VSL
Dutch
Metrology
Institute

CERTIFICATE

Certificate number : 39331789
Project number : 113001021

Applicant
Ultrasonic Flow Measurement
Smaragddijk 34
4706 MA ROOSENDAAL

Submitted
A liquid flow meter (type Clamp-on).

Manufacturer	: Katronic Technologies Ltd.
Type	: KATflow 170
Serial number	: 1700001
Transducer number	: K1Ex 0031 2011 (paired set)
Range	: 4 .. 20mA = 0 .. 350 m^3/h

The meter is provided with a digital display and analog output.

Calibration method
The deviation of the meter as a function of flow rate has been determined by direct comparison with the National Standard of the Netherlands for liquid quantity measurements(reference meters).
Tests have been carried out using water with a pressure up to 2.1×10^5 Pa and a mean temperature of 19.0°C (± 0.5°C).

Date of calibration
November 15th, 2011.

Results
The results of the calibration are presented on page 2 of 2.

Traceability
The results of the calibration services of VSL are traceable to primary and/or (inter)nationally accepted measurement standards.

Dordrecht. November 17th, 2011
VSL B.V.

J.C. Rath
Liquid Flow & Volume Metrology

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This certificate is consistent with Calibration and Measurement Capabilities (CMCs) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures (CIPM). Under the MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C (for details see http://kcdb.bipm.fr).

CIPM MRA

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Results

Reference Flow rate [m^3/h]	*Indicated Flow rate [m^3/h]	Deviation [%]	**Reference velocity [m/s]	Analog Output [mA]
149.22	149.15	-0.04	2.02	10.82
73.31	73.47	+0.21	0.99	7.36
18.59	18.51	-0.39	0.25	4.85

* Indicated flow rate = (output mA – 4)/16 x 350 m^3/h
** Reference velocity = Reference Flow Rate / 0,020484951 m^2 / 3600

$$\text{Deviation [\%]} = \frac{\text{Indicated Flow rate} - \text{Reference Flow rate}}{\text{Reference Flow rate}} * 100\ \%$$

The uncertainty in the deviation is less then or equal to 0.25%, based on 3 repeated measurements a each flow rate. The reported uncertainty of measurement is based on the standard uncertainty of measurement multiplied by a coverage factor $k = 2$. which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM).

Remarks

During calibration the following parameters has been used :

PIPE MATERIAL	Stainless Steel
PIPE OD	168.3 mm
PIPE WALL	3.4 mm
LINING	No
FLUID TYPE	Water
WATER TEMPERATURE	19.0 °C
REYNOLDS CORRECTION	Active
KINEMATIC VISCOSITY	1.001 E-6 m^2/s
NUMBER OF TRAVERSES	2
TRANSDUCER SPACING	69 mm

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