Vögtlin Instruments GmbH

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vögtlin instruments

Calibration report *105495 - 612707 - Air - 200 - As found / As left*

Identifications

	Tested device	Used reference(s)	
Type:	Flow Meter	Rotary Gas Meter	Piston
Serial No:	105495	20508932-2006	160378
Code:	GCM-D9SA-BN00	P5780	ML800-24
Certificate:	612707	190906PM048	18542
Reference:		R7	174

Conditions

	Customer	Calibration
Fluid:	Air	Air
Range:	200	
Unit:	ln/min	
Unit Ref.:	0°C / 1.013 bar a	
Temperature:	20 °C	24 °C
Pressure:	1 bar a	0.99 bar a
Atm. pressure:		978 mbar a

Flow results

Nominal range [%]	Reference Flow [ln/min]	DUT Flow [ln/min]	Deviation MV [%]	Deviation FS [%]	Used Ref.
0	0	0	---	---	
2	3.939	4	1.52	0.03	174
25	50	50	0.00	0.00	R7
50	100	100	0.02	0.01	R7
75	150.3	150	-0.21	-0.16	R7
100	200.1	200	-0.06	-0.06	R7

Additional information

Calibrator:	HIL	Calib. date:	10.07.20
Configurator:	HIL	Config. date:	13.07.20

Device within specification (Tolerance: +/-1% full scale)

Signature: _____

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Calibration Traceability
All reference equipment identified above are traceable to the Swiss Accreditation Service (SAS) of METAS (Metrology and Accreditation Switzerland), or equivalent international bodies for accreditation. The METAS Calibration Laboratory and Quality System are compliant to ISO/IEC 17025.

Measurement Uncertaintles
The reported expanded uncertainty of measurements is stated as the standard uncertainty of measurement, multiplied by the coverage factor k=2, which for a normal distribution corresponding to a coverage probability of approximately 95%.

Reference Flow stated in the Calibration Report:<0.3%

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MesaLabs

NVLAP®

NVLAP Lab Code 200661-0
Calibration

Met Lab® Calibration Certificate

Model.	ML-800-24
Serial No.	160378
Calibration Date.	July 12, 2019
Report No.	18542
Supersedes Report No.	17361

Sold To.
Vogtlin Instruments AG
Langenhagstrasse 1
CH-4147 Aesch
Switzerland
PO No. Nr.792095

All calibrations are performed in accordance with ISO 17025 at Mesa Laboratories, Inc., 10 Park Place, Butler, NJ, 07405, 800-663-4977, an ISO 17025:2005 – accredited laboratory through NVLAP. This report shall not be reproduced except in full without the written approval of the laboratory. Results only relate to the items calibrated. This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

The Met Lab ML-800 is a true primary volumetric flow standard. Temperature and pressure corrections are applied to the volumetric flow readings to obtain standardized flow readings rated with an expanded uncertainty of 0.15% with a coverage factor of k=2.The flow cell described above is dimensionally calibrated against NIST-traceable standards. The temperature and pressure sensors are also calibrated against NIST-traceable standards. Calibration certificates for the standards used in this calibration are available upon request. The diameter, length, temperature, and pressure are tested in accordance with procedure numbers PR14-01, PR14-02, PR14-04 and PR14-34.

A flow verification test is performed on all ML-800 flow cells per procedure number PR14-16 using nitrogen or filtered laboratory air to ensure proper operation in typical laboratory conditions.

Expanded uncertainty:

Temperature	±0.04 °C
Differential Pressure	±10 Pa
Length [note 1]	±0.014%
Diameter [note 1]	±0.007%

All at two times coverage factor of k=2 for a confidence interval of approximately 95%.

Note 1 – Length and Diameter uncertainty are accredited measurements only as part of Mesa Laboratories' flow measurement accreditation.

Laboratory Environment:
Temperature Ambient: 23.13 °C Pressure Ambient: 753.40 mmHg

By:

Mohammed Aziz
Dir. Of Engineering
Mesa Laboratories, Inc., Butler, NJ

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Calibration Certificate

Report Number 18542

Measurements for: ML-800-24	SERIAL #: 160378
	Dual Sensor? Yes

Date	July 12, 2019

As Received Flow Verification (Functionality Test)

Nominal Flow sccm [1]	Ref. Std	Instrument Under Test	Deviation %	Allowable Deviation [2]	E_N [3]	Tolerance
5000	5001.8	4999.3	-0.05%	0.23%	0.22	In Tolerance
500	501.54	501.82	0.06%	0.23%	0.24	In Tolerance
50	50.698	50.686	-0.02%	0.23%	0.10	In Tolerance

Flow Std SN	Flow Std Model	Flow Std Cal Date	Flow Std Cal Due Date
117991	ML-800-24	11-Feb-19	11-Feb-20

1. The flow rate at a standard temperature of 0°C and pressure of 760 mmHg

2. Allowable Deviation for the Flow Verification refers to the RSS of total estimated uncertainty for the Instrument Under Test, the Reference Standard and the test uncertainty.

3. En values ≤ 1 indicate that the two flow measurements agree with each other within uncertainty expectations

As Received Temperature and Pressure Verification

	Reference Standard	Instrument Under Test	Deviation	Allowable Deviation	E_N [3]	Tolerance
Bath Set Temp. 22.5 (°C)	22.52	22.53	0.01	0.15	0.07	In Tolerance
Pres Differential Zero pt (mm Hg)	0.00	0.01	0.01	0.35	0.03	In Tolerance
Differential Pres Span (mm Hg)	14.50	14.58	0.08	0.35	0.23	In Tolerance
Temperature Std SN	305460	Std Cal Date	2-Oct-18	Std Cal Due Date	2-Oct-19	
Pressure Std SN	15328	Std Cal Date	11-Sep-18	Std Cal Due Date	11-Sep-19	

Calibrated Volume (cc) :	Long Stroke	Short Stroke
	45.9957	22.9784

Depth Rod SN	Depth Rod Cal Date	Depth Rod Cal Due Date	Gauge Block SN	Gauge Block Cal Date	Gauge Block Cal Due Date
107044	6-Mar-19	5-Mar-20	GB-206259	15-May-19	13-May-24

As Shipped Flow Verification (Functionality Test)

Nominal Flow sccm [1]	Ref. Std.	Instrument Under Test	Deviation %	Allowable Deviation [2]	E_N [3]	Tolerance
5000	5001.3	5000.6	-0.01%	0.23%	0.06	In Tolerance
500	500.95	501.35	0.08%	0.23%	0.34	In Tolerance
50	50.509	50.522	0.03%	0.23%	0.11	In Tolerance

Flow Std SN	Flow Std Model	Flow Std Cal Date	Flow Std Cal Due Date
117991	ML-800-24	11-Feb-2019	11-Feb-2020

1. The flow rate at a standard temperature and pressure of 0°C and 760 mmHg

2. Allowable Deviation for the Flow Verification refers to the RSS of total estimated uncertainty for the Instrument Under Test, the Reference Standard and the test uncertainty.

3. En values ≤ 1 indicate that the two flow measurements agree with each other within uncertainty expectations

As Shipped Temperature and Pressure Calibration

	Reference Standard	Instrument Under Test	Deviation	Allowable Deviation	E_N [3]	Tolerance
Bath Set Temp. 16.5 (°C)	16.61	16.54	-0.07	0.15	0.47	In Tolerance
Bath Set Temp. 22.5 (°C)	22.52	22.53	0.01	0.15	0.07	In Tolerance
Bath Set Temp. 28.5 (°C)	28.51	28.52	0.01	0.15	0.07	In Tolerance
Pres Differential Zero pt (mm Hg)	0.00	0.00	0.00	0.35	0.00	In Tolerance
Pres Differential Span (mm Hg)	14.50	14.50	0.00	0.35	0.00	In Tolerance
Temperature Std SN	305460	Std Cal Date	2-Oct-18	Std Cal Due Date	2-Oct-19	
Pressure Std SN	15328	Std Cal Date	11-Sep-18	Std Cal Due Date	11-Sep-19	

Flow/ Temp/ Pressure Calibration Technician	Abdus Subhan
Dimensional Calibration Technician	Alfred Habazaj

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KALIBRIER-ZERTIFIKAT

190906PM048

Prüfling

Geräteart:	PM048 (R7)	Endwert	500	Einheit	ln/min
Seriennummer:	20508932-2006	Druck	Gegen Atmosphäre	Einheit	mbar a
Gerätetyp:	Drehkolbengaszähler	Temperatur	20	Einheit	°C
Toleranzen [%]:	0.5 v.M.	Auftrag-Nr.		Bestell-Nr.	

Messbedingungen

Druck Messgerät:	Var.	Einheit	mbar a	Messmedium:	Luft		
Umgebungsdruck:	986	Einheit	mbar a	Feuchte:	5.3	[% r.H.]	
Umgebungstemp.:	24.27	Einheit	°C				

Verwendete Referenzen

PM Nr.	Bezeichnung / Beschreibung	Messunsicherheit
134	Bios Drycal ML1020, 5-500 ln/min, S/N 133357	0.25%v.M.
	Mittelwert aus 3 Messungen mit 1 Min. Abstand (Cont. Mode)	

Messaufbau / Beschreibung

Sollwertgeber S/N125029 > PM134 > PM048 (60Sekunden Stabilisierungszeit, danach Mittelwert aus 60 Sekunden Messzeit)

Messwerte as found

Nennwert [%]	Messwert Referenz [l/min]	Messwert Prüfling [l/min]	Effektive Abweichung v. M. [%] (1)	Max. tolerierte Abweichung v. M. [%] (2)	Tol. grenze [%] (3)	VI Referenz Nr (4)	Erfüllt (5)	Bemerkungen
99	495.320	494.480	0.17	0.50	33.9	134		
90	448.710	448.066	0.14	0.50	28.7	134		
80	400.737	399.248	0.37	0.50	74.3	134		
70	348.470	347.586	0.25	0.50	50.7	134		
50	251.400	251.077	0.13	0.50	25.7	134		
40	200.040	199.434	0.30	0.50	60.6	134		
30	149.100	149.077	0.02	0.50	3.1	134		
20	99.843	99.583	0.26	0.50	52.1	134		
10	50.061	49.919	0.28	0.50	56.7	134		
2	9.952	9.929	0.23	0.50	46.2	134		

(2) Maximal tolerierbare Abweichung aufgrund der Spezifikationen des Prüflings.
(3) Erreichungsgrad der Toleranzgrenze (Verhältnis zwischen Effektiver zu maximal möglicher Abweichung)
(4) Festhalten der für den jeweiligen Messpunkt verwendeten Referenz (siehe Zusammenstellung Verwendete Referenzen)
(5) Grün bedeutet, der Messpunkt ist innerhalb der Spezifikation, rot = Messpunkt ausserhalb der Spezifikation
Alle verwendeten Referenz-Messgeräte sind auf nationale Standards rückführbar. Die Arbeitsnormale werden periodisch mit geeigneten Werksnormalen kalibriert
Durchflusswerte mit der Indexierung [n] für normal beziehen sich auf die folgenden Referenzbedingungen: 0°C; 1013.25 mbar a
Durchflusswerte mit der Indexierung [s] für standard beziehen sich auf die folgenden Referenzbedingungen: 20°C; 1013.25 mbar a

Bemerkungen

Abkürzungen

v. E.	Fehlerspezifikation vom Endwert
v. M.	Fehlerspezifikation vom Messwert
VI	Vögtlin Instruments GmbH

Spezifikationen nicht erfüllt
Spezifikationen erfüllt

Validierung

Datum: 06.09.2019

Kalibriert durch: N. Toth

Unterschrift:

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