C87 1/2

TPF CONTROL

ilac-MRA

CALIBRATION
RvA K 149

Calibration Certificate

44377

Applicant

Customer name	CCSTEC GesmbH
Address	Triesterstrasse 36 2512 Oeynhausen Austria
Order reference applicant	CP0999
Order reference TPF Control	44376

Instrument information

Manufacturer	TSI
Instrument type	Mass Flow Device
Model	4043 H
Serial number	4043 1653 004
Tag Number	C87

Calibration method

The device under test is directly, in line, connected to a flow calibrator to compare flow readings. An appropriate warm up time is incorporated.
A flow source is connected to the inlet of the instrument to generate a flow.

Environmental conditions

The laboratory environment was maintained at 21°C ± 2°C and 40%rh ± 20%rh.
The atmospheric pressure at the time of calibration was 1005 mBar.

Date (or period) of calibration

15 January 2018

Results

The results of the calibration are presented on the following page(s).

Uncertainty

The reported expanded uncertainty is based on the standard uncertainty of the measurement multiplied by a coverage factor k, such that the coverage probability corresponds to approximately 95%.
The standard uncertainty of measurement has been determined in accordance with EA-4/02.

Traceability

The measurements have been executed using standards for which the traceability to (inter)national standards has been demonstrated towards the RvA.

Date

15 January 2018

Calibration Technician

Jonny Crum

Technical Manager

Rik van de Bovenkamp

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RvA is member of the European Co-operation for Accreditation (EA) and is one of the signatories to the EA Multilateral Agreement and to the ILAC Mutual Recognition Arrangements (MRA) for the mutual recognition of calibration certificates.

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Instrument specification [Device Under Test]

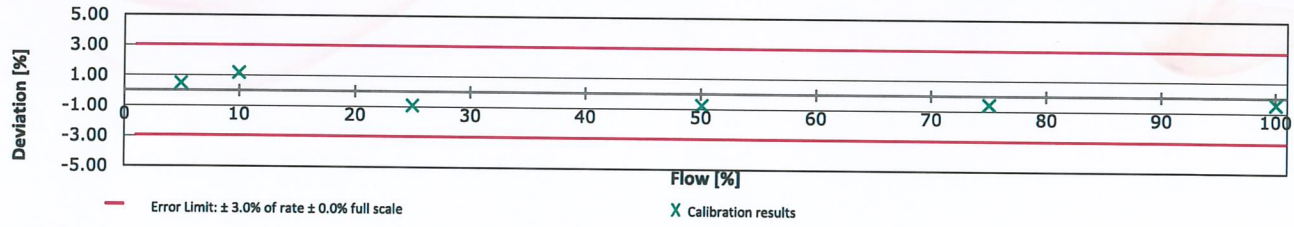
Process gas	:	Air	Input signal	:	n.a
Qmax	:	200 ls/min	Output signal	:	Display
Reference conditions	:	21.1 °C & 1013.25 mBar	Inlet pressure	:	0 Bar (g)
			Outlet pressure	:	0 Bar (g)

Calibration conditions

Calibration gas	:	Air	Calibration inlet pressure	:	0 Bar (g)
Gas conversion factor	:	1.0000 (TSI)	Calibration outlet pressure	:	0 Bar (g)

Calibration results

Instrument reading			Reference	Deviation (ERROR)			Uncertainty
Output Display	Full scale	Calculated flow	Flow	Of rate	DUT - REF	Limit	Calibration Flow
[ls/min]	[%]	[ls/min]	[ls/min]	[%]	[ls/min]	[%]	[%]
0.00							
9.98	4.99	9.98	9.9316	0.47	0.05	3.00	0.33
20.00	10.00	20.00	19.765	1.17	0.23	3.00	0.33
50.05	25.03	50.05	50.518	-0.93	-0.47	3.00	0.31
100.26	50.13	100.26	101.04	-0.77	-0.78	3.00	0.32
150.12	75.06	150.12	150.97	-0.56	-0.85	3.00	0.31
200.06	100.03	200.06	200.89	-0.41	-0.83	3.00	0.32



Note

1 The deviation is determined by : $\text{Deviation} = \frac{\text{Instrument reading - Reference}}{\text{Reference}} * 100\ \%$

2 The hysteresis of the DUT can be determined by the deviation between two series but is not included in the uncertainty.

3 The indicated Lab Standard Flow is derived applying the gas conversion factor. Calibration takes place with the calibration gas, results are reported in process gas (DUT).