid or the needed accuracy. During the VSL training you will learn about the theoretical background of the methods and how to perform the calibration by yourself.

### Contents of the three day training

- Gravimetric, volumetric (proving tank), master meter, pipe prover and tower calibration methods,
- Calibration models (calculation of measurement error etc.),
- Important fluid dynamics properties like Bernoulli's law, the Reynolds number, etc.
- Viscosity, density, temperature and pressure effects during calibration,
- Specific requirements for the calibration of different flow meter types like turbine, PD, Mass, Ultrasonic, EMF, Delta P, and others using each calibration method,
- Interpretation of BIPM, OIML, API and ISO documents about flow measurement,
- ISO/IEC 17025 requirements for flow laboratories,
- Laboratory vs field calibration,
- Witness a calibration using different methods in a Liquid Flow Calibration facility with the possibility to ask questions.

### Optional: an extra day of training on measurement uncertainty analysis in flow measurement

Introduction to measurement uncertainty analysis and an example of one of the calibration methods/models.



### 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 meter system. The measurement standards for liquid flow measurements are compared with those of other National Metrology Institutes, spread throughout the world, in an ongoing process.

This guarantees the (inter-) national comparability of liquid flow and volume measurements.



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### Participants

The training has been developed for people working for a calibration laboratory, a manufacturer, a service company, or end-user that performs testing, proving and calibration of liquid flow meters.

### Trainers

Flow metrologists, responsible for the National Standards for the traceability of liquid flow meters in the Netherlands, will present this course to you. They have experience in both laboratory and field calibration methods.

### Duration of the training

This is three day training with a possibility of one extra day for an introduction to measurement uncertainty analysis in flow measurement. The training sessions start at 8:30 in the morning till about four o'clock in the afternoon. Lunch is included.

### Language

The training is in the English language.

### Dates

21, 22 and 23 May 2019.

Optional: 24 May 2019 for introduction to measurement uncertainty.

### Investment

3 day training calibration of liquid flow meters	€2085.00
1 day Introduction to measurement uncertainty	€915.00

Package deal liquid flow meters and uncertainty	€2545.00
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Fee includes course material, lunch/coffee/tea/soft drinks during training hours. VAT, travel and accomodation expenses are not included.

When registered a list with local hotels will be sent to the participant.

### Training location

c/o Flow Center of Excellence  
Leerparkpromenade 50  
312 KW Dordrecht  
The Netherlands

### Certificate

All participants receive full documentation and a certificate of attendance at the end of the training.

### Other options

Alternatively this training can be given as an in company training. Please contact us for more information.



### More information

For further information and registration please contact:

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The Netherlands

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# Registration Form

## Registration VSL training Calibration of liquid flow meters

21, 22 and 23 May 2019 (Optional: Uncertainty 24 May 2019)

### Participant

Name	
Initials	
Job Title	
e-mail address	
Telephone number	
Uncertainty 24 May 2019	Yes, I will take part / No, I will not take part
Diet wishes	vegetarian / halal / other specify:

### Organization

Company	
Address	
City	
Postal code / ZIP	
Country	

### Invoice address and purchase order

PO number / reference	
Company	
Contact person	
Address	
City	
Postal code / ZIP	
Country	
Telephone number	
e-mail address	

### Signature

Date	
Signature	

### Send registration to:

Mrs. Marion de Niet, [mdniet@vsl.nl](mailto:mdniet@vsl.nl)