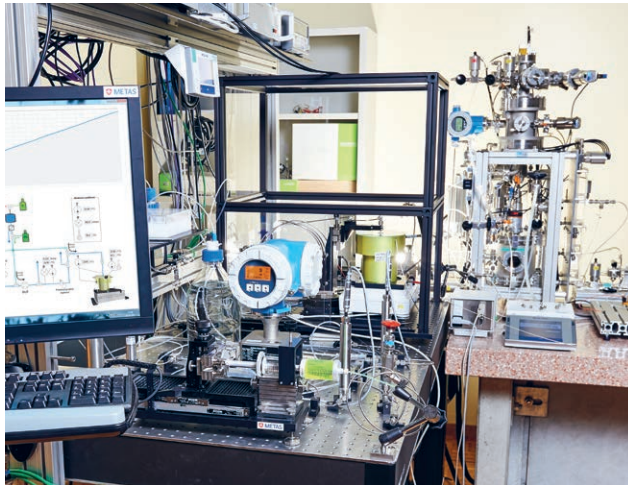


Benefit of SI-traceability:

Ensuring metrological traceability (to the International System of Units SI) enables full confidence in measurement results. As an independent test laboratory with internationally recognized and SI-traceable methods, METAS specializes in the characterization of flow devices.

METAS develops and engineers flow equipment, firmware and software in-house.



Interested in the testing and measurement capabilities of these METAS facilities? Contact us with questions or a visit request.

METAS: The National Metrology Institute of Switzerland

The Federal Institute of Metrology METAS is the National Metrology Institute of Switzerland. It represents the state of the art of measuring accuracy in Switzerland. Through its activities in research and development and its range of services, METAS is instrumental in ensuring that measurements can be performed in Switzerland at the level of accuracy demanded by industry, research, administration and society.

METAS realises the Swiss reference standards, ensures their international recognition and disseminates them with the requisite degree of accuracy in each case. METAS oversees the market launch process, use and control of measuring equipment in the retail trade, traffic, public safety, health and environmental protection. It makes sure that the measurements required for the protection of people and the environment can be carried out correctly and in the prescribed manner.

METAS keeps up with scientific and technological developments in order to maintain its place at the cutting edge. It is engaged in research and development with a view to improving flow measurement devices. The Flow Laboratory is at the forefront of fast changing flow rate characterization in microfluidic applications.



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Schweizerische Eidgenossenschaft
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Federal Institute of Metrology METAS

Swiss Confederation

Microfluidics for traceable liquid dispensing



Flow calibration of liquids from nano- to milli-volumes in a second

Ultra-low flow rates are important aspects of **drug delivery** in Life Science and for **dosing** in industrial chemistry applications – in fact, anywhere volumetric delivery at given flow rates are critical for safety or processing. In order to achieve high flow rate accuracy and to verify repeatability and reproducibility, **calibration and characterization** are required.

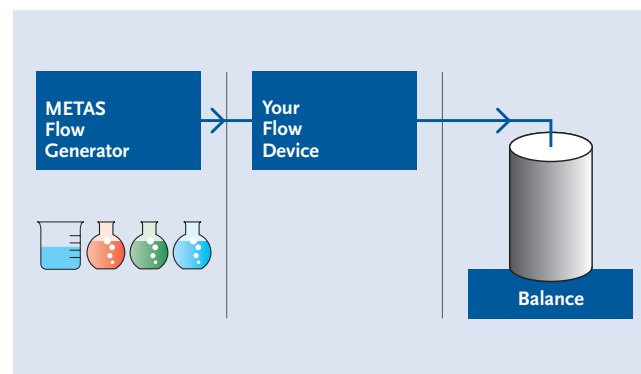
At METAS, micro-flow and milli-flow facilities cover flow rates ranging from **50 nl/min to 400 ml/min**. Besides these high-end measurements at steady flow rates, **fast changing flow rates (as short as 1 second)** can be generated with the METAS syringe pump and applied to any flow device. **All METAS calibrations are SI-traceable.**

Typical **applications** include but are not limited to pharmaceutical flow, flow chemistry and health care.



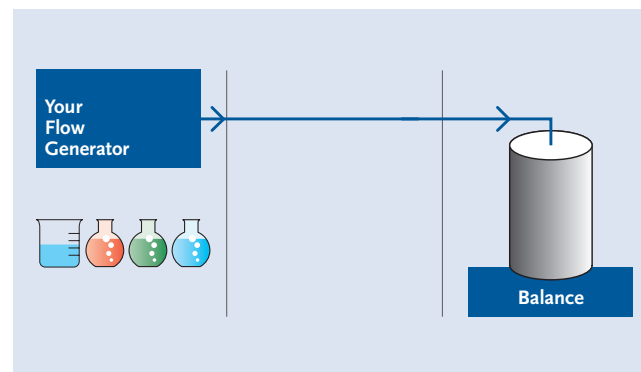
Calibration of HPLC pumps, micro pumps and flow meters for microfluidics and drug delivery devices.

The **measuring principle** is based on a flow generator, based itself on a METAS-developed motorized syringe pump, and a dynamic weighing procedure, monitored by application specific temperature and pressure measurement devices.



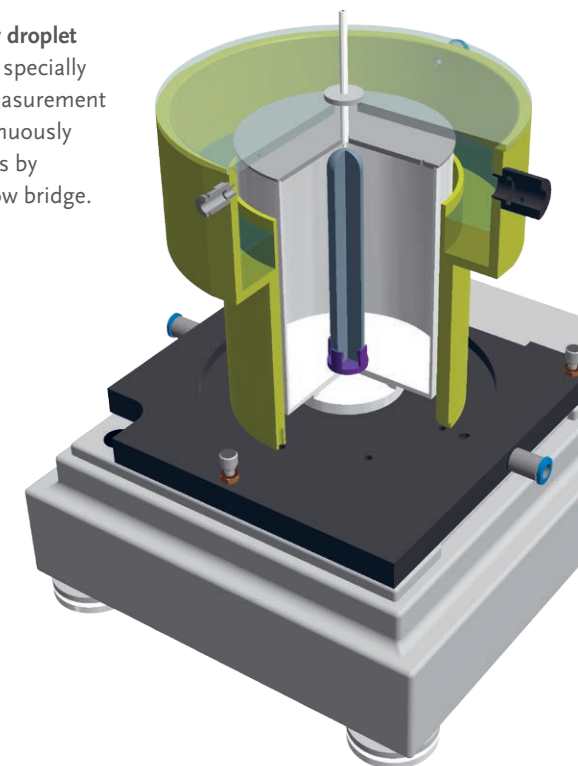
Your **flow devices** may be calibrated with water or any other suitable liquid. Measurement uncertainties for steady flow rates range from 0.9 % to 0.07 % respectively.

Another service offered is to calibrate your **pump (flow generator)**.



The **METAS syringe pump** consists of high precision components and mounting parts (on which different syringes may be fixed). This facilitates the varying of flow rates from nano- to millilitre per minute, **taking as little as 1 second**. The position of the linear stage is paired with a time stamp.

Avoiding any droplet formation: A specially designed measurement beaker continuously collects fluids by creating a flow bridge.



Traceable calibrations of fast changing flow rates within 1 second can be generated with the METAS syringe pump (red) and applied to any flow device. This is also applicable to flow generators as the dynamic gravimetric method (black) is able to detect such fast changing flow rates. The measurement uncertainties for the rates in the range of 50 nl/min to 400 ml/min are 2 % to 0.2 % respectively.

