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A portable primary standard for very low flow applications Hugo Bissig, Martin Tschannen, Marc de Huu

WETAS

Agenda

- 1. Motivation
- 2. Portable flow generator for various liquids
- 3. Conclusion

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Micro Flow Facility – characterisics

	METAS
Flow rate range	1 ml/min – 100 nl/min
Uncertainty (k = 2)	0.1 - 0.6 %
Water temperature	Ambient
Pressure range upstream DUT	0 – 2.5 bar
Flow generator	
Water collection	

Flow scheme «Capillary – DUT – Balance»



KCDB kcdb.bipm.org/appendixC

Calibration and Measurement Capabilities – CMCs Internal NMI service identifier: 5135-CH11, U = 0.15 – 0.7 %

BMT 2015, FS: Low Liquid Flows in Medical Technology, 2015, Lübeck, D

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Flow generator for water or other liquids





Flow generator for water or other liquids

Calibrate volume flow generator with water



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Flow generator for water or other liquids

Fill the volume flow generator with any liquid





Flow generator for water or other liquids



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Flow generator for water or other liquids

Advantages/disadvantages

- +/- Low variation in flow rate
- Shorter measurement times for all flow rates
- larger uncertainties
- + + any liquid can be filled in the syringe



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BMT 2015, FS: Low Liquid Flows in Medical Technology, 2015, Lübeck, D

- METAS Conclusion Gravimetric Flow rate range: Pressure range: Temperature: Uncertainties: Portable flow Gravimetric 7.2870 7.2865 7.2860 7.2855 7.2850 7.2845 7.2840 7.2835 0 10 20 30 40 50 60 Shorter measurem Position from bottom (mm) uncertainties (? 0.0 Flow generator as primary standard (outlook) Calibrate cross-section of syringe and speed of the linear stage Validate by means of a comparison with the gravimetric method
 - Very good reproducibility of measurements
 - Capability to calibrate flow sensors and flow generators

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Thank you very much for your attention